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DIFFERENCES IN KNOWLEDGE ABOUT BIRDS AND THEIR CONSERVATION BETWEEN RURAL AND URBAN RESIDENTS OF PUERTO RICO

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Abstract: People's knowledge of birds and the opinions and perceptions about specific issues related to the conservation of birds were quantified in rural and urban communities in northeastern Puerto Rico. Data were collected using questionnaires in interviews with 131 citizens haphazardly selected within the study site. Our results indicate that urban residents had a significantly higher level of education and were more knowledgeable about the bird species in their neighborhoods than residents of rural communities. However, the knowledge of exotic bird species was similar between residents of both communities, with psittacids and finches (Passeridae, Plociedae, Estrildidae) identified as the most common exotics in their neighborhoods. Rural and urban residents also differed in what they considered important threats to birds in their communities. Rural residents mentioned deforestation (44%), urban sprawl (31%), and hunting (25%), whereas urban residents mentioned urban sprawl (48%) and deforestation (44%) as important environmental problems that affect birds. Only 5% of the urban residents mentioned hunting as a factor affecting bird populations. The interviewees also differed significantly in their perception of the effectiveness of conservation laws and regulations. About 58% of rural residents said that laws and regulations were adequate, in contrast to 45% of urban residents who believed that the laws were adequate. Overall, this study showed that the people living in rural and urban communities in northeastern Puerto Rico have little knowledge of birds and had contrasting attitudes and opinions about important issues that affect birds in their communities.

Key words: bird conservation, citizens' opinions, conservation knowledge, Puerto Rico, urban gradient

Resumen: DIFERENCIAS EN EL CONOCIMIENTO SOBRE LAS AVES Y SU CONSERVACIÓN ENTRE LOS RESIDENTES DE ZONA RURAL Y URBANA DE PUERTO RICO. El conocimiento del público sobre las aves y sus opiniones y percepciones sobre asuntos específicos relacionados a la conservación de estas fue cuantificado en comunidades rurales y urbanas del noreste de Puerto Rico. Los datos fueron obtenidos utilizando cuestionarios administrados a 131 personas entrevistadas según fueron encontradas en las áreas de estudio. Nuestros resultados indican que los residentes de áreas urbanas tienen un nivel de educación más alto y fueron más conocedores de las aves en sus vecindarios comparados con residentes de áreas rurales. Sin embargo, los residentes de comunidades rurales y urbanas mostraron conocimiento similar de las aves exóticas e identificaron a psitácidos y gorriones (Passeridae, Plociedae, Estrildidae) como los exóticos más comunes en sus vecindarios. Los residentes de áreas rurales y urbanas difirieron en lo que consideran amenazas a las aves en sus comunidades. Residentes de áreas rurales mencionaron la deforestación (44 %), desparrame urbano (31 %), y cacería (25 %), mientras que los residentes urbanos mencionaron el desparrame urbano (48 %) y la deforestación (44 %) como problemas ambientales importantes que afectan a las aves. Sólo el 5 % de los residentes urbanos mencionó la cacería como un factor importante que afecta a las poblaciones de aves. Los entrevistados también difirieron de manera significativa en sus percepciones de la efectividad de las leyes y regulaciones de conservación. El 58 % de los residentes rurales indicó que las leyes y regulaciones actuales son adecuadas, mientras que 45 % de los residentes urbanos creen que son inadecuadas. En general, este estudio mostró que la gente de comunidades urbanas y rurales en el noreste de Puerto Rico tiene poco conocimiento de las aves y contrastan en actitudes y opiniones sobre asuntos importantes que afectan a las aves en sus comunidades.

