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# FROM EARTHWORM TO POCKET MONSTER Childhood Experience of Nearby Nature and Adult Environmental Behavior Over Time in Taipei Min-Quan Elementary School Neighborhood

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## ABSTRACT

**There is some agreement that childhood experiences of nature are important for humans to develop environmental knowledge and values. There are, however, few longitudinal and even fewer studies focusing on the relationship between children's experiences of nearby nature and their environmental behavior as adults. In this research, a questionnaire was designed to ask four different age groups about their childhood experiences of nearby nature and their current environmental behavior. The four groups each spent their elementary school years in the same Taipei, Taiwan neighborhood at different time periods (1970's, 1980's, 1990's, 2000's) when the character and availability of nearby nature changed rapidly as agricultural villages transformed into urban neighborhoods. For example, those who were children during the 1970's had access to an open channel stream; the 1980's group experienced a partially culverted stream which was completely culverted in the 1990's. The youngest group experienced a new artificially created watercourse above the original creek location during the 2000's. The research findings show that the children's experience of nature declined from the 1970's to 1990's and increased again between the 1990's and 2000's as the places where children played changed. The results also show that an increase in the children's experiences of nearby nature translated into increased participation in environment – related activities as adults. This paper will present a case for why environmental planners/designers; science educators and parents should revalue the importance of nearby nature in creating neighborhoods for rich experiences with nature.**

## INTRODUCTION

What is the relation between children, nature and animals? Whether cruelty as in pulling apart worms and

fish or in the kindness of helping an injured bird, the bond connecting animals and children is something mysterious. Developmental psychologists have conducted research on children-animal relationships and found that animals provide children imagination and joy as well as nonverbal language communication (Melson, 2002). Moreover, from a human ecology standpoint, children themselves are part of the animal world (Cobb, 1969). Veterinarian studies have concluded that childhood experience with pets help develop one's concern and empathy for animals and nature (Serpell, 1980.) Natural resource researchers found that most wildlife-oriented activities occur in the home range (U.S. Fish and Wildlife Service, 1980.) Landscape architecture and environmental psychology studies also found that nearby nature affects people's preference and satisfaction with their homes (Kaplan, 1985). Children-animal relationship research, however, emphasizes laboratory and home based animals while children's relation with those wild animals that live in our environment as our neighbors are not studied, especially in urban residential areas. Further, urban ecological studies debate the size and ecological function of the urban green spaces. Other studies conclude further merits of urban nature for the urban physical-chemical environment without considering human relationships with the environment. There are, as observed, few studies focusing on the relationship between children's experience of nearby nature and their environmental behavior as adults.

Technology has animated nature. Our animal stories have changed from the *Aesop's Fables* to *Finding Nemo*, a fantastic animal world using 3-D animation. Our culture's source of biological knowledge has changed from direct experience through everyday life to secondary fiber optics. Even the knowledge itself has widened and deepened its scope from visible to invisible nature. In Taiwan, children are facing more and more pressure to learn, although the educational system has changed many times *for them*. In the late 1990's there was an educational reform called "Native Education" when the importance of environmental education was emphasized, and local culture and ecology were prioritized. However, everyday experience with nature for urban children is very limited when trying to follow the everyday assignments and tests of environmental education. Parents feel more frustrated than thankful given the very limited natural resources in their everyday urban environment. To create educational opportunities, people are focusing on intensive educational sites with strong experiential/educational intensity rather than everyday experience with nearby nature. Here, a general mistake people make is that the single events are emphasized and the cumulative effects are neglected. On one hand, people are worried about children's formal education. On the other hand, adults are so busy that they ignore their immediate environmental changes and their impacts on children's education.

Given all the complexity of cultural and environmental change, do our little *Homo sapiens* today play with plastics instead of chasing after grasshoppers, putting beetles in the pencil boxes and following ants trails? Is there some affinity between children and animals, basic but significant, that does not change with time and technology?

