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Cover Photograph: Wild Little Egret fledgling playing in Kunming Zoo, Yunnan Province, China. Photo courtesy: Ran Dai.

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Uninvited? Wild Herons in the City Zoos of China: A Questionnaire Survey

Ran Dai[1*], Yunqiao Li[2], Youshuai Zhu[3], Jiajiang Deng[4], Xiaolin Liu[5], and Mingsheng Teng[6]

Abstract - Urban wildlife management is a topic of growing importance in Asian cities undergoing rapid urbanization. City zoos provide herons and other waterbirds with alternative resources to augment survival and reproduction in the urban environment. To understand the role of zoos as potential heron habitat, between 01 August–31 December 2022 and 25–30 October 2023, a questionnaire survey was performed with staff with knowledge on the herons inhabiting their zoos. Of 83 zoos interviewed, feedbacks were obtained from 66 zoos, with positive heron occurrences reported from 41 zoos. Litte Egret and Black-crowned Night Heron were the two most-observed species, followed by Chinese pond heron, Grey Heron, Intermediate Egret, Cattle Egret, Great Egret, Striated Heron, and Chinese Egret. 24 plant species/groups were reported being used (or not) for nesting in. The median area of land and water habitat used by the herons in each zoo was 0.23 ha and 0.67 ha, respectively, with mostly ≥ 10 m between the land and the nearest water sources. Both natural and artificial food types were found in the diet of the herons. Mixed attitudes - positive, negative, both positive and negative, or neutral - were suggested. Fisher's Exact Tests were used to examine the possible impact of zoo size, zoo position, colony size, and colony age in relation to zoo age on management suggestions. However, no significant correlation was found. Because the majority of heron population descriptions were only estimates, and feedbacks on management suggestions were relatively rare, we suggest future, systematic monitoring of heron populations, and further discussions on wild heron management protocols.

Introduction

Urban wildlife management is a topic of growing importance in Asian cities undergoing rapid urbanization. Some heron species are urban exploiters which exhibit consistent adaptations to life in the cities (Humphrey et al. 2023). City zoos provide certain heron species and other wildlife that have adapted to the urban environment with additional resources to augment survival and reproduction (Urfi 2010). In China, urban parks (including zoos, botanical gardens, and other green spaces) typically with a vegetation coverage of over 65 % (Ministry of Housing and Urban-Rural Development 2002) provide the herons with potential roosting or nesting sites. In addition, city zoos consist of physical components (e.g., water ponds, and waterfront areas) resembling the natural habitat for captive and wild animals alike. In fact, some of the earliest studies (e.g., Shaw [1939], Li and Liu [1963]) on heron ecology were performed in the zoo context. In recent years, an increased sighting of heron visitation to many Chinese cities (R. Dai, Huitong Engineering Consultant Co Lit, Kunming, 2025 unpubl. data) has been interpreted often as the result of, or are "indicative"

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of an improvement in the cities' environment. However, the inhabitation of urban landscapes by herons might also be driven by land-use changes and natural-habitat loss (Roshnath and Sinu 2017). The suitability of city zoos as an alternative habitat or shelter for harboring wild herons in the human-dominated landscape is, however, not well-understood. Since currently no specific protocols are available regarding urban heron management in China, the fate of the animals might largely be subject to human perspectives and localized management practices.

Understanding the ecology of wildlife is fundamental to making effective management measures. For example, knowledge of the key habitat features enables identification of potential areas attractive to heron occupation. In the case of nuisance herons, where activities (e.g., foraging) of the animals frequently incur extra management costs (Telfair et al. 2000), information of dietary compositions facilitates setting up restriction over accesses to desirable food resources, and discourage colony expansion (e.g., Grant and Watson 1995). Alternatively, these knowledges can be used to support creation of artificial habitats to eliminate the pressure posed by unexpected heron visitations.

Currently, 206 zoos are reported in mainland China (Tian 2023). A wide-scale study is needed in order to gather relevant ideas, identify knowledge gaps, and explore the connections between ecological knowledge and management measures. The aim of the present study was to investigate the scale and impact of heron visitation to or occupation of city zoos in a number of major and minor Chinese cities. Our results will inform better management of wildlife in the Chinese cities for some common animal groups, like the herons.