Palabras clave: conservación de aves, conocimiento de conservación, gradiente urbano, opiniones de ciudadanos, Puerto Rico

Résumé : CONNAISSANCE DES OISEAUX ET DE LEUR CONSERVATION : DIFFERENCES ENTRE LES POPULATIONS RURALES OU URBAINES DE PORTO RICO. La connaissance des oiseaux, les opinions et perceptions des sujets spécifiquement liés à la conservation de l'avifaune ont été quantifiées dans des communautés rurales et urbaines au nord-est de Porto Rico. Les données ont été collectées grâce à des questionnaires lors d'entretiens auprès de 131 personnes choisies au hasard au sein de la zone d'étude. Nos résultats montrent que, comparativement aux habitants des communautés rurales, les populations urbaines ont un niveau d'éducation significativement plus haut et de meilleures connaissances des espèces d'oiseaux de leur environnement proche. Toutefois, les connaissances des espèces exotiques étaient comparables dans les deux communautés, les psittacidés et certains passereaux (Passeridae, Plociedae, Estrildidae) étant identifiés comme les oiseaux exotiques plus communs de leur entourage.

Les habitants des zones urbaines et rurales diffèrent également dans ce qu'ils considèrent comme étant les plus fortes menaces pesant sur les oiseaux dans leurs communautés. Les habitants des zones rurales ont mentionné la déforestation (44%), l'extension urbaine (31%) et la chasse (25%), alors que les habitants des zones rurales ont mentionné l'extension urbaine (48%) et la déforestation (44%) comme des problèmes environnementaux importants affectant les oiseaux. Seuls 5% des habitants en zone urbaine ont mentionné la chasse comme un facteur affectant les populations d'oiseaux. Les personnes interviewées différaient significativement dans leur perception de l'efficacité des lois relatives à la conservation et les réglementations. Environ 58% des habitants des zones rurales estiment que les lois et les réglementations étaient suffisantes, contre 45% pour les habitants de zones urbaines. Dans l'ensemble, l'étude a montré que les populations des zones rurales et urbaines du nord-est de Porto Rico ont peu de connaissances des oiseaux et présentent des positions et opinions contrastées sur les principaux problèmes affectant les oiseaux dans leurs communautés.

Mots clés : conservation des oiseaux, connaissance de la conservation, gradient urbain-rural, opinion publique, Porto Rico

Urbanization has a significant impact on human perception of nature. As urbanization increases, especially in the tropics (Aide and Grau 2004), the human inhabitants are becoming increasingly unfamiliar with their native biological environment (McKinney 2006). This has disturbing implications for the conservation of native species because efforts to persuade people to promote conservation of native species may be more difficult when so many people have no factual knowledge of, experience with, or emotional connection to indigenous species in their own area (McKinney 2002). Fraga (2006) suggested that distribution patterns exist in the thoughts, attitudes, and perceptions about conservation depending on social class, ethnicity, religion, and labor position. Historically, social and economic factors of rural areas contribute to lower income, higher rates of illiteracy and unemployment, and less development compared to urban areas (Fraga 2006). Thus, it is reasonable to expect differences between residents in rural and urban areas in their attitudes and perceptions relating to conservation.

The Caribbean island of Puerto Rico is one the most densely populated islands in the world with 3.9 million persons living in 8,875 km^2, about 446 persons/ km^2 (United Nations Population Division 2007). At present, 11% of Puerto Rico's area is covered by urban/built-up surfaces and uncontrolled development has led to a high degree of sprawl in 40% of the island, with cities and towns poorly populated and surrounded by large areas of sprawl (Martinuzzi *et al.* 2007). Three main patterns of population distribution and development have been defined for Puerto Rico: Urban, Sparsely Populated Rural, and Densely Populated Rural (Martinuzzi *et al*. 2007). The Densely Populated Rural, which covers about 48% of the island surface, is equivalent to the Wildland-Urban Interface, which is recognized as an area for a variety of human-environmental conflicts (United States Department of Agriculture and United States Department of the Interior 2001). During recent decades the northeastern area of Puerto Rico, particularly the lands surrounding the El Yunque National Forest (henceforth EYNF), have undergone a drastic change in land use from agriculture to urban/suburban development, becoming one of the most urbanized landscapes on the island. The EYNF is a protected subtropical rainforest that is under intense human pressure (Lugo *et al.* 2004), and large tracts of its buffer zone are located in the wildland-urban interface.