It is our responsibility as landscape architects and environmental planners that if urban residential nature is important for children, then we should create and protect it.

## BACKGROUND

In 1949, the United Nations Counselor Group was invited to develop seven regional plans in Taiwan. At that time, new planning concepts such as compact housing, residential neighborhood unit, new town plan and zoning were introduced due to the influence of these popular ideas in the United States and Europe. In order to resolve problems of housing deficiency in the old city center, the Taipei City Government started a land rezoning plan to develop a new community in the Development Restriction Area covered with rice fields, farms and grassland near Taipei Airport. Today the population of Min-Sheng community is 82,025 and its area is 29,846 km<sup>2</sup>.

The Min-Quan Elementary School Neighborhood is a part of the Min Sheng community. Most of the children who grew up in the neighborhood were students at the Min-Quan Elementary School, and shared the experience of environmental change over time in the nearby places. The history of the neighborhood environment has not been documented before, however, some childhood spatial elements are mentioned in people's casual conversation, such as "the big ditch" in the neighborhood. Tables 1 and 2 are some examples of the environmental changes.










## METHODS

### Research Questions

- If the natural environment in neighborhoods changes over time, does the childhood experience of nature change, too?
- Did nature in the neighborhood once educate children? Does it today?
- Do childhood experiences of nature in the neighborhood affect people's environmental behavior as they become adults?

### Questionnaire Design

People were asked to fill out a questionnaire with eight questions. Table 3 shows how the questions are asked in the questionnaire with respect to research questions. The mean age and number of questionnaires are listed in Table 4.

Period / Map	Description	Period / Map	Description
1910's 	<ul style="list-style-type: none"> <li>•Pin-Pu Plane Tribe</li> <li>•Keelung River flood plane</li> <li>•Three houses near the neighborhood creek</li> <li>•Farms, wetland and grassland (until 1967, less than 15% area was developed)</li> </ul>	Pre 1970's <sup>1</sup> 	<ul style="list-style-type: none"> <li>• Natural, possibly agricultural use (Fu-Min Drainage)</li> <li>• Surrounded by paddy fields</li> <li>• There were only three households along the creek during the 1920', and less than 15 in the 1940's during the Japanese Colonial Period.</li> </ul>
1970's 	<ul style="list-style-type: none"> <li>•First concrete embankment of the Keelung River was built in 1970</li> <li>•Community was newly developed: "The United Village" "Public Services Housing" "The United Village (II)"</li> </ul>	1980's 	<ul style="list-style-type: none"> <li>• Concrete channelized</li> <li>• Water quality was getting worse due to waste inputs.</li> <li>• Flooding after typhoons (rains)</li> <li>• A child's accident happened</li> </ul>
1980's 	<ul style="list-style-type: none"> <li>•Taipei Airport was built</li> <li>•Chun-Shan National High way went across the river</li> <li>•More development in the community "Min-Ren Building", "Shin-Kong Building" and "Jien-Chen Garden Luxurious Building"</li> </ul>	1990's 	<ul style="list-style-type: none"> <li>• The channel was covered and the water flew underground in a culverted form, serving as a run-off collection channel.</li> <li>• Some equipment and lawn on the surface.</li> </ul>
1990's 	<ul style="list-style-type: none"> <li>•Min Quan East Road built</li> <li>•Fu-Yuan Street widened</li> <li>•Neighborhood creek culverted</li> <li>•Keelung River "straightened"</li> <li>•Riverside Park designed</li> </ul>	2000's 	<ul style="list-style-type: none"> <li>• A new "ecopark" was designed and complemented exhibiting ecosystem of Taipei Basin.</li> <li>• Aquatic species introduced and wetland constructed</li> <li>• High biodiversity</li> <li>• Some people set their turtles free in the pond</li> <li>• Some egrets and night herons forage here</li> </ul>
2000's 	<ul style="list-style-type: none"> <li>•Clear boundary between the neighborhood and a larger nature-the Keelung River</li> <li>•No more neighborhood vacant lots</li> <li>•Neighborhood ecological education park constructed</li> </ul>		