Materials and Methods

Between 01 August–31 December 2022 and between 25–30 October 2023, a questionnaire survey (see Supplemental File 1, available online at https://eaglehill.us/urnaonline/suppl-files/urna-078-Dai-s1.pdf) was carried out, which aimed at staff with knowledge of the wild herons inhabiting the zoos they worked at. We aimed to cover all capital cities in the 34 provinces or regions (32 in mainland China and two in Hong Kong and Macau), since large cities often have the greatest human populations (hence the likelihood of human-wildlife conflicts). Answers obtained there were considered representative of the human-heron relationships in urban China. However, responses from the smaller cities, whenever available, were also included. Up to three people were interviewed for each zoo, with a separate questionnaire used for each of the participants. The questionnaire was delivered in an electronic form, using the social media application WeChat (ver. 8.0.38, Tencent Holdings Limited), by email, or by describing the questions via phone calls.

The questionnaire contained four different sections, each involved a number of questions examining one aspect of heron ecology or management recommendations. The first section was on heron occurrence and population. The participants were asked if wild herons had ever been observed in zoos. We named eight common species in urban settings by referring to various scientific publications and news reports. These species included *Egretta garzetta* L. (Little Egret), *Nycticorax nycticorax* L. (Black-crowned Night Heron), *Ardea coromandus* Boddaert (Eastern Cattle Egret), *Ardeola bacchus* Bonaparte (Chinese Pond Heron), *Ardea cinerea* L. (Grey Heron), *Ardea intermedia* Wagler (Intermediate Egret), *Ardea alba* L. (Great Egret), and *Butorides striata* L. (Striated Heron). The participants were asked to check the box when a species was observed, specify its population size (and indicate the census methods used: direct count or estimation), and add any species not included in the list. The participants were also asked about activity (foraging, breeding, or roosting, one or more of these activities) of the herons in the zoos. The second section was about

habitat characteristics of the herons. The participants were first asked to describe heron habitat using one sentence (e.g. "artificial island in a water pond"). They were then asked to specify the areas of, and the distance between the land and the nearest water sources. Another question on the vegetation component asked names of the plant species used or not used by the herons. The third section was on the dietary composition of the herons. The participants were asked what the herons ate for food and whether provisions were given to them, and to list the names of the natural/artificial food. They were also asked to indicate whether the provisions were intended for the herons or not, which helped to understand the original purpose of the food provided.

In the fourth section on management recommendations, the participants were asked for suggestions on managing wild herons visiting the zoos. Former experience with wildlife (Serpell 2004, Ngo et al. 2022), location (e.g., urban vs rural, Bandara and Tisdell 2003), wildlife population (Basak et al. 2022), and other variables have been demonstrated to influence human attitudes toward and tolerance of wildlife communities. To determine if zoo size, colony size, colony age relative to zoo age, and zoo position affected zoo attitudes, Fisher's Exact Tests were conducted. Zoos were categorized as "small" if their size was less than the median size of 66 hectares (see Results) or as "large" if their size was equal to or greater than the median size. The observed colony size was categorized as either "small" if it was less than the median size of 300 (see Results) or "large" if it was equal to or greater than the median size. Colony age as a percentage (%) of zoo age (obtained from the official websites of the zoos) was categorized as either "long" (if it exceeded the median value, 27 % [see Results]) or "short" (if it was less than the median). Based on Google Earth satellite pictures, the zoo's location was classified as either "downtown" (if it was more central in the city's territory) or "outskirt" (if it was in a more outlying place). In order to test with "positive" and "negative" attitude types, we additionally merged the "neutral" and "both positive and negative" attitudes (see Results) into a new category called "Other".

Results

Of the 83 zoos requested for the interview, 66 responded with feedback. However, in most cases, not all the questions were answered fully in the feedback received (see Supplemental File 2, available online at https://eaglehill.us/urnaonline/suppl-files/urna-078-Dai-s2.xlsx). Heron occurrence was reported from 41 (62 %) zoos with feedback (Fig. 1), among which 18 reported breeding activities, 13 reported roosting activities, and 13 reported feeding activities (some zoos reported more than one activity). In those cases, the number of herons performing individual activities (breeding, roosting, or feeding) was not reported. Another three zoos identified nesting/non-nesting plants, however without indicating breeding activities performed. These answers were removed from the results. The majority of the zoos reporting positive heron occurrence ($n = 36$) identified 1–4 heron species. Two responses reported heron occurrences, but failed to indicate which species were present. 25 zoos reported negative occurrences of herons. The breeding season of the herons started from as early as late January and ended as late as October, according to 15 zoos with feedback.

