

## Use of visitors' perception in urban reserves in the Buenos Aires metropolis

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**Abstract** Urban nature reserves (UR's) fulfill unique functions for society and are irreplaceable, satisfying human needs particularly in urban and periurban areas. The aim of this paper was to use a perception based approach to analyze whether the urban nature reserves in the metropolitan area of Buenos Aires, Argentina were principally used by visitors according to their main conservation mission. Five hundred written surveys designed to evaluate users' profile and their perceptions of the selected reserves were conducted during the summer of 2009 to visitors selected at random. Collected data was analyzed by multivariate analyses. The results discriminated two groups (1 and 2) of reserves showing that people chose to visit a nature reserve for two contrasting motivations: the contemplation of nature (group 1) or active recreation (group 2). Both groups of reserves, the respondents participated in environmental programs. All respondents knew about plants whereas knowledge of the fauna was related to the visitors' level of education. In all reserves respondents considered that nature enhance the quality of human life in the first place, and valued biodiversity in second place. Visitors in group 1 considered nature as very important, while respondents in group 2 thought that is important as a place for having fun. Our findings can potentially assist administrators to understand better how visitors perceive the reserves.

**Keywords** Nature reserves · Perception · Pro-environmental behavior · Environmental education

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## Introduction

Humans have great affection for green spaces as they are important in different ways throughout people's lives. Contact with nature, aesthetic preferences and/or recreation and play are the principal motivations for spending some time outdoors (Matsuoka and Kaplan 2008). Also environmental psychological research has extensively documented the positive effects of nature experience on human health and well-being in a variety of domains (Hartig 2004; Hartig and Cooper-Marcus 2006; Kaplan 2001).

The characteristics and proportion of green space found within cities are generally dependent on historical factors as well as contemporary planning and management policies (Faggi and Ignatieva 2009). Many green spaces are not just formal parks; they may have a dominant characteristic that is of particular value for nature conservation, recreation or educational opportunities (Stainsby 2009).

As a result of city sprawl and the increase in the number of people living in urban areas city administrations and planners have been aware of the loss of natural habitats within reach of cities. Based on the international biodiversity conservation agenda (Wyse Jackson and Sutherland 2000), municipal administrations—thinking globally and acting locally—have implemented several urban reserves (Zedler and Leach 1998; Heikkilä and Lindholm 2000; Shafer 2008), and launched conservation programs to maintain ecological compensation areas which embrace natural succession in or near the city boundaries (Mc Neely 2001).

Urban reserves are characterized by a wild appearance. They are distinguished from other types of green areas even if part of the natural environment has been artificially recreated or if some of the plants or animals actually belong to other geographical regions or are even exotics. They act as a counterpoint to the controlled urban scene and provide opportunities for activities not well served by recreational parks (Thompson 2002). They offer many different ecosystems and landscapes, provisioning, regulating and cultural services (Millennium Ecosystem Assessment 2005).

The objectives to enhance their importance as priority areas for local nature conservation, Visitors are made aware of the reserves' objectives through signs, guided tours, pamphlets, conferences and videos which distinguish them from common urban green spaces.

Reserves can vary structurally in terms of their environmental signatures, including extension, geomorphology, fauna and vegetation cover. They are perceived as a preferred destination by the user on account of their structural, semantic and connotative values. While structural features comprise the characteristic of the reserves (form, size vegetation, landscape, etc), semantically, they provide insight into the needs and values of their visitors, as users respond to their feelings and preferences by choosing to visit specific reserves, as described by Ritterfeld and Cupchik (1996) for interior spaces. Users' perceptions can mirror these connotative values through their opinions and attitudes. Therefore perception assessment can be useful in designing and evaluating conservation and environmental education programs.

The aim of this paper was to use a perception based approach to analyze whether urban nature reserves in the metropolitan area of Buenos Aires were principally used by visitors according to their declared conservation mission such as conservation and environmental education.