*Table 2. Environmental change of the neighborhood creek.*

*Table 1. Environmental comparison of the neighborhood surrounding area.*



Research Question	Questionnaire
If the natural environment in neighborhoods changes over time, does the childhood experience of nature change, too?	(Q #1) Think about your childhood, what did you do when you were not in class? (What place? Talk about this place. What did you do there? How many times a week?) (Q #3) In your neighborhood, were there natural places you could play? (What place? Discuss this place. What were you doing? How many times a week?) (Q #4) Please circle your childhood experiences in your neighborhood. (Q #7) Please circle the animals you touched in your childhood.
Did nature in the neighborhood once educate children? Does it today?	(Q #5) Please put a star on the childhood experiences of nearby nature that made you interested in natural science. (Q #6) What kind of plants and animals were in your neighborhood when you were a child? (Q #7) Please circle the animals you touched in your childhood.
Do childhood experiences of nature in the neighborhood affect people's environmental behavior as they become adults?	(Q #4) Please circle your childhood experiences in your neighborhood. (Q #8) Please circle the environmental behaviors you actually do now.

Table 3. Research questions and questions in the questionnaire.

	Mean Age	Childhood	Number of Questionnaires
Group 1	38	1970's	25
Group 2	28	1980's	31
Group 3	18	1990's	26
Group 4	10	2000's	28

Table 4. Questionnaire distribution.

## FINDINGS

The findings show that children experienced less and less nature in the neighborhood since the 1970's when the neighborhood was developing. Diverse natural environments in the neighborhood for children to play in the 1970's turned into vacant lots in the 1980's where children enjoyed playing with nature. In the 1990's parks were almost the only places in the neighborhood for children's nature play. In the 2000's children enjoy well-designed ecoparks with high biodiversity and nature features in the neighborhood, however, children's daily lives are much more regulated than before. Figures 1-3 are main findings of the research.

### Surprise: Gender Matters!

Although the differences between boys and girls were not asked in the research questions, there are interesting differences in the findings. The first interesting finding is from the multiple choices where people circle their childhood experience of nearby nature. Experiences related to "kill" and "sympathy" was chosen for comparison in Table 6.

The results show that there is no significant difference between boys and girls in "general kill."<sup>2</sup> However, boys are especially good at "unusual kill"<sup>3</sup> – 22% had ever pulled butterfly's wings off and 31% cut off ant's legs. The mortality of "unknown creatures" is as high as cockroaches, which is something people *must kill* in Taiwan.<sup>4</sup> The results show that girls show more sympathy to living creatures than boys do.





### Animal Species Girls and Boys Touch

11 out of the 15 species boys touch more than girls do are Arthropods. Among the species the girls touch more, 7 out of 21 are mammals and 2 are birds and only 4 Arthropod species. Other interesting findings are that girls touch tadpoles and boys touch more frogs; girls touch more snails and boys touch slugs; girls touch mosquitoes while boys touch cockroaches. The strangest finding is that girls touch snakes more than boys do.

## DISCUSSION

From the 1990's and through the 2000's, despite a decreased amount of natural environment, decreased travel frequency and the number of nature visits of children compared to the previous twenty years, the number of visited natural sites, number of species and CNNED increased. An increased experiential diversity per travel event implies a higher experiential intensity for the children in the 2000's. How does it happen?