The population of herons at each zoo ranged from 2–850 individuals (24 responses). Among them, only five zoos used direct count (including two zoos using nest count), whereas 19 zoos used estimation for the census. Ten other zoos provided only a rough estimate (e.g., ≥ 6 individuals), a population range (e.g., 3–10 individuals), or a nest count (e.g., about 750 nests). The median colony size based on direct counts was 300. The median colony age relative to zoo age was 27 % (range = 8–100 %, from 20 zoos with feedback).

Three other zoos responded with a rough estimate (e.g., ≥ 6 years) on colony age, which were excluded from the calculation. One response reported the disappearance of a six-year-old colony, after the removal of nesting trees and reduction of food sources.

The median number of heron species was three, with up to six species observed in each zoo. Litte Egret and Black-crowned Night Heron were the two most-observed species (which also had the greatest populations) (Fig. 1), followed by Chinese pond heron, Grey Heron, Cattle Egret, Intermediate Egret, Great Egret, striated heron, and *Egretta eulophotes* Swinhoe (Chinese Egret) (Table 1). One response reported escapement of captive herons from a broken aviary, which remained "semi-wild" ever since. Two responses stated that wild herons nested in trees close to an aviary (with one captive Grey Heron in it), with roosting also found on the roof of the aviary.

While two responses described the habitat of the herons simply as "woodlot/grove" and "bamboo forest," 14 responses depicted one or multiple vegetated-areas near water (including one response describing an area between the zoo and an adjacent water park) as habitat for the herons. Perhaps due to misunderstandings of the question, one response reported an area inside an aviary for captive herons, which was removed from the results. The median size of the land habitat for herons at each zoo was 0.23 ha (range = 0.001–53.30 ha), from 16 zoos with feedback. 11 out of 14 zoos (with feedback) described the distance of the land to the nearest water source to be ≤ 10 m, with the other

Figure 1. Wild herons in the city zoos of China. (A) Black-crowned Night Herons roosting in a blossoming *Prunus* sp. (Cherry Tree) at Chongqing Zoo. (B) An artificial island (for captive waterbirds) serving as habitat for wild herons in Nanning Zoo, Guangxi Province. (C) Little Egret adults and chicks in a nest in Kunming Zoo. (D) a young Little Egret standing facing the concrete floor at Kunming Zoo.

three responses describing the distance to be 20–500 m. The median size of the nearest water sources, when specified (n = 13 responses), was 0.67 ha (range = 0.002–20 ha).

24 plant species/groups were reported from 18 zoos with feedback. Among them, 16 species were used, and ten species were not used by the herons for nesting in (two were described as both nesting and non-nesting plants) (Table 2). Two zoos responded with only "trees" or "big trees," and the answers were removed from the results. In addition, two responses indicated species-specific use of nest-trees. One response claimed that Grey Herons tended to nest in the tall trees, whereas Little Egrets, Cattle Egrets, and Chinese pond herons seemed to favor the shorter trees, and sometimes also bamboo. Another response observed that Little Egrets nested mainly in slash pines and bamboo, while Black-crowned Night Herons nested in slash pines and camphor trees. An additional response stated that herons seemed to avoid vegetation designated for landscaping, and instead they appeared to prefer less-managed vegetation.

The diet of the herons included both natural and artificial food types. They included fish, amphibians, reptiles, and invertebrates (Table 3) and foods provided by humans, from 27 zoos with feedback. Among the natural foods, loaches (11 responses), frogs (ten responses), and shrimp (nine responses) were the most reported of all. Artificial foods were reported from ten zoos, which were either intentionally provided to the herons or were stolen from captive animals (two responses). In addition, one response observed Cattle Egrets wandering near the captive herbivores (deer and donkeys), probably looking for insect prey startled by the mammals.

18 zoos provided (partially-overlapping) management recommendations, which were grouped into different attitudes, including positive (+ve), negative (-ve), and neutral (0), based on the potential consequences on the birds:

To create new habitats or to improve the quality of the current habitats (five responses). One response suggested leaving out a specific portion of the zoo's natural vegetation without landscaping for the herons to live in; while controlling heron populations. Another

Table 1. Number of zoos reporting positive occurrences of wild herons and population range for individual species. Responses which provided ranges with no upper limits (e.g., > 100 individuals), nest counts, or contained missing data were not included in the individual population accounts.

Heron species	Number of zoos	Heron population			
		1–10	11–100	101–500	> 500
Little Egret	33	11	7	3	2
Black-crowned Night Heron	30	4	11	3	1
Chinese Pond Heron	17	5	3	0	0
Grey Heron	16	6	4	1	0
Cattle Egret	5	0	2	0	0
Intermediate Egret	5	2	1	1	0
Great Egret	2	0	0	0	0
Striated Heron	2	1	0	0	0
Chinese Egret	1	1	0	0	0

Table 2. Plant species/groups used (✓) or not used (X) by herons for nesting in, and the number of zoos with feedback.