In Puerto Rico, the relationship between conservation areas and nearby rural communities and urban centers is complex. For example, forest reserves such as the EYNF are now surrounded by two types of communities: traditional, rural low-income communities locally called "parcelas or barriadas," and high-income, closed residential developments (Lugo *et al*. 2004). Historically, rural communities have depended more on forest resources or services (e.g., wood, bird hunting, illegal garbage dumps) than urban communities which use the forest mostly for recreation and outdoor activities. In this study, we explore the relationship between birds and people in rural and urban communities near the EYNF. Given the sociological differences between the communities, we expected to find differences in people's knowledge of birds and their attitudes and perceptions relating to bird conservation. The goals of this study were to compare: (1) knowledge that local people have about birds, (2) public opinion about environmental problems that are potential threats to birds, (3) public opinion of conservation laws and regulations, and (4) citizen's opinions as to what can be done to benefit bird conservation in their communities.

STUDY AREA AND METHODS

This study was conducted in the urban and rural areas of the municipalities of Canóvanas, Río Grande, Luquillo and Fajardo, near the El Yunque National Forest, also known as the Luquillo Experimental Forest (EYNF). The EYNF is a 11,300 ha protected area of subtropical rainforest located in northeastern Puerto Rico and it contains the largest remnants of primary forest on the island (Lugo 1994, Lugo *et al*. 2004). Species lists document about 86 terrestrial bird species in the region of which 66 species occur in the EYNF (Wiley and Bauer 1985). In recent decades, changes in land use at the EYNF's periphery have resulted in a 2,185% increase in urban land cover in the lands surrounding the forest (Lugo *et al*. 2004).

Data were collected using a questionnaire focused on 13 items, which targeted residents of rural and urban sites near the EYNF (see Appendix 1 for the questions). Rural and urban study sites were classified from aerial photographs based on the intensity of urbanization (i.e., percent of developed land) at each site as described in the urban ecology literature (Marzluff 2001). Rural and urban residents were identified as people living during the survey period in either rural or urban communities within the study sites. Interviews with 131 people were conducted in rural and urban sites and involved obtaining responses to the questionnaire as well as demographic information (age and gender), and information on education level. People were invited to participate in the questionnaire as they were encountered or available (*i.e.,* haphazard sampling) while we walked along roads in areas previously identified from aerial photographs as urban or rural. All interviews were conducted in Spanish by the first author. The questionnaire included both open-end and close-end questions about the knowledge of local bird species, introduced bird species, identification of specific bird species from photographs (regardless its common name), birdwatching activities, opinions on specific environmental problems (e.g., deforestation, urban sprawl, bird hunting), and perception of laws and regulations designed to protect birds. In addition, the questionnaire included the identification of four resident species from photographs (Puerto Rican Woodpecker [*Melanerpes portoricensis*], Zenaida Dove [*Zenaida aurita*], Red-legged Thrush [*Turdus plumbeus*], and Pin-tailed Whydah [*Vidua macroura*]) to test residents knowledge of local bird species. Because bird species common names vary geographically across the island we consider all common names cited in the literature (Biaggi 1997) for the above species as valid names for identification. Because the study involved human subjects, a special permit was obtained from the University of Puerto Rico to conduct the interviews. In this study, all the interviewees were legally adults and voluntarily participated in this survey. Interviews were conducted on week days from 0900–1600 during October 2006 to January 2007.

Questionnaire data were documented as frequencies and percentages, and were used to summarize the properties of the dataset. Data were analyzed using contingency tables, chi-square test, and Spearman rank correlation, and tested for statistical differences at the 5% level of significance. All statistical analyses were conducted with MINITAB software package.