A cue helps interpreting the result. In the 1990's the environmental movement started in Taiwan. Environmental issues such as a more prevalent concern for the nature, animal rights and quality of life were reestablished and highlighted. In

Period/Photo	Description
1970's <sup>1</sup> 	<ul style="list-style-type: none"> <li>• “The little frog” was one of the earliest TV cartoon in the 1970's.</li> <li>• Adventure stories of a brave frog</li> <li>• Japanese cartoon.</li> </ul>
1980's 	<ul style="list-style-type: none"> <li>• “Xiao-mi-fong” –the Japanese cartoon of adventures of a little honey bee who was looking for his mother</li> <li>• It was a story about adventure and friendship in the nature.</li> <li>• The cartoon was played on TV everyday.</li> </ul>
1990's 	<ul style="list-style-type: none"> <li>• The pocket monsters, also created by Japanese artists, are magical creatures living in boxes. Children could have them in their pockets.</li> <li>• The pocket monsters are kids' weapons, helpers and friends.</li> <li>• There are over 100 species of pocket monsters. Many of them are based on real animals/plants and many are imagined.</li> </ul>
2000's 	<ul style="list-style-type: none"> <li>• Pocket Monsters still popular in the 2000's because they are always evolving and getting more and more powerful.</li> <li>• The scenarios are mostly in urban environment.</li> </ul>

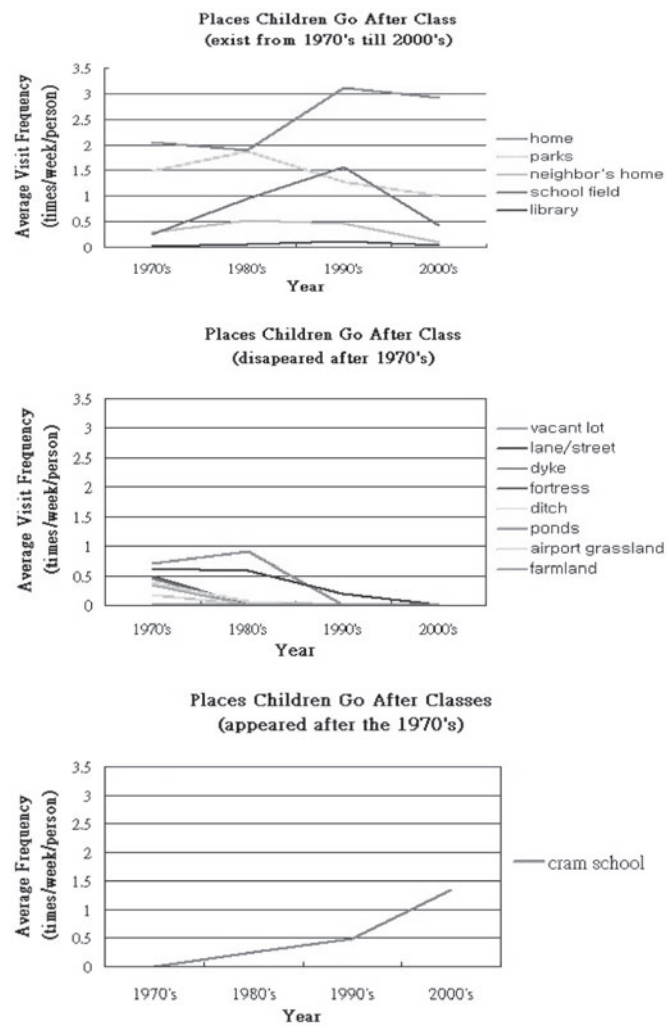


Figure 1. Places children go after class change from 1970's to 2000's.

the neighborhood, a well-designed ecological park was built in 1999 that provided children intensive experience of nature in a limited area. Although not as wide and wild as the natural places of the 1970's and 1980's, the park in the 2000's provides rich experiences of children's everyday play with nature.

People who grew up in the 1970's who have the highest experiential diversity show the lowest linear correlation between childhood experience and adult behavior. Why? One can find some points (people) are off the trend among the 40-year-old adults (children in 1970's) and several 28-year-old adults (children in 1980's). And these are people who had richer experience in their childhood but show lower environmental activities participation.