In line with their objectives our hypothesis are the different communicational strategies mentioned above. A high degree of agreement between respondents regarding their motive for visiting, environmental preferences and knowledge would be predictable consonant with the objectives of the reserves. In particular we expected that "observation of nature" would be primary motive for visiting a reserve. In addition, people would be more familiar with the local biodiversity observed in the reserves after their visits.

## Material and methods

### Characteristic of urban reserves

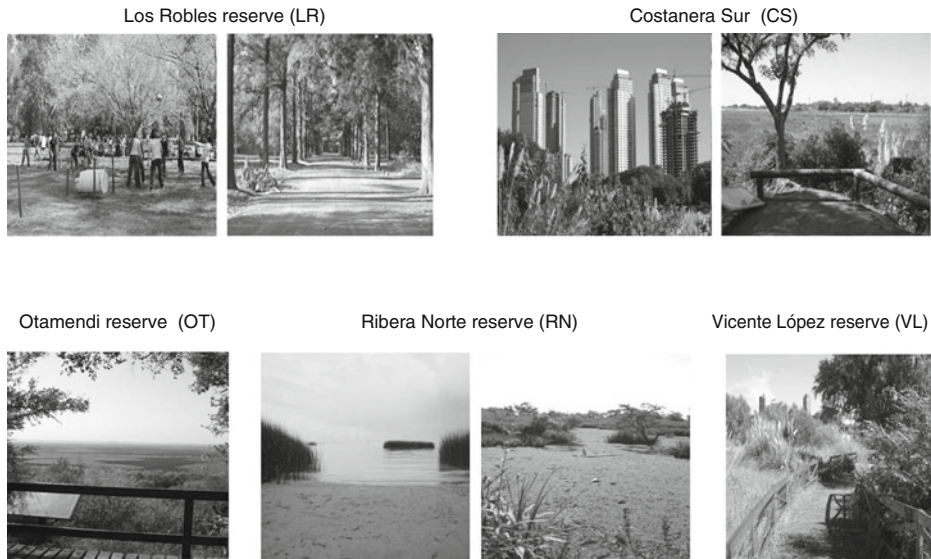
In the present study we chose to work with these hypotheses using a perception-based approach in five of the 11 urban reserves in the metropolitan area of Buenos Aires. (Figure 1) The reason behind this choice was their importance as conservation areas and because they have similar landscapes (dry and riverine forests, grasslands, lagoons, wetlands and water-front) and so they comparable. Conversely they showed some differences in regards to their origin, extension, infrastructure, the recreational environmental activities offered (Fig. 2), and socioeconomic features of the surroundings. Three of them, Otamendi, Ribera Norte and Los Robles reserves, are primarily natural areas, while the Costanera Sur and Vicente Lopez reserves are located on landfill areas that have been reclaimed from the river (Table 1). Table 1 summarizes characteristics of each reserve such geographic location, nearest city, area (Ha), biome, flora and fauna, administration, mission, IUCN category, ecological value description and biodiversity.

### Definitions

**Perception** includes attitude and opinion. Opinion refers to judgments, verbally or conceptually expressed, in favor or against a topic, activity, or an object. In contrast, attitude is a psychological disposition acquired and organized through one's own moral standards, experiences, and expectations, which incites the individual to act or react in a particular way when confronted with people, objects, and situations (Cervantes et al. 2008). Perception based methods emphasize the human viewer side of a landscape and have met the generally accepted standards for precision and reliability of measurement systems (Daniel 2001).



**Fig. 1** Locations of the reserves studied, provided by Atlas Ambiental de Buenos Aires. [www.atlasdebuenaosaires.gov.ar/aaba/](http://www.atlasdebuenaosaires.gov.ar/aaba/)



**Fig. 2** Some features and activities in the reserves studied

In the present study we considered *Biodiversity knowledge* as the capacity to name at least three plants and animals living in the reserve visited.

We defined *Pro-environmental behavior* as the active participation in activities related to the conservation of nature. This indicator was used to evaluate the respondents' commitment of to the environment and was assessed by questioning the visitors about their participation in environmental programs e.g. tree planting, clearing up actions and communicational activities.

*Motivations* refer to the wide range of ways in which human needs or purposes are met by the natural environment. Following Matsuoka and Kaplan (2008) we considered seven categories as reference: 1) nature observation, 2) resting, 3) walking, 4) running, 5) practice of sports, 6) bike riding, 7) playing.

*Usefulness of nature* has recreational or aesthetic value from an anthropocentric point of view. Nature also is useful in the stabilization of ecosystems and it has survival value in reconstruction and conservation to avoid irreversible change. (Ehrenfeld 1978).

## Survey methodology

Five hundred written surveys (100 surveys for each reserve) designed to evaluate users' profiles and their perceptions of the selected reserves were applied during the summer of 2009. Isovariance curves were used to determine the optimal number of surveys (Cochran and Cox 1965). The written survey included 12 questions. Five questions collected personal and background data. One question sampled uses and activities, two queried the evaluation of the reserves by considering what visitors liked and disliked, and four questions referred to the perception of and relation to nature. Some of the questions were either a) *fixed* (yes or no answers, or a choice among fixed options), or b) *open ended* (the user expressed his/her opinion). People passing by were interviewed at random; all questionnaires were valid because no third party service was involved in the interviewing process. All respondents

**Table 1** Urban reserves: geographic location, nearest city, area, biome, administration, mission, IUCN category, ecological value description

Urban reserves	Geographic location of the reserve	Nearest city	Area (Ha)	Biome	Flora and fauna	Administration	Mission <sup>a</sup>	IUCN category
Otamendi	34° 10' LS 58° 48' LW	Ing. Otamendi and Campana	3,000	Fluvial wetland	flechillar, tala, ombu, ferns, elder, espartillar ( <i>spartina densiflora</i> ), cortaderia, Eryngium, ceibo, there are 270 species of birds	National Administration Nature Reserve Otamendi Wetlands of international importance (Ramsar)	Conservation, environmental education and citizen participation	V Protected Landscape/seascape
Ribera Norte	34° 28' LS 58° 29' LW	San Isidro and Buenos Aires	12	Fluvial wetland		Municipal Reserve Ribera Norte Educational Refuge	Coastal environmental protection from la Plata Riverside, environmental education and scientific research	V Protected Landscape/seascape
Vicente López	34° 29' LS 58° 28' LW	Vicente López and Buenos Aires	3,5	Fluvial wetland		Municipal Reserve	Environmental education and biodiversity preservation	V Protected Landscape/seascape
Los Robles	34° 40' LS 58° 52' LW	Moreno, La Reja	1,000	Trees and plants from the Espinal ecoregion and wetlands		Municipal Reserve Park	San Francisco Lake and Reconquista river Conservation	V Protected Landscape/seascape
Costanera Sur	34° 36' LS 58° 31' LW	in Buenos Aires city	353	Fluvial wetland		Municipal Reserve Wetlands of International importance (Ramsar) Reserva Ecológica Costanera Sur	Protects the only sector of Buenos Aires city with a wild environment for recreation, education and research.	V Protected Landscape/seascape

<sup>a</sup> (Chébez 2006)

interviewed were informed about the nature and purpose of the study, and they completed the questionnaire onsite. Questionnaires were administered during workdays and weekends from 9 am to 7 pm.

### Data analysis

Frequencies of respondents' data were calculated as percentages of the profile description.

A Chi Square analysis was performed. Multivariate analyses were carried out using STATISTICA software 6.1. First, a principal components analysis (PCA) was performed to find out whether reserves could be grouped according to users' activities. A data matrix was built for the five reserves by considering the seven motivation categories mentioned above (resting, playing, bike riding, running, walking, practice of sports, and nature observation).

To explore the relationships between the visitors to each reserve and their opinions about the usefulness of nature, a fixed question with six options was analyzed: 1) decorate the city, 2) improve quality of life, 3) protect animals, 4) recreational and relaxing area, 5) no use, 6) no response. Additionally, the visitors' knowledge about animals and plants, and the participation of respondents in environmental activities were evaluated.

### Results

Most of the reserves were visited during the weekends, mostly several times a year, with the exception of the Costanera Sur reserve that was visited several times a month. In all reserves, people mainly stayed for less than 4 h; in the Costanera Sur reserve, people visited for between 30 min and 2 h (Table 2). Costanera Sur and Otamendi reserves were mostly visited by people over 41 years; Vicente Lopez and Ribera Norte reserves were mainly visited by people between 21 and 40 years, and Los Robles was preferred by young people under 21 years (Table 3). Most visitors had a secondary education level, however in Los Robles reserve the percentage of people with only elementary school was significantly higher (40 %) (Table 3). Users of the Costanera Sur reserve mainly lived in Buenos Aires city and those visiting the other reserves lived in the metropolitan area. No differences in gender were found in visitors to Los Robles, Vicente López and Ribera Norte reserves. On the contrary, Otamendi was visited more commonly visited by women ( $p=0.059$ ) and Costanera Sur by men ( $p=0.049$ ). Employees and retired people were more frequent in the Costanera

**Table 2** Favorite activities and time spent by visitors in the reserves

	Walking	Bike riding	Running	Resting	Play	Nature observation	Sports	Spend time			
								Less than 30 min	Between 30 min and 2 h	2 to 4 h	More than 4 h
Costanera Sur	38.21	11.3	17.88	9.7	0.81	13.01	8.94	0	56	39	6
Vicente López	25.8	0	0	8.06	1.61	51.6	12.9	68	21	6	4
Ribera Norte	29.05	0	0	0	0	64.10	6.83	7	61	23	9
Otamendi	39.02	0	1.6	7.31	0.81	36.58	14.634	0	44	43	13
Los Robles	23.07	0	7.69	11.53	12.82	21.79	14	0	9	16	76

**Table 3** Gender, age, education level, marital status and occupation of people interviewed

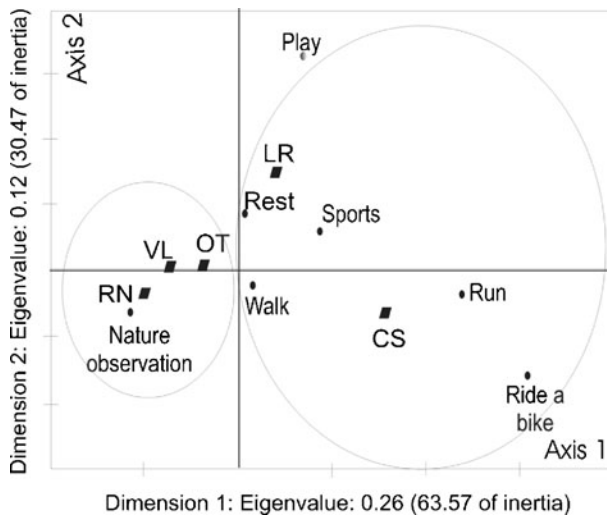
Variable	Costanera Sur	Vicente López	Ribera Norte	Otamendi	Los Robles
Gender					
Female	43	46	45	62	51
Male	57	54	55	38	48
Age					
>15	1	0	1	0	6
15/20	7	1	7	5	25
21/30	20	17	21	21	24
31/40	8	32	30	20	24
41/50	22	31	26	21	12
51/60	24	13	6	17	7
>61	18	6	9	16	2
Educational level					
Primary school	13	6	7	18	51
Secondary school	56	48	49	40	41
University	31	46	44	42	8
Marital status					
Single	29	27	37	26	45
Married	56	66	51	60	43
Widowed	2	0	3	2	0
Divorced	13	7	9	12	12
Occupation					
Employee	39	43	48	55	46
Unemployed	4	1	2	1	9
Retired	11	4	4	13	0
Student	15	8	10	8	20
Housewife	3	0	3	5	7
Self-employed	28	39	33	18	12
No response	0	0	0	0	6

Sur, Ribera Norte and Vicente López reserves, while students predominated in Los Robles reserve (Table 3).

### Activities

Figure 3 showed that observation of nature and walking were the two principal motivations for visitors in the five reserves. Figure 3 clearly shows two defined groups of reserves: three were preferred for the observation of nature (Ribera Norte, Vicente López and Otamendi reserves) and two for recreation (Costanera Sur and Los Robles reserves). People in the Costanera Sur reserve liked to run or ride a bike; in Los Robles they preferred to play and rest. The first axis explained 26 % of variance. Observation of nature was related to the negative values of axis 1 and running and bike riding activities, to the positive values of this axis. Axis 2 explained 12 % of variance and was associated with the play activity and with Los Robles reserve towards the positive values. (Figure 3).





**Fig. 3** PCA of a matrix constructed with five reserves and seven activities: resting, playing, bike riding, running, walking, sports, nature observation

The results obtained from PCA allowed us to divide the nature reserves in two groups (Table 4): Group 1 (Vicente Lopez, Ribera Norte and Otamendi Reserves) was categorized by the observation of nature and Group 2 (Los Robles and Costanera Sur) by recreational activities.

We regrouped activities such walking, running, bike riding and playing under “sports”. Table 4 shows the significant differences between the groups: Group 1 reserves were visited for nature observation, whereas Group 2 reserves were preferred for practicing sports.

### Biodiversity knowledge and pro-environmental behavior

In both reserves groups’ people knew about plants (Fig. 4). People in group 1 named more animals than the people in group 2. In particular visitors to Los Robles could not name animals.

Regarding the pro-environmental behavior of respondents in Group 1 (Vicente Lopez, Ribera Norte and Otamendi reserves) 29.22 % of the respondents participated in environmental programs, whereas only 20.9 % did so in Group 2 (Costanera Sur and Los Robles reserves).

### The importance of nature

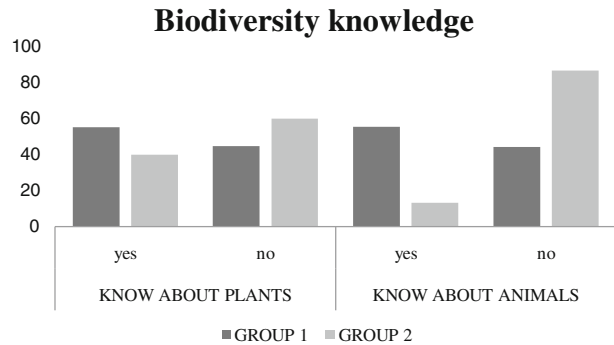
Respondents in all reserves considered that nature enhanced the quality of human life in the first place, and they valued biodiversity in second place. Visitors in Group 1 significantly

**Table 4** Different letters means “significative differences”

Activities	Frequency		<i>P</i> .value	Chi square	df
	Group 1	Group 2			
Sports	21.5 <sup>a</sup>	85 <sup>b</sup>	$5.1015 \times 10^{-6}$	20.79	1
Rest	4	19	0.1024334	2.66	1
Nature observation	42 <sup>a</sup>	22.5 <sup>b</sup>	$1.0759 \times 10^{-9}$	37.18	1



**Fig. 4** Biodiversity knowledge of plants and animals names, group 1 and group 2



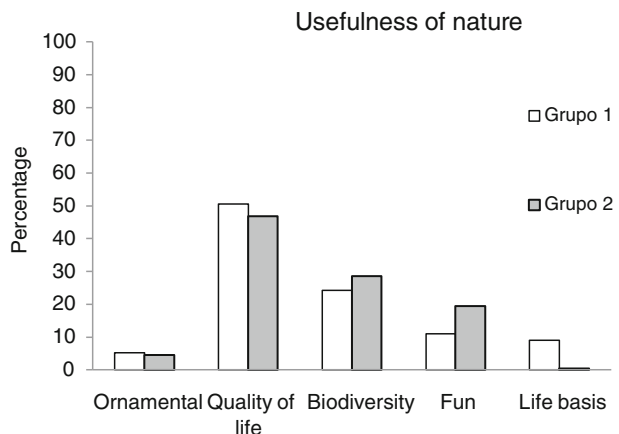
( $p=0.0042$ ) considered nature as very important because it was seen as the basis of life (Fig. 5). On the contrary, people in Group 2 thought that reserves were also important as a place for having fun (play).

## Discussion

Although urban nature reserves are distinguished from other types of green areas providing functions for biodiversity conservation and education not well served by recreational areas (Thompson 2002), our findings showed two contrasting motivations on the election for visiting them. People predominantly chose a reserve for two contrasting motivations: nature observation (Group 1), or recreation (Group 2). Our results confirmed findings from others parts of the world that the natural environment satisfies human needs in different ways. In the reserves studied we recognized the general trend described by Matsuoka and Kaplan (2008) that nature plays a vital role in human wellbeing in three different ways: 1- contact with nature, 2- aesthetic preferences and 3- recreation and play.

Most respondents agreed that urban nature reserves enhanced the quality of life, an anthropocentric common perception for people living in large dense cities, where nature is related to wellbeing, because green areas improve the urban environment (Van Leeuwen et al

**Fig. 5** Usefulness of nature



2006; Laforteza et al. 2009), and nature was significantly considered as the basis of life specially in Group 1.

The other assumption that visitors are familiar with local diversity was partially being confirmed. Only Group 1 visitors could name animals, which may be related to their level of education (Table 3). Bujis et al 2006 in their study of social perceptions of the European landscape, reported that the more highly educated respondents could name animals and plants. In the particular case of Los Robles 51 % of respondents only had primary school.

The pro-environmental behavior that distinguished respondents in the Group 1 reserves agrees with Arcuri (1990) who pointed out, that there is a direct relationship between environmental attitude and environmental knowledge. It is also in agreement with the studies carried out in Doñana National Park in southwestern Spain, which showed the positive influence of active participation in environmental education programs on perception and appreciation the of the landscape (Benayas et al. 1987; Mugica and De Lucio 1996).

Among the traditional reasons for protecting natural areas, the way visitors value different landscape features matters because landscape evokes deep emotions and can mobilize strong attitudes towards conservation (Gonzalez Bernaldez 1981; Williams 1985). It has also been shown that attraction of landscape features is linked to the knowledge we have of them (González Bernáldez 1985).

In Los Robles (Group 2) respondents used the reserve principally as a space for physical activities (Björk et al. 2008), which also encourages social interaction as expressed by Coley et al. (1997).

## Conclusion

Visitors to different nature reserves benefited from the natural environment in different ways: more emotionally and intellectually in Ribera Norte, Vicente Lopez and Otamendi and more socially and physically in Costanera Sur and Los Robles.

All the evidence suggested that visitors' opinions and attitudes can be used as a tool to assess the compliance of the conservation and educational mission of nature reserves and could be helpful for their improvement.

Preferred uses were good predictors of biodiversity knowledge and pro-environmental behavior and those predictors can be used to assess the compliance of the conservation and educational established missions normally advocated by nature reserves. The information obtained in this study showed that the established biodiversity conservation mission was perceived by visitors as a distinction from other green spaces Aires in only three (Ribera Norte, Vicente Lopez and Otamendi) of the five reserves studied in the metropolitan area of Buenos. Therefore we suggest that communication of the mission needs to be improve in the other two reserves. This could include the enhancement of environmental education trying at the same time to increase visitor participation in environmental actions. So, this kind of research can potentially assist administrators to understand better how visitors perceive reserves.

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