Group	Family	Common name	Used for nesting/ not	Number of zoos
Conifers	Cupressaceae	Chinese Cypress (*Cupressus duclouxiana*)	✓	1
		Dawn Redwood (*Metasequoia glyptostroboides*)	✓	2
	Pinaceae	Cedar (*Cedrus sp.*)	✓	2
		Slash Pine (*Pinus elliottii*) and other pine trees	✓	3
Broad-leaved trees	Arecaceae	Palm (family Aracaceae)	✓	1
	Euphorbiaceae	Chinese Tallow (*Triadica sebifera*)	✓	1
	Fabaceae	Locust Tree	✓	1
	Meliaceae	Chinaberry (*Melia azedarach*)	✓	1
	Moraceae	Camphor Tree (*Cinnamomum camphora*)	✓	3
		Chinese Mulbury (*Cudrania tricuspidate*)	✓	2
		Paper Mulberry (*Broussonetia papyrifera*)	✓	1
		Fig Tree (*Ficus spp.*)	✓X[1]	3
	Oleaceae	Privet (*Ligustrum spp.*)	✓X[2]	2
	Salicaceae	Poplar (*Populus spp.*)	X	3
		Willow (*Salix spp.*)	X	3
	Berberidaceae	Heavenly Bamboo (*Nandina domestica*)	X	1
	Betulaceae	Asian White Irch (*Betula platyphylla*)	X	1
	Ebenaceae	Persimmon (*Diospyros sp.*)	X	1
	Lytnraceae	Common Crepe Myrtle (*Lagerstroemia indica*)	X	1
	Pittosporaceae	Japanese Cheesewood (*Pittosporum tobira*)	X	1
	Rosaceae	Christmas Berry (*Photinia sp.*)	X	1
	Scrophulariaceae	Foxglove Tree (*Paulownia fortune*)	X	1
	Unknown	"lian shu"	X	1
Bamboo	Poaceae	Hedge Bamboo (*Phyllostachys glauca*) and Other bamboo species	✓	2

[1] Two zoos stated that fig trees were used by the herons for nesting in, while one additional zoo stated they were not used.
[2] One zoo stated that privets were used for nesting in, and another zoo stated they were not used.

response suggested using flowing water, and keeping the water clean; (+ve)

To provide extra food to the herons (five responses). One response suggested using live fish or cutting big fish down to small pieces while feeding. Another response suggested providing a suitable amount of food, to avoid wasting; (+ve)

Table 3. Diet of wild herons by different categories including fish, amphibian, reptile, and invertebrate, and the number of zoos under each category.

Category	Name		Number of zoos
Fish	Loaches (*Misgurnus spp*.)		11
	Tilapia (*Tilapia sp*.)		3
	Topmouth Culter (*Culter alburnus*)		1
	Amur Carp (*Cyprinus rubrofuscus*), crucian carp (*Carassius carassius*), grass carp (*Ctenopharyngodon idella*) and other carps		5
	Bitterling (*Rhodeus sp.*)		1
	Unknown fish[1]	"he hua yu"	1
		"huang yu"	1
		"xiao tian yu"	1
		"xiao za yu"[2]	1
Amphibian	Paddy Frog (*Fejervarya multistriata*) and other frogs		10
Reptile	lizards		1
	conches		1
	insects		2
Invertebrate	Leeches (class Clitellata)		1
	Crabs		1
	Chinese White Shrimp (*Fenneropenaeus chinensis*) and other shrimps		9
	clams		2

[1] The scientific names for four unknown fish species were not found, and instead, the local names in Chinese Pinyin were provided.
[2] "xiao za yu" (meaning "small various fishes") may include more than one species.