Some reasons were given by themselves written in the questionnaire, such as “in order to make a living, I can't take care of other things...” which follows Maslow's theory of “hierarchy of needs” that “people will not have concerns about higher-level environmental concerns if their basic needs for food, shelter and physical security are barely met.”<sup>5</sup> Other

Table 5. Change of the animal cartoons. Media played an important role in childhood after the 1980's. The animal cartoons, which changed from real animals to imagined ones reflect different contemporary concept of animals.

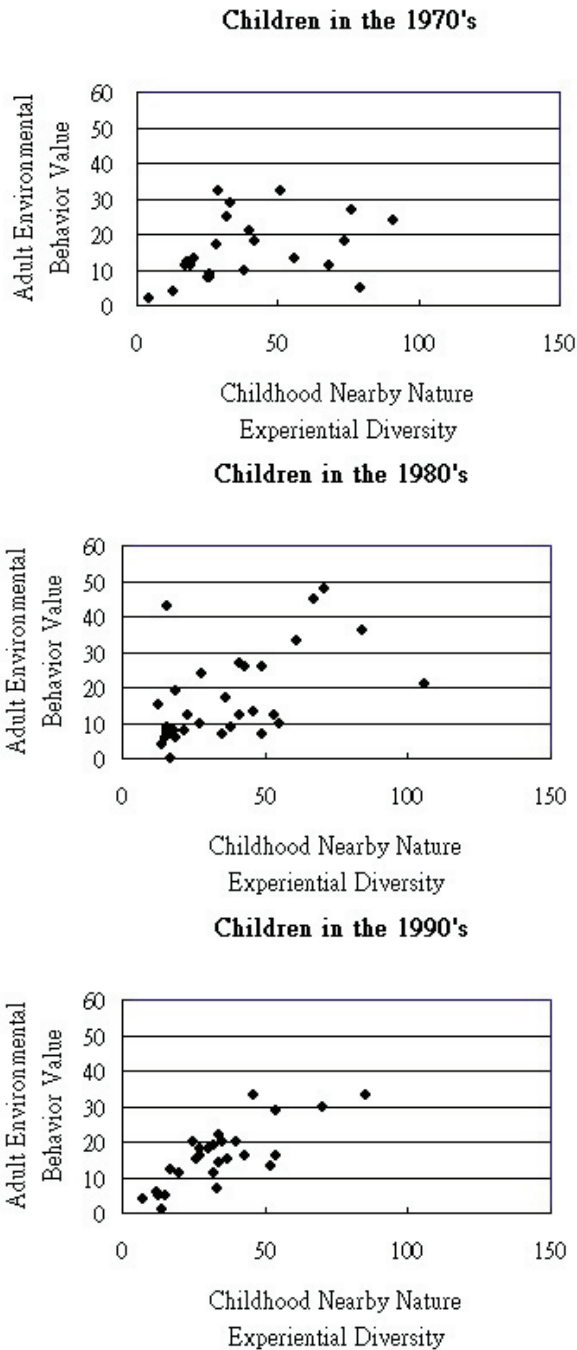


Figure 2. Distribution of childhood nearby nature experiential diversity and adult environmental behavior illustrate their correlation.

possible reasons may be due to the life-stage of 40-year-olds, where their focus of life is different from the other two, such as family, children, house...etc. For 28-year-old adults, since most of them are still single, they can probably afford to be more environmentally active than people in their 40's. For 28-year-old adults, however, influence from the childhood is less than the 18-year-olds due to pressure from jobs and financial constraints, as a respondent states: "in order to buy a house, my everyday life is about making money...I miss those

