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Urban Park Visitors and Their Knowledge of Animal Species

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ABSTRACT Informal or incidental learning in recreational parks has been rarely assessed, although most city-dwellers enjoy and appreciate wildlife in their day-to-day lives. Incidental or informal learning is non-intentional and grows out of spontaneous situations and is mostly self-directed. Here, we focus on the informal setting of a small urban park in Ludwigsburg (Germany) as a source of incidental learning. Two hundred and forty-eight visitors were interviewed at the park using a questionnaire, and 102 other people (non-visitors) acted as a control group. Park visitors scored significantly better in their knowledge of animal species compared with our control group. Species knowledge increased with age, with number of park visits, and with educational level. Using the number of species visitors had previously seen at the park, we found a significant influence of educational level, park visiting frequency, and of park use. Ninety-seven percent of participants responded with positive attitudes towards animals, and most animals were detected by their movement, rather than by their sound or coloration.

Keywords: animals, biodiversity, incidental learning, informal learning, knowledge

Biodiversity has become one of the most important terms in environmental education (Gaston and Spicer 2004). However, biodiversity is a rather ill-defined, abstract and complex construct (van Weelie and Wals 2002) which has to be broken down into smaller entities to aid learning and understanding. Most environmental conservationists prefer species as the taxonomic level at which to focus (van Weelie and Wals 2002). Indeed, discrete species are often the focus of biodiversity and environmental concerns, for example, in the case of the Ivory-billed Woodpecker (Dalton 2005), and the popularity of birds has been shown in many studies (Czeck, Krausmann and Borkhataria 1998; Bjerke and Østdahl 2004).

Positive attitudes towards animals (Bjerke, Odegardstuen and Kaltenborn 1998, Bjerke, Kaltenborn and Odegardstuen 2001) and knowledge about animals are often emphasized as predictors of environmental behavior (Randler and Bogner 2002; Gaston and Spicer 2004; Randler, Ilg and Kern 2005). Animals are a fascinating topic for children and adolescents. For example, in Norway, animal-related leisure activities received high scores in a survey: bird feeding (74%), or watching hare, fox or moose (63%; Bjerke, Odegardstuen and Kaltenborn 1998).

The public learns in many places and contexts (Falk 2005) and people regularly utilize informal settings for free-choice learning (for an overview, see Falk 2005). Museums, zoos, aquariums and nature centers (and other similar institutions) offer recreational and educational opportunities to their visitors (see, for example, Chobot 1989; Brody and Hall 2002). In contrast to formal and intentional learning processes, learning in such settings is more incidental. Incidental learning can be considered a kind of informal learning (Marsick and Watkins 2001), which is non-intentional and grows, for instance, out of spontaneous situations (Maarschalk 1988). Thus, incidental learning is mostly self-directed (e.g., Livingstone 1999, in press), which is an important aspect for sustainable knowledge acquisition. Usually, every visitor in such venues learns something, sometimes with or without a specific motivation. This kind of learning is often embedded in a social context and might be enhanced by conversations and discussions (Falk 2005). Incidental learning can take place in an urban park or recreational area. The visitors watch different animals, they observe their behavior and, as a visit in the park is often a social event, they talk about the various species or ecological aspects with their companions. Finally, if a visitor is truly interested, he or she will seek further information about the animals and plants they've seen, for example, from books or the Internet. Informal learning in parks, however, has rarely been assessed (Brody and Hall 2002).

Most city-dwellers enjoy and appreciate wildlife in their day-to-day lives (Dwyer et al. 1992) and most participants of urban park surveys respond positively to wildlife-related questions (Ho et al. 2005). For example, 55% of urban park visitors made an observable response to wildlife (Dick and Hendee 1986). However, wildlife observation is, for most visitors, casual and incidental to other activities (Dick and Hendee 1986). Most studies have taken place in large natural areas or in large park systems within metropolitan areas (Dick and Hendee 1986; Tinsley, Tinsley and Croskeys 2002; Ho et al. 2005). In the present study, we focussed on the informal setting of an urban park as a place of incidental learning. This learning might take place during talks and discussions with people about the nature of the animals, feeding wildlife or searching for specific species.