To control heron populations (five responses). One response claimed that wild herons were sneaking food from captive *Pelecanus onocrotalus* L. (Great White Pelican) and *Aonyx cinereus* Illiger (Asian Small-clawed Otter). As the herons and otters both fed on (small) fish of similar sizes, increased human presence during the feeding time or feeding the otters only within their enclosures would discourage the herons. And for the pelicans with larger gape sizes than most herons, feeding big fish (weighing between 0.2–0.3 kg) only might discourage food-sneaking by herons; (-ve)

"Do-nothing": either encourage or discourage heron occupation of the zoo environment (three responses); (0)

To reduce human disturbances (three responses). One response suggested keeping some distance away from the herons. Another response proposed the regulation of negative human behaviors (e.g. startling the nesting herons in order to obtain photos); (+ve)

To drive herons away (three responses). One response claimed that a large number of overwintering Black-crowned Night Herons (> 600) was seen every year, which exceeded the environmental capacity of the zoo. The second response claimed that the measurement was necessary only when the heron feces posed a negative impact on the trees of the zoo. The third response pointed out that wild herons should be driven away as they might be carrying transmissible diseases (e.g., avian influenza and avian cholera) harmful to the captive birds; (-ve)

To include herons as part of a local education program (one response); (+ve)

To provide rescuing services for injured individuals and fallen chicks (one response). (+ve)

Five responses exhibited positive attitudes only, four responses exhibited negative attitudes only, four zoos exhibited neutral attitudes, and four zoos exhibited both positive and negative attitudes. The number of zoos with different attitudes across population size class, zoo location, colony size, and colony age relative to zoo age is shown in Fig. 2.

Zoo size ($P = 0.83$), zoo position ($P = 0.51$), colony size ($P = 0.10$), and colony age relative to zoo age ($P = 0.33$) did not significantly correlate with human attitude towards wild herons.

Discussion

We conducted the first nation-wide study in mainland China to investigate wild heron inhabitation in the Chinese city zoos. While many studies focus on mammals and their conflicts with humans (Basak et al. 2022), our study provided insights into conservation concerns pertaining to urban waterbird communities. Although the statistical results were not significant, we speculate that the mixed management recommendations received were associated with the different impacts caused by heron visitation in each zoo, which were case-specific. In several cases, where positive and neutral attitudes (i.e., "do-nothing") were proposed, a relatively longer colony history was reported (e.g., the colony had existed before the zoo, which possibly underlies an easier acceptance by humans), the colony size was found to be smaller than the median value, or the habitat was larger than the median value. These factors might then contribute to a higher level of coexistence between wild herons and humans. In comparison, negative attitudes (e.g., driving herons away) were probably associated with higher heron densities vs limited environmental capacities (e.g., less vegetative support and food) of the zoo. Several responses detailed management actions, such as restricting accesses to food based on the different gape sizes between captive animals and wild birds, of which the efficacy remains to be evaluated.

In addition, in several cases, management recommendations were proposed seemingly based on an inadequate knowledge of the herons. For example, one response which proposed driving the herons away failed to provide any information on the heron ecology

(species, population, habitat, or diet). Though concerns were expressed regarding the possibilities of disease transmission by wild herons, no scientific evidence or case studies were mentioned in the responses received.

Since most zoos monitored heron populations with an estimate rather than direct count, the population descriptions tended to be rough, which might also be biased due to individual training and different observational conditions. We suggest future, more systematic monitoring that allows for better assessments of the environmental impacts of wild herons in Chinese zoos. Over half of the zoos with feedback reported positive heron occurrence, indicating a wide use of the zoo as habitat. Apart from the physical conditions, such as vegetated land, adjacent water sources, and food, the presence of captive herons, or herons released from the aviaries might also attract wild herons to visit the zoos.

Our study uncovered additional conservation considerations, such as including wild herons into in-situ conservation projects (e.g., Stanley Park Ecology Society 2024) and initiatives to promote education and public awareness. Based on these findings, we encourage further public discussions on urban heron and waterbird community management and conservation.