RESULTS

The interviewees were composed of 66.4% males and 33.6% females. A significantly higher percentage of males than females was interviewed in rural communities (79% vs. 21% respectively; 58% vs. 42% in urban communities; $\chi^2 = 10.21$, df = 1, $P < 0.001$). The mean age of the interviewees in this study was 42 years ± 11.4 SD. Age structure showed that 60.3% of interviewees were from the 31–50 year-old age group class. Other age classes documented in this study were: 21–30 yr-old (15.3%), 51–60 yr-old (16.8%), and ≥ 61 yr-old (7.6%). The quantified population age structure represents a large segment of the economically active population with a small percentage of senior citizens. Due to the reluctance of some interviewees to answer income-related questions and unreliable data provided by a few interviewees, the analysis of income data was not included in this study. In addition, an estimated 5% of the people refused to participate in this study and about 15% of the questionnaires were not included in the analysis due to insufficient information provided by the interviewees. Data from questionnaires showed that 2.2% of the interviewees had an educational level less than high school, 33.6% had only a high school education, 39% attended technical institutes, and 25.2% had higher education (i.e., either completed a college degree or had taken some college level courses). Overall, the educational level of the interviewees differed significantly between rural and urban communities, with residents of urban areas showing a significantly higher level of education than residents of rural sites ($\chi^2 = 14.3$, df = 3, $P < 0.01$). Residents in urban communities had higher percentages of

Table 1. Responses of rural versus urban residents in northeastern Puerto Rico to an open-ended question in which they were asked to rank in order of importance those measures that might be implemented to improve bird conservation in their communities. *N* indicates the number of respondents.

	Percentage Response			
	Rural (n = 52)	Urban (n = 79)	χ^2	P
Habitat preservation	21.1	48.1	36.6	< 0.001
Species conservation	17.3	3.8		
Education	13.4	17.7		
Ban hunting	19.2	2.5		
Other	21.2	13.9		
No opinion	7.7	14		

technical (43%) and college degrees (32%) than residents in rural areas (33% and 15% respectively). In addition, a comparison of the educational background by gender and site showed that both males and females in urban areas had a significantly higher level of education than males in rural areas (χ^2 = 8.59, df = 3, $P < 0.05$ for males; χ^2 = 8.28, df = 3, $P < 0.01$ for females).

Questions designed to test whether people's knowledge of birds and the issues important to their conservation are related to the site of residence (i.e., rural or urban) had contrasting results depending on the question. When asked about the approximate number of bird species in Puerto Rico, only 3.5% of the interviewees provided a correct answer (about 300 species) and no differences were found between rural and urban residents. In contrast, when asked which species is Puerto Rico's national bird, residents in urban areas identified correctly the Bananaquit (*Coereba flaveola*) more frequently (39.5%) than residents in rural sites (25%) (χ^2 = 4.81, df = 1, $P < 0.05$). However, residents of both sites showed confusion in selecting which species is the national bird. About 46% of rural residents selected the Puerto Rican Parrot (*Amazona vittata*), while 58% of urban residents chose bird species other than the Bananaquit.

Questioned about which are the most common species in their neighborhoods, residents of rural and urban sites both identified the Bananaquit, Gray Kingbird (*Tyrannus dominicensis*), Rock Dove (*Columba livia*), and the Greater Antillean Grackle (*Quiscalus niger*). Residents of rural and urban sites differed significantly in their ability to correctly identify four pre-selected species from photographs (χ^2 = 8.02, df = 3, $P < 0.05$). About 24% of urban residents and 10% of rural residents were able to identify three bird species from four photographs. The combined data showed that the Zenaida Dove (44.6%), Red-legged Thrush (28%), and Puerto Rican Woodpecker (18.8%) were the most recognizable bird species. None of the interviewees were able to identify the Pin-tailed Whydah from photographs. The knowledge of exotic bird species by the general public was similar for both rural and urban residents. Psittacids (rural 38%, urban 50%) and finches (rural 6%, urban 3%) were identified as the most common exotic birds; however, a large proportion of the interviewees failed to identify exotic birds in their neighborhoods (rural 56%, urban 47%), and only 5.7% of rural residents and 6.3% of urban residents had exotic birds as pets. When questioned about the presence of migratory birds, only 1.5% of the interviewees (all rural residents) selected waterfowl species as the most common migrants seen in their communities. Questioned about birdwatching as a past time, the responses of the interviewees were not enthusiastic as only 6% of residents in rural and 4% in urban areas had ever participated in birdwatching activities.