Methods

Study Site —"Favoritepark"

This study was conducted in the Favoritepark (total area: 72 ha), an urban park within the city of Ludwigsburg (9°11' E/48°54' N; 292 m above sea level; about 70,000 inhabitants) in south-west Germany. About 77% of the total area is covered by deciduous trees, which in turn is dominated mainly by oaks *Quercus* (up to 250 years old; 50% of the deciduous trees). The district of Ludwigsburg has a low proportion of woodland (18% of the total area) compared with the other districts in southern Germany. Therefore, this and the other small parks in the district experience heavy visitor load. Some visitors visit the park on their way to Ludwigsburg Castle, and the park itself has a long history as a hunting refuge. The park is fenced off and visits are only allowed between 0800 and 1900 hours during the summer months and between 0900 and 1700 hours in winter. Visitors have to stay on a path which is about 1.5 km in length. Walking a dog is not allowed (Löhrl 1958; Bretzendorfer 1987; Randler 2006). The park has the status of a nature reserve (highly protected area) but there is not much visitor information about the animals (one information table at each entrance depicts European Mouflon/Wild Sheep (*Ovis ammon*) and Fallow Deer (*Dama dama*). Plants, trees, birds and other mammals are not depicted.

Questionnaire

Two hundred and forty-eight participants were interviewed at the park using a questionnaire (see Table 1 for the questions). An additional sample of 102 participants (control group) was collected in various settings in and around Ludwigsburg, focusing on individuals who had not visited the park within the past several years. The questionnaire, which included closed and open-ended questions, took 5–10 minutes to complete (Table 1). Face-to-face interviewing in the park took place between 2 and 19 August 2005, usually between 1000 and 1200 hours and between 1330 and 1700 hours.

The additional control group was sampled between 24 August and 7 September 2005 between 1400 and 1800 hours. The interviewer was female, was dressed casually, and conducted interviews with a consistent appearance and technique (Dick and Hendee 1986). Each interview started with an introduction and brief explanation of the study (to learn more about park users) followed by the questions (Dick and Hendee 1986). Due to the nature of the park, stratified sampling (Tinsley, Tinsley and Croskeys 2002) was unnecessary because different age classes and educational levels were found within the individuals interviewed.

Table 1. Questionnaire used for the on-site interviews.

1. Gender (m/f)
2. Age classes: up to 15 years, 16–25 years, 26–35 years, 36–45 years, 46–55 years, >55 years
3. Educational level: primary school, secondary school (three levels: lowest stratification [Hauptschule]; medium stratification [Realschule]; highest stratification [Gymnasium]).
4. Frequency of visits: more than once a week, once a week, once a month, irregular, first time (never/several years ago – control group)
5. Purpose of visit: leisure (walking, relaxing), sporting, watching animals, because of children/grandchildren, professional, travel on the way to the Ludwigsburg castle
6. Do you visit the park alone or in groups? (yes, no, both)
7. Name/identify the commonest tree species.
8. What age do the oldest trees have?
9. Which of these animals have you seen here before? (ten A4-sized photographs)
10. Please identify these animals (ten A4-sized photographs)
11. How was your attention attracted towards the animals? (movement, sound, coloration)
12. Do you know additional animal species living in this park?
13. What do you feel when you see these animals?
14. Do you request changes within the park?

Species Selection

We chose animals that were common breeders in the park (derived from Bretzendorfer 1987): Fallow deer (*Dama dama*), Mouflon (*Ovis ammon*), Red Squirrel (*Sciurus vulgaris*), Great Spotted Woodpecker (*Picoides major*), Blackbird (*Turdus merula*), Great Tit (*Parus major*), Blue Tit (*Parus caeruleus*), Marsh Tit (*Parus palustris*), Chaffinch (*Fringilla coelebs*) and Nuthatch (*Sitta europaea*). As coloration is a major feature for identification, we used a color-laser-printer (OKI C3750) to print good quality photos of all ten species in full color, one animal per A4-sized sheet of paper. The participants were asked to first name which species they had seen in the park before and were then asked to identify the species in the photos as precisely as possible.

Coding of the Questionnaire

General questions: Age classes (six classes), gender (dichotomous), educational level (four stages) and frequency of park visits (see below) were coded accordingly.

Park visiting frequency: Park visiting frequency was coded as a variable (for the General Linear Model, GLM): more than once a week, once a week, once a month, irregularly, first time, and never/several years ago. Respondents who indicated the latter formed our control group.