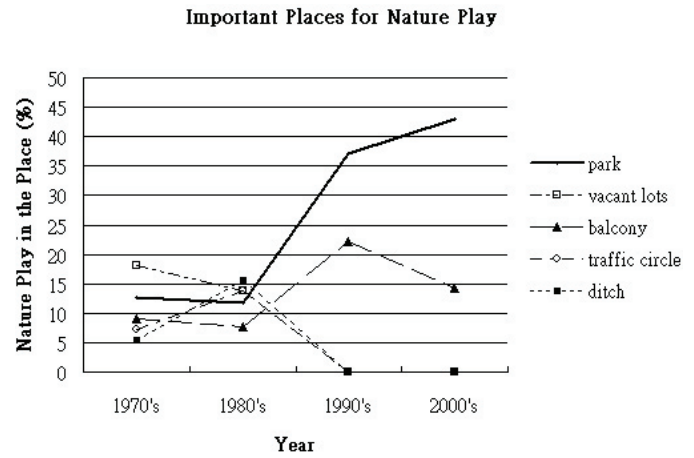


Figure 3. This graph shows the percentage of nature play that happened in the parks, vacant lots, balcony, traffic circle and the ditch. Importance of parks dramatically increased since the 1980's when places other than parks for nature play gradually disappeared.

	%Boys (n=54)	%Girls (n=57)
<b>General Kill</b>		
Kill Termites	35	33
Kill Cockroaches	59	63
Kill Spiders	28	28
Kill Unknown Creatures	57	56
<b>Unusual Kill</b>		
Pull off Butterfly's Wings	22	7
Cut off Ant's Legs	31	23
<b>Sympathy</b>		
Stop Others from Killing	20	32
Put Injured Creatures in Safer Places	24	28

Table 6. Gender differences in the way children relate to insects.

naïve childhood days..." The other reason is from education; during 1990's environmental movement, 28-year-old adults today were in high school, and were educated to be more environmentally conscious. 18-year-old adults, although less environmentally active, have the highest linear correlation between the childhood experience of nearby nature and adult environmental behavior. The results imply the importance of socio-economic status of individuals and both social and environmental education. Following the results we can predict that when the 18-year-old adults grow older, influences from their childhood experience of nearby nature may as well be diluted.

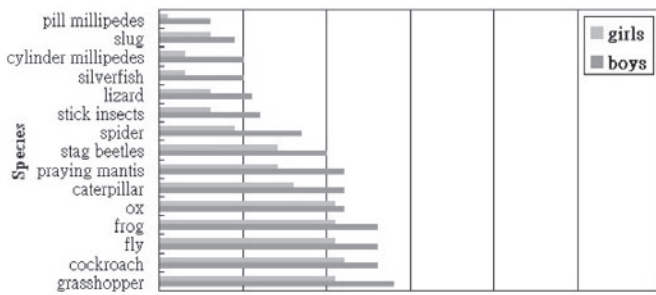


Figure 4. Animal species boys touch more than girls do.

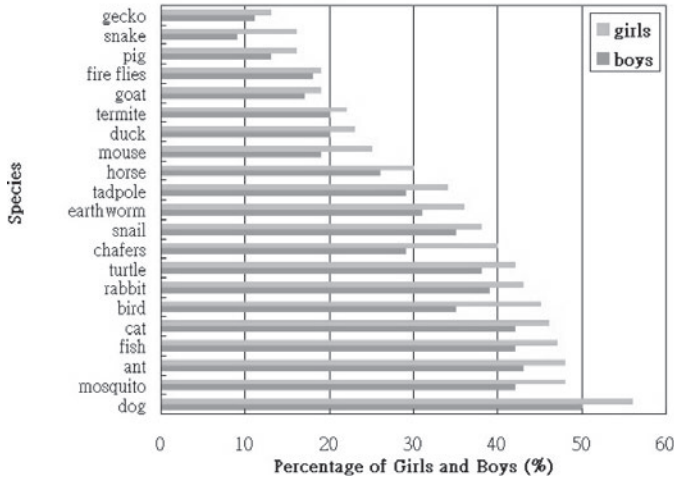


Figure 5. Animal species girls touch more than boys do.