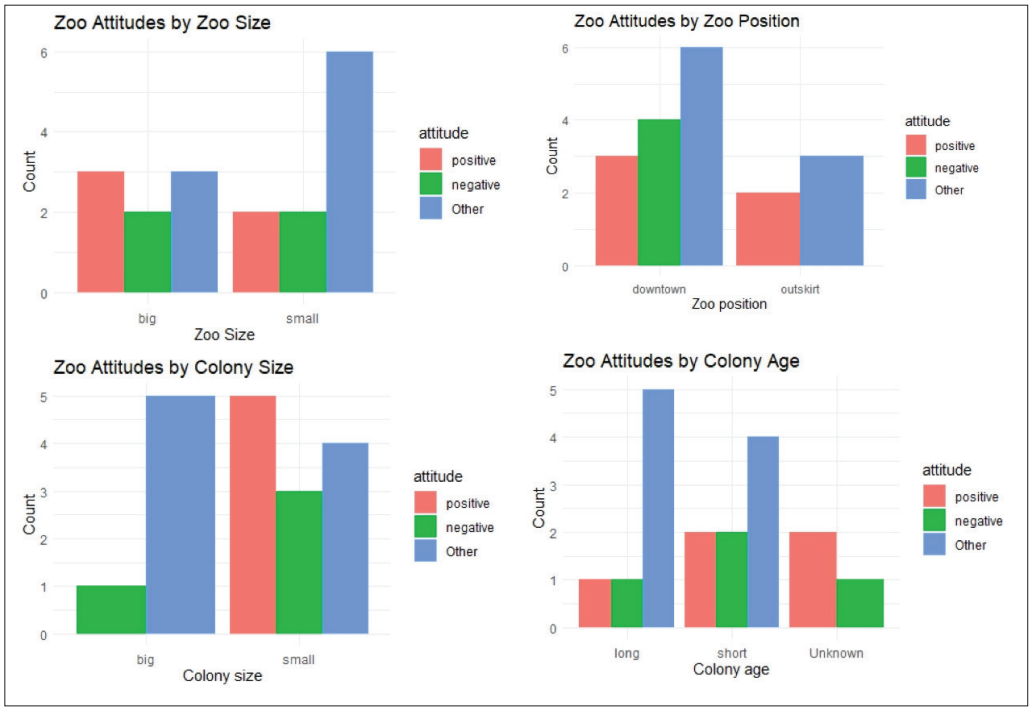

Figure 2. Number of zoos with attitudes that are positive, negative, and other (both positive, negative, and neutral) across various size classes (small or large), locations (outside or downtown), colony sizes (small or large), and colony ages relative to zoo age (long or short).

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Literature cited

Bandara, R. and C. Tisdell, 2003. Comparison of rural and urban attitudes to the conservation of Asian elephants in Sri Lanka: empirical evidence. Biological Conservation 110: 327–342.

Basak, S. M., M. S. Hossain, D. T. O'Mahony, H. Okarma, E. Widera, and I. A. Wierzbowska. 2022. Public perceptions and attitudes toward urban wildlife encounters–A decade of change. Science of the Total Environment 834: 155603.

Grant, K.R. and J. Watson. 1995. Controlling nuisance egret and heron rookeries in Oklahoma. Great Plains Wildlife Damage Control Workshop Proceedings: 45.

Humphrey, J.E., A. Haslem, and A. F. Bennett. 2023. Avoid, adapt or exploit: Re-visiting bird responses to urbanization using a novel landscape approach. Global Ecology and Conservation 48: e02735.

Li, Y. H. and X. Y. Liu. 1963. On the breeding behavior of the Pond heron. Acta Zoologica Sinica 15: 203–210.

Ministry of Housing and Urban-Rural Development, The People's Republic of China. 2002. Principles on the classification of urban greenlands. Available online at: https://www.planning.org.cn/law/uploads/2013/1383997143.pdf. Accessed 01 October 2024.

Ngo, K. M., T. Hosaka, and S. Numata. 2022. Attitudes and preferences of wildlife and their relationship with childhood nature experience amongst residents in a tropical urban city. Urban Ecosystems 25: 1939–1948.

Roshnath, R. and P. A. Sinu. 2017. Are the heronry birds adapting to urbanization? Zoo's Print 32: 27–33.

Serpell, J. A. 2004. Factors influencing human attitudes to animals and their welfare. Animal welfare 13: S145–151.

Shaw, T. H. 1939. The heronries at Tai-miao Pak, Peking. Peking Natural History Bulletin 14: 81–82.

Stanley Park Ecology Society. 2024. Stanley Park Heronry Annual Report: 2023 Season. Stanley Park Ecology Society. Available at: https://stanleyparkecology.ca/2024/02/02/spess-2023-heron-report-is-now-available/Richmond News+9.

Telfair, R. C., B. C. Thompson, and L. Tschirhart. 2000. Nuisance heronries in Texas: Characteristics and management (2nd ed.). Wildlife Diversity Program, Wildlife Division, Texas Parks and Wildlife Department. PWD BK W7000–134.

Tian, X. H. 2023. Zhong guo dong wu yuan hang ye fa zhan de xian zhuang, wen ti yu zhan wang [Current status, issues and perspectives of the zoos in China]. The Annual Meeting of The Chinese Association of Zoological Gardens. 22–25 December 2023. Ha'erbin, Heilongjiang Province, China.

Urfi, A. J. 2010. Using heronry birds to monitor urbanization impacts: a case study of Painted Stork Mycteria leucocephala nesting in the Delhi Zoo, India. Ambio 39: 190–193.