Park use: Many participants responded positively to more than one question. We therefore grouped the data into three groups: 1) Visitors who claimed to visit the park especially to watch animals as a leisure activity (even if they responded positively to other questions); 2) Visitors who claimed to visit the park especially because of their children/grandchildren; 3) All other purposes. We consider

the latter as a park usage which is not especially devoted to learning about animals because visitors from this group responded negatively to both items "watch animals" and "because of my children/grandchildren."

Animals: When coding data, each correctly identified species received a score of 1. When the participants only were able to identify the correct genus, they received a score of 0.5, as we wanted to test species knowledge in general. For example, many persons were not able to identify a Blue Tit (*Parus caeruleus*) correctly, but were able to identify the bird as a Tit (genus *Parus*). Data for both questions were added and each participant was assigned two new variables: i) number of species seen previously on-site, and ii) identification score. Both these data were $\log_{10}$-transformed to meet the needs of parametric testing.

Visibility Score of Animals

We calculated a visibility score for all ten species. Species were ranked according to their abundance (number of breeding pairs in the park or number of individuals, based on personal observations and census work between 2000 and 2005 prior to the study), body size (taken from Bezzel 1985, 1993), overall coloration (1 = dull, 2 = medium, 3 = bright; estimated from identification books) and tameness (1 = does not approach when food is provided, 2 = approaches when food is provided, 3 = feeding from the hand). Body size and abundance were transformed to ranks, for example, the rarest species received a score of 1, the lightest/smallest species also received a score of 1. The scores of every category for each animal were added and one single visibility score for each species was calculated. The scores were used as ranks for non-parametric testing.

Statistical Procedure

We used two different univariate general linear models (GLM). First, the total sample including the control group was subjected to a stepwise backwards procedure using the identification score as the dependent variable, and age, gender, education and park visiting frequency as independent variables. We excluded all non-significant variables and interactions in a stepwise procedure based on their *p*-values, starting by deleting the factor or interaction yielding the highest *p*-value. Second, the subsample "park visitors" was subjected to a similar procedure using the scores of the variable "Which of these animals have you seen here before?" Here, we used gender, age, education, park use, park visiting frequency, and social context as independent variables. The final models of both procedures retained only significant variables. Sample sizes differ because not all participants responded to every question. Sample sizes are given separately for each calculation either in the text or in the tables.

Results

Park visitors scored significantly better in their knowledge of animal species ($M \pm SD$: 5.86 ± 2.12; n = 248) compared with our control group (3.76 ± 1.51; n = 102). Using a general linear model (GLM), we found a significant influence of age, park visit frequency and educational level on species knowledge ("identification score;" Table 2, Figures 1–4). Animal species knowledge increased with age (Figure 2), with number of park visits (Figure 3) and with educational level (Figure 4). Primary school pupils showed a high level of knowledge already (Figure 4).

Using the number of species visitors had previously seen on-site as the dependent variable (Table 3), we found a significant influence of educational level, park visiting frequency and of park use. The total number of species seen previously in the park increased with the number of park visits and with educational level. However, park use deserves further attention. Concerning why people visited the park, 60.1% (n = 149) responded positively to the item "to watch animals," 9.3% (n = 23) responded positively to the item "because of my children / grandchildren," and 30.6% (n = 76) were grouped into a category comprising all other responses. We consider this last group as one which is not especially devoted to learning about or watching animals. Interestingly, this group reported having seen more species than the others.

Table 2. General linear model (GLM) retaining only significant variables (see Methods), using identification score (sum of correct identifications) as the dependent variable.

Source	Sum of Squares Type III	*df*	Mean of Squares	*F*	*p*	Partial Eta²
Corrected model	4.392	13	0.338	12.41	< 0.001	0.328
Constant	62.381	1	62.381	2290.79	< 0.001	0.874
Age	0.863	5	0.173	6.34	< 0.001	0.088
Educational level	0.607	3	0.202	7.43	< 0.001	0.063
Frequency of visits	1.806	5	0.361	13.26	< 0.001	0.167
Corrected total variation	13.378	343				

Corrected $R^2 = 0.302$

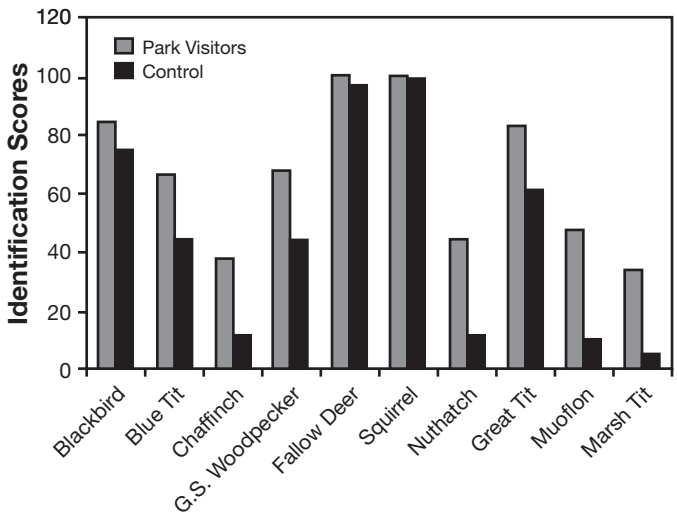

Figure 1. Identification scores of park visitors and non-visitors (control group) for each animal species.

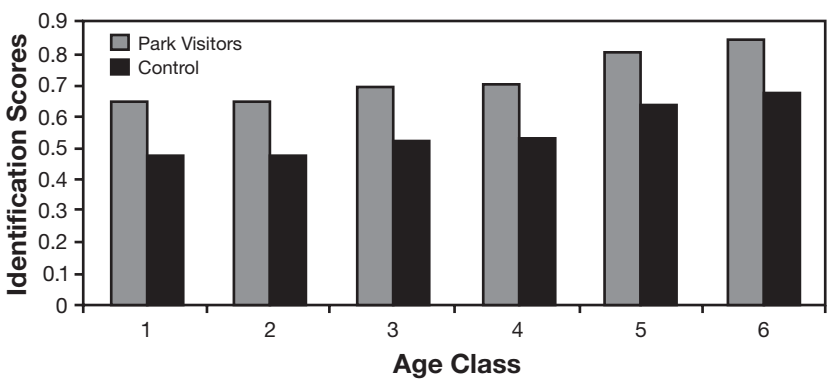

Figure 2. Identification scores of park visitors and non-visitors, split according to age classes (1 = <15 years, 2 = 16–25, 3 = 26–35, 4 = 36–45, 5 = 46–55, 6 = >55).

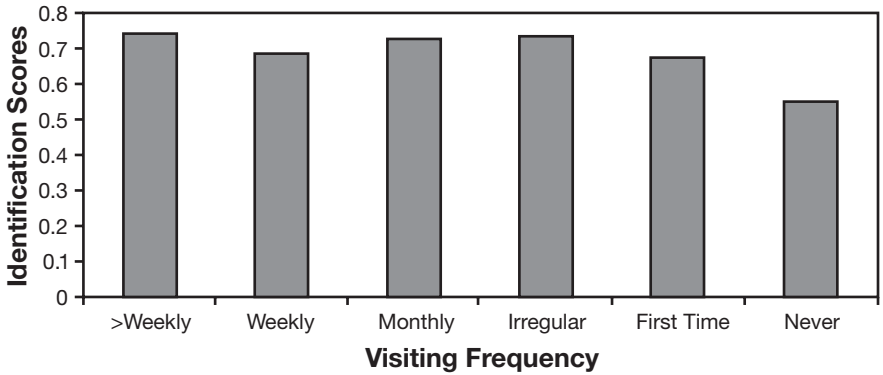

Figure 3. Identification scores according to park visiting frequency.

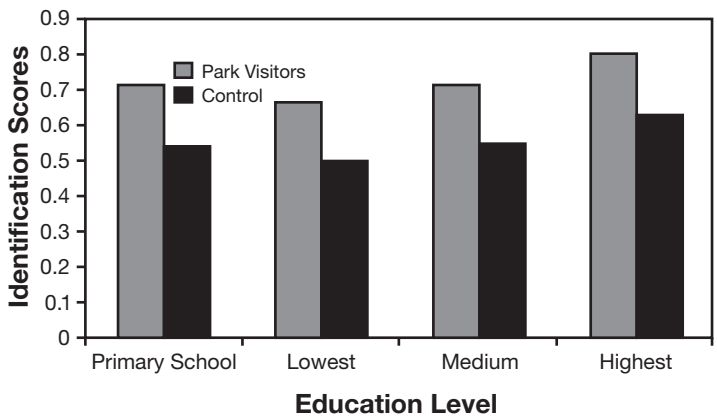

Figure 4. Identification scores of park visitors and non-visitors, split according to educational level: primary and secondary (lowest, medium and highest level).

Table 3. General linear model (GLM) retaining only significant variables (see Methods), using number of species seen previously as the dependent variable (sample based on park visitors).

Source	Sum of Squares Type III	*df*	Mean of Squares	*F*	*p*	Partial Eta²
Corrected model	6.114	9	0.679	14.95	< 0.001	0.365
Constant	39.141	1	39.141	861.28	< 0.001	0.786
Educational level	0.374	3	0.125	2.75	0.044	0.034
Frequency of visits	4.918	4	1.229	27.05	< 0.001	0.316
Park use	0.500	2	0.250	5.50	0.005	0.045
Corrected total variation	16.748	243				

Corrected $R^2 = 0.341$

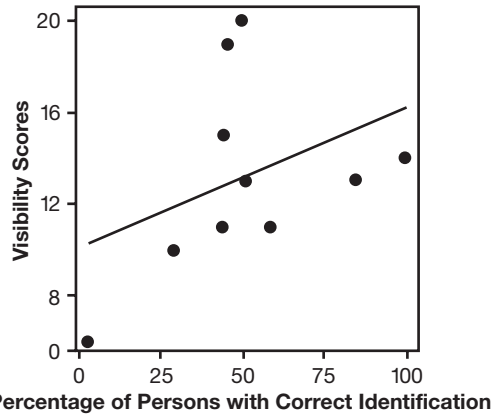

Figure 5. Correlation between visibility scores of the animals and identification scores of park visitors.

Of the visitors, 67.7% (n = 168) were unable to list additional species living in the park. The other 32.3% (n = 80) listed between one and five species. As expected, visitors with a high identification score (high species knowledge) were also able to list additional species that were living in the park (Kendall-Tau-b = 0.338; $p < 0.001$; n = 248). Oaks were correctly identified as the most common tree by 64 (25.8%) of the visitors.

Additional information was requested by 40 visitors (16.1%), mostly with regard to birds and trees. However, there was no significant difference between those who requested additional information and those who did not. The identification scores were similar: 5.87 (± 2.00) in visitors requesting further information versus 5.86 (± 2.15) in visitors requesting no further information (t-test: t = 0.282; p = 0.778; df = 246; based on $\log_{10}$-transformed data).

The visibility score of an animal species (see Methods for calculation) correlated significantly with both the percentage of persons who were able to identify the species (r_s = 0.726; p = 0.018; n = 10 species; Figure 5) and the number of species seen previously (r_s = 0.774; p = 0.009; n = 10 species). Animals with a high visibility score, that is, there was a high probability of encountering them during a park visit, were indeed more often observed and more often identified correctly by park visitors.

Most visitors (75.4%) recognized animals because of their movements (n = 187), while 20.2% (n = 50) recognized them because of their sounds. Animal coloration was mentioned by only 3.6% (n = 9) of visitors. Of the participants, 97% responded with positive attitudes to our open-ended question "What do you feel when you see these animals?" (e.g., "fantastic" [n = 12], "pleasant" [14], "enjoy it/delighted" [14], "nice" [91]). Four persons expressed neither positive nor negative emotions, and two individuals expressed negative emotions ("frightened"), which might be related to the relative tameness of large species such as fallow deer. One person expressed an ambivalent view because she (aged 15–25) appreciated the natural animals but was concerned about their dependence or imprinting on humans.

Discussion

Park visitors had a high level of animal species knowledge, which was influenced by age and education. Also, the frequency of park visits had a positive influence on knowledge. Some aspects deserve further discussion: primary school pupils already showed a high level of knowledge. This might result from the fact that all pupils in Germany visit the same school type (primary school) from 1st to 4th grade. After that, pupils are separated into three stratifications according to their marks. Therefore, primary school comprises all stratification levels.

As mentioned, age and educational level were significant predictors of species knowledge. Related to this, Kellert (1996) showed that interest towards animals increased with increasing educational level (see also Bjerke and Østdahl 2004). Concerning age, older people in the US expressed less interest and affection towards animals than younger people (Kellert 1996). This seems to be in contrast to our findings, where species knowledge increased with age of the person. However, our sample is not representative because we aimed at an investigation of park visitors—uninterested, older persons may avoid parks. Nevertheless, in our control group of non-visitors, species knowledge also increased with age of the person (Figure 2). Bjerke and Østdahl (2004) found that as people age residential animal-related activities increase in frequency. So, in turn, knowledge might also increase.

Gender did not influence the results, suggesting equal knowledge amongst males and females. Men and women also do not differ, for example, in perceived importance of wildlife (Ho et al. 2005) or in interest in watching birds (Bjerke and Østdahl 2004).

Interestingly, participants who said that they visited the park mainly to watch animals observed fewer species compared with visitors who used the park for other activities, such as relaxing or travelling to Ludwigsburg Castle. These people perhaps focus on very few species, such as squirrels, which approach visitors and take food from the hand. Squirrels have been shown to be an attractive species to people (Bjerke and Østdahl 2004). Therefore, people who visit the park to "watch animals" or "because of their children/grandchildren" may be more interested in specific species rather than in species diversity or species richness. This might further have an influence on nature conservation programs and exhibitions because it does not seem to be species richness or diversity which is appreciated but rather just a few spectacular and attractive species (Dalton 2005). Appreciation of animals or of wildlife does not seem to be related to the ability to correctly identify a species, as almost all visitors (97%) responded with a positive attitude towards animals in our open-ended question.

Of our sample, 60.1% responded that they come to the park to observe nature. This is a high proportion, compared, for example, with Scott (1997) who reported a value of 12.7%, and with Dick and Hendee (1986), who reported a proportion of 3%. This might be a result of the unique opportunities to watch or even feed animals in an impressive naturalistic setting. Usually, animal encounters are unpredictable and incidental (Dick and Hendee 1986), but in Favoritepark wildlife encounters are common. This might be a further reason why parents and grandparents take their children or grandchildren to the park—wildlife encounters are highly likely and the success rate is high. Further, despite the relative tameness of many species, the park is a natural area with high biodiversity, for example, of woodpecker species (Randler 2003), and it is managed for conservation issues. Such natural areas produce more observable responses (72%) compared with developed areas (37%; Dick and Hendee 1986).

Attention to wildlife was elicited mainly by movement and sound, and less by color. These findings are comparable with those reported by Dick and Hendee (1986: 85% sound/movement; 13% sound only; 2% color). Shaar (1979) concluded that movement and color are the sources of wildlife attraction, but color might go undetected, especially during the summer in broad-leaf forests. Concerning reported benefits and values, our results are in line with Dick and Hendee (1986). Ninety-two percent (97% in our study) said that contact with wildlife enhanced their visits, and only 1% made negative comments (Dick and Hendee 1986).

Park visitors had a greater knowledge of species compared with the control group, but how may learning take place in the park setting? Of the respondents, 84.1% (n = 206) were visiting the park in groups, which might facilitate conversation, discussion and information about the animals seen (see Falk 2005). Such incidental learning often comes from some kind of social activity (Falk 2005), and, indeed, one or a few bystanders watching or feeding wildlife seems to stimulate observable responses towards wildlife by others (Dick and Hendee 1986). During squirrel studies, one of us (CR) often observed people feeding animals and discussing their natural history. As there is not much information for visitors at the park, learning might take place at home, where television, magazines,

the Internet, and books can provide information about the species seen previously in the park (Marsick and Watkins 2001). Learning in public urban parks seems to generate an interest in learning more, and therefore could be enhanced and supported. Marsick and Watkins (2001), for instance, summarize different measures that should be considered:

- time and place for learning
- creation of learning opportunities
- creation of an atmosphere of social relatedness and confidence.

For example, in the special case of Favoritepark, this could be realized and supported by information tables or by hypermedia information desks. A visitor watching animals might have a number of questions. If information is offered on self-directed learning activities immediately in the park, he or she might use it, and thus will incidentally learn about the species. Otherwise, the question the person had might be forgotten by the time they arrive home.

Wildlife in urban parks enhances visits and seems to improve identification skills and knowledge. As people grow older they base their outdoor recreation increasingly around their residential area. Therefore, urban parks should be managed to enhance the visits of elderly people. Further, such urban parks should provide possibilities for small children to get in touch and learn about animals when accompanied by parents or grandparents.

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