**CONCLUSION**

**1. Nearby nature in the studied neighborhood changed with time and this change altered generations of children’s everyday experience of nature from the 1970’s until the 2000’s.**

The research showed that many experiences of nature were lost with the disappearance of the natural environment (streams, vacant lots, grassland and so forth). The diversity of children’s experiences of nature declined between the 1970’s and 1990’s (from 39 to 33) but increased again after the 1990’s (from 33 to 40) following the pattern of environmental change. Based on the data analysis, the thesis concludes that childhood experience of nearby nature and the direct contacts with the animal species evolve with the neighborhood environment. A neighborhood environment with diverse natural features supports diverse experiences of nature.

**2. Children’s life style including experience of nature changed from exploratory experiences to more controlled and regulated ones over time between the 1970’s and the 2000’s.**

Based on the research data, children’s nature visits declined steadily from the 1970’s (0.73 times per day) to the 2000’s (0.25 times per day). One can conclude that children in the 2000’s do

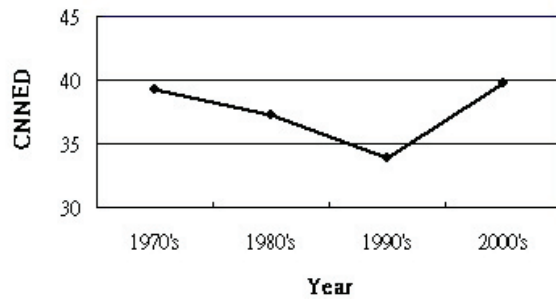


Figure 6. Childhood experience of nearby nature.

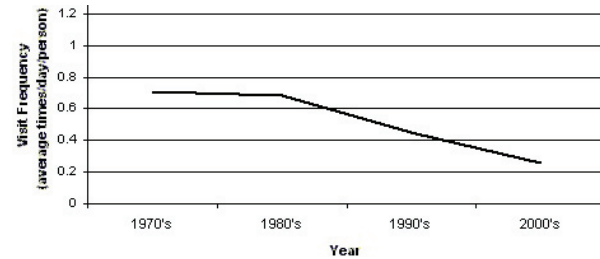


Figure 7. Children’s nature visit after classes.

not go outdoors often and seldom explore their neighborhood environment as much as their parents’ generation did. Both social and environmental reasons contribute to this result. Children of the 2000’s return home or go to the cram schools directly after school, and have fewer choices of nearby natural environments to build their own knowledge and experiences.

**3. Neighborhood environmental change influences how children define “nearby” and their childhood territory.**

How near is regarded as “nearby” depends a lot on the accessibility of those natural locations. In the Min-Quan Elementary School neighborhood, the higher dyke and the widened roads were main elements as cutters of the children’s natural territory.

**4. Children’s natural territory shrank over time following the steps of development. Public parks are the last pieces of land for children to experience nature in the 2000’s in the studied neighborhood.**

The research showed that children in the 1970’s and 1980’s grew up with more diverse nearby nature; children in the 1990’s enjoyed the least amount of nearby nature in the built out neighborhood (16 nearby natural places in the 1970’s; 13 in the 1980’s; 7 in the 1990’s and 11 in the 2000’s.); children in the 2000’s have more designed nearby nature in the parks (43% nature play). Importance of the parks in providing good environments for children to experience nature was proved in this research. It is believed that this is a common fact for many developed urban residential areas.

**5. Neighborhood environmental alterations change wildlife habitat in the neighborhood.**

Following the disappearance of waters and bare soil grounds in the 1970’s and 1980’s, many wildlife species disappeared



as well. Mudfish and snakes, which indicate higher biological diversity disappeared after the 1970's. Biological indicators of open water such as dragonflies and mosquito fish disappeared after the 1980's. Domestic species, urban adaptive species and invasive species became much more abundant after the 1980's and had become part of children's experience of nature.