One method of examining if people living in different types of communities differ in their perception of which are important environmental or conservation issues that affect birds, is to provide citizens with a list of specific issues and ask them to rank the issues in order of importance. In this study, the interviewees were given a list of environmental problems and asked to rank those which they consider the top three in their communities. Residents of rural areas selected deforestation (44%), urban sprawl (31%), and hunting (25%) as the most important factors that affected birds in their communities, whereas, urban residents mentioned urban sprawl (48%), deforestation (44%), and hunting (5%) as the most important factors (χ^2 = 13.0, df =2, $P < 0.002$). In addition, few people in urban areas considered exotic species (1.2%) and illegal capture of birds (1.2%) as a threat to local bird populations.

A series of questions related to laws revealed differences between the interviewees in their perceptions regarding the effectiveness of conservation laws and regulations. About 58% of the respondents in rural areas said that laws and regulations were

adequate, in contrast to 45% of the urban respondents who believed they were adequate ($\chi^2 = 7.21$, df = 1, $P < 0.01$). Citizens who supported laws and regulations (25% in rural and 37% in urban sites; $\chi^2 = 5.84$, df = 4, $P > 0.05$) argued that current laws protect species and habitats, and regulate bird hunting. In contrast, residents opposed to current laws and regulations (37.5% in rural and 75% in urban sites; $\chi^2 = 44.78$, df = 4, $P < 0.001$) pointed out that poor law enforcement and insufficient protection of species and habitat were important factors that affect birds. Nevertheless, half the interviewees (52%) did not express an opinion. Questioned about what can be done to improve the situation for birds in their communities, interviewees differed in their responses (Table 1). Residents of rural areas responded that measures designed for the preservation and conservation of habitats and species, and a ban on the hunting season should benefit birds. In contrast, residents in urban sites responded that measures focused on habitat preservation and education were the most important measures for bird conservation.

DISCUSSION

We found that despite differences in education, residents of both urban and rural communities showed little knowledge of the birds in their communities, and had contrasting attitudes and opinions about important issues that affect birds in their communities. For example, questions designed to test the people's knowledge of birds showed that only 3.5% of all interviewees knew the approximate number of bird species that occur on the island. Moreover, only half of all interviewees could identify the Bananaquit as Puerto Rico's national bird, although residents of urban areas were more knowledgeable than people of rural areas regarding this topic. The Bananaquit was proposed as Puerto Rico's national bird during the 1970s and this has been taught to the general public since primary school. However, there is confusion among the public about which species is the national bird, particularly in rural areas, where many people think it is the endangered Puerto Rican Parrot. The national bird "issue" has been a subject of legislative debate and several species have been proposed (e.g., the Gray Kingbird, Puerto Rican Vireo [*Vireo latimer*)]), and recently a local bird conservation NGO has expressed their preference for the endemic Puerto Rican Woodpecker (Sociedad Ornitológica Puertorriqueña 2005).

Residents of rural and urban communities showed little knowledge of the diversity of birds that exists in their neighborhoods and could only identify the very abundant species, mostly synanthropic species (i.e., species that live in close association with people). When asked to identify local bird species from photographs, urban residents were more successful (24%) than residents of rural areas (10%), despite the fact that some of the species displayed in the photographs were predominant in rural areas (e.g., Red-legged Thrush and Puerto Rican Woodpecker). Rural resident were less successful than urban residents when asked to correctly identify a particular bird species because either they did not know the species presented on photographs or misidentified them. The low percentage of people capable of identifying common bird species from photographs confirms the perception that the public, regardless of where they live, have little knowledge of the birds found in their communities. Lack of knowledge was further evident from responses to questions about migrant birds. Although Puerto Rico has about 134 bird species that are frequent migrants or winter visitors (Raffaele 1989), only a few rural residents had any knowledge relating to migratory birds. Those who responded to the migrant questions all mentioned waterfowl species as the only migrants in their communities, perhaps because of the conspicuousness of waterfowl relative to most migrant songbirds.

