

## Urban rewilding: Human-wildlife relations in Genoa, NW Italy

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### ABSTRACT

In recent years, the presence of urban wildlife has increased in many cities around the world, with the consequent increase of human-animal relations. The city of Genoa (NW Italy) is a particularly complex case study where such phenomena are associated with rural depopulation of the surrounding countryside and spontaneous rewilding processes that have led several animal species to approach urban areas in search of new spaces. This paper deals with human-wildlife interactions in Genoa in relation to the geography of the city by way of a survey circulated throughout Genoa. Drawing from survey data, the research investigates residents' perceptions and understanding of urban wildlife in relation to their area of residency with a focus on wild boars. People's responses show that some areas of the city have a higher level of interaction with wildlife, and this partly affects the way in which such phenomena are perceived and tolerated by the population. In addition, the results show that there is no clear opposition towards urban wildlife and that people are concerned about sustainable forms of urban planning to the benefit of both residents and wildlife.

### 1. Introduction

As urban areas around the world are expanding, cities