### **6. Neighborhood environmental change affects wildlife habitat and therefore the educational opportunities as well.**

People who grew up in the 1970's and the 1980's showed more familiarity with a wider range of animals (remembered biological diversity: 3.62 and 3.71) than the younger age group (remembered biological diversity: 2.86). Children in the 2000's used inclusive natural categories which could be an implication of insufficient exposure to nature.

### **7. In highly urban neighborhoods, designed "ecoparks" make natural environments available for children to enrich their experiences with nature.**

Children today demonstrate a higher degree of experience of nearby nature given smaller and fewer nearby natural environments compared with the past. One can conclude that a well-designed ecological park compensates as an excellent alternative experience of nature.

### **8. Childhood experience of nearby nature could be a determinant of adult environmental behavior.**

This paper is an exploratory research finding a positive statistical relationship between childhood experiences of nearby nature and adult environmental behavior, which provides some empirical support for a link between the two phenomena. Assuming the respondents have accurate memories of childhood and answered the questionnaire without extreme biases, the result of this survey tends to confirm the existence of a link between childhood experience of nearby nature and adult environmental behavior.

### **9. Life stages and hierarchy of needs affects the influence childhood experience of nearby nature has on adult environmental behavior.**

Some cases showed that even growing up with rich experiences with nature, socio-economic constraint would play a part in a person's environmental behavior. The research confirms psychologist Maslow's "hierarchy of needs" theory and helps us more deeply understand relationships between childhood experience of nature and adult environmental behavior.

### **ENDNOTES**

\* Travel is calculated from places children go after class except the homes.

\*\* Frequency of children's nature visit is the sum of frequency of natural visit people answered in the questionnaire.

<sup>1</sup> The photo representing pre-1970's environment was not taken at the actual site since no on-site picture was found. However, the environmental characteristics were similar.

<sup>2</sup> This is a general term based on the observation that people generally kill some creatures that are pests or just unlovely—the reason varies.

<sup>3</sup> This is from the observation that children sometimes torture living creatures to death for some reason.

<sup>4</sup> It is believed that most of the people in Taiwan, both man and woman hate cockroaches, a species makes people scream, cry and kill, according to my own observations.

<sup>5</sup> Peter H. Kahn, jr. "Bayous and Jungle Rivers: Cross-Cultural Perspectives on Children's Environmental Moral Reasoning". In Herbert D. Saltzstein (Ed) *Culture as a Context for Moral Development: New Perspectives on the Particular and the Universal*. SF: Jossy-Bass Publishers. 1997. p.27.

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## A POST-OCCUPANCY EVALUATION OF LOW-INCOME HOUSING

### Do User's Values and Preferences Overlap with Sustainable Development Principles?

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#### ABSTRACT

The objective of this study is to determine how user preferences for outdoor space support or undermine sustainable site design. The study examines how these preferences can inform site planning and offer guidelines for sustainable development. Sustainability, a cultural and ecological process, is advanced through professionally and industry derived guidelines primarily informed by ecological function. Yet, it is user needs and values that create socially sustainable places. Therefore to successfully address both the ecological and social parameters of sustainability, user preferences need to be understood. Understanding user preferences is particularly important when advancing sustainable design in a non-market based system like affordable housing. Through a post occupancy evaluation (POE) survey this study explores user needs and preferences of private and public outdoor space (parking, open space and building typology) in two affordable homeownership housing developments in Oakland, California. The survey included an owner given tour of private and neighborhood outdoor space, prioritization of the outdoor spaces and making spatial trade-offs. The survey results showed a strong preference for private yard space, privacy and boundaries. These preferences need to be reconciled with the communally based approach of sustainable site design. Additionally, users desired more paved surfaces to make spaces usable. As spaces are paved over the volume of runoff increases beyond original design intentions, counter to sustainable goals. Common areas are highly valued for the large outdoor area, although rarely used by adults and often by children. Satisfying the ideals of privacy and boundaries as well as including suitable amenities can increase the frequency of use. This analysis produces