Despite the overall lack of knowledge of birds, about 50% of all interviewees identified psittacids and finches as the most common exotic birds in their neighborhoods and yet only 6% admitted to possessing exotic cage birds in their homes. Exotic birds (mostly finches and psittacids) are very popular in Puerto Rico, where there are over 30 species breeding or established, and they constitute an important component of the local pet trade (Raffaele 1989).

It was evident that most people rarely paid any attention to birds regardless of whether they live in rural or urban areas. For example, only 6% of the interviewees had ever gone birdwatching, and most only occasionally. Residents in rural and urban communities also differed in their perception regarding environmental problems that affect birds in their communities. Rural residents indicated that deforestation, urban sprawl, and bird hunting were important environmental problems that affect birds in their communities, while residents of urban areas mentioned urban sprawl and deforestation, and rarely mentioned hunting (5%). It is interesting that both urban and rural residents mentioned deforesta-

tion in the same percentages (44%) as a threat to birds. This suggest that a portion of the population, regardless of where they live, are aware of deforestation in Puerto Rico's past and are concerned about the increase in deforestation in their communities in recent years associated with urban development (Martinuzzi *et al.* 2007).

The people of both communities also differed in their perception about the effectiveness of conservation laws and regulations. Rural residents more frequently indicated that current conservation laws and regulations provide adequate protection to birds in contrast to people of urban areas. Nevertheless, it is important to note that about 50% of the interviewees preferred not to express an opinion on this subject. A notable difference between urban and rural respondents was their opinion regarding bird hunting. In this study, 25% of rural residents opposed bird hunting in their communities, in contrast to only 2.5% of urban residents. The negative opinion of rural residents about conservation laws and regulations may occur because they consider hunting a problem, possibly due to first-hand knowledge of hunting violations in their communities, which urban residents do not see, so that urbanites may think that compliance with hunting laws is adequate. The attitude of rural residents in Puerto Rico toward hunting contrasts with the attitude of citizens of the continental United States, where rural residents tend to be more pro-hunting in contrast to urban residents who are more likely to be anti-hunting. A study of hunting opponents in Michigan, USA, by Shaw (1977) found that hunters came from rural backgrounds, while most hunting opponents came from predominately urban backgrounds. A similar finding was reported in a Canadian study that found rural residents were almost three times more likely to hunt than those from urban areas (Mitchell 2001). Compared with the continental United States, bird hunting in Puerto Rico is a less popular activity as suggested by the number and proportion of active hunters, 2.3 million (0.74%) vs. 4,600 (0.11%) respectively (United States Fish and Wildlife Service 2006, Department of Natural and Environmental Resources 2005). Additional factors behind the relatively low numbers of local hunters in Puerto Rico are restrictions on gun possession, low number of available game species, and absence of a hunting tradition.

Rural and urban residents also had contrasting opinions about the measures that should be taken to improve the welfare of birds in their communities. Residents in rural areas suggested that measures designed for the preservation of habitat, conservation of species, and strict enforcement of bird hunting regulations or a complete ban on bird hunting, were important for the conservation of birds in their communities. Conversely, urban residents suggested that efforts should be focused on the preservation of habitats and public education. The emphasis on public education by urban residents in contrast to rural residents as a means to conserve birds was not surprising given the urban residents' higher average level of education.

This study highlights the importance of assessing an individual's knowledge and opinions about local biodiversity as a tool for understanding the values and attitudes of the general public toward conservation in areas where pressures for development conflict with wildlife conservation measures. Public understanding of biodiversity has often been measured against scientific knowledge, and the lack of scientific knowledge by the general public has been used to argue against public participation in decision-making and policy development (Fisher and Young 2007). Our results suggest that independent of the lack of scientific knowledge that the general public has of birds and their conservation, individuals expressed well grounded concerns about specific environmental issues that affect birds in their communities. Also some of the differences found between rural and urban residents may be due to the fact that rural areas are nearby to cities in Puerto Rico and therefore urban dwellers can get into rural habitats relatively easily. This may explain the urban residents' ability to identify species not found commonly in the urban zone.

In this study, the lack of knowledge about nature shown by urban citizens is probably related in part to the high level of urban biotic homogenization (after McKinney 2006) found in Puerto Rican cities. McKinney (2006) suggests that because so many people living in cities and urban areas are dominated by widespread non-native species, humans are becoming increasingly unfamiliar with their native biological environment. The decline in nature-related knowledge of urban human populations is a global trend. A recent study suggests that urban populations in the continental USA are shifting away from nature-based recreation (Pergams and Zaradic 2008), which increases unawareness about local biodiversity and conservation of native species. Pergams and Zaradic (2008) speculated that the decline in nature-based recreation (e.g., visits to national parks) might be due to increases in recreational use of video games and computers. Whatever

the cause in Puerto Rico, residents of both urban and rural areas have poor knowledge of wild birds. It is likely that natural history knowledge, at least in rural areas, has declined substantially on the island since the 1940s, as rural residents abandoned subsistence agriculture, which required that they be more aware of their natural surroundings. The general lack of knowledge of local birds and natural history poses a substantial challenge for conservation efforts.

Studies that integrate scientific knowledge and the opinions and concerns of local residents are rare, and they can be useful to develop a more sustainable approach to bird conservation as well as biodiversity conservation in general. The type of research used in this study is biased towards the opinions and values of middle age citizens, mostly males, who were most available for interviews. A challenge for future studies is to develop methods, such as internet questionnaires, to reach citizens of younger age groups more effectively.

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Appendix 1. Summarized version of the questionnaire used during interviews with residents of rural and urban areas near the El Yunque National Forest, Puerto Rico.

Date
Nearest point count station
Type of land cover

A. Personal Information
1. Age
2. Sex
3. Address

B. Educational Background
1. Illiterate
2. Grammar school (grades 1–6)
3. Middle school (grades 7–9)
4. High school
5. Did not finish high school
6. Technical school
7. College courses but not obtained a bachelor's degree
8. College degree

C. Labor status
1. Unemployed
2. Part time job
3. Full time job
4. Government employee
5. Private sector employee
6. Self-employed
7. Retired

D. Open-ended questions designed to test the general public knowledge of birds and opinions about bird conservation.

1. How many bird species occur in Puerto Rico? (approximate number)
2. Which is Puerto Rico's national bird?
3. Which are the five most common bird species in your neighborhood?
4. Please identify the following bird species from photographs.
   a. Zenaida Dove
   b. Puerto Rican Woodpecker
   c. Red-legged Thrush
   d. Pin-tailed Whydah
5. Which are the most common exotic bird species found in your neighborhood?
6. Which are the most common migratory bird species found in your neighborhood?
7. In your opinion, what measures should be taken to project and conserve our birds?
8. Do you own exotic cage birds? If yes, which species do you possess?
9. Do you practice birdwatching? If yes, how frequent?
   a. Daily
   b. Weekly
   c. Monthly
   d. Occasionally
10. Which of the following environmental problems do you consider are the most important that affect birds in the area where you live? Please rank items in order of importance (1 = most important, 5 = less important).
   a. Deforestation
   b. Introduction of exotic bird species
   c. Bird hunting
   d. Illegal capture and trade of birds
   e. Urban sprawl
11. In your opinion, are current conservation laws and regulations designed to protect birds adequate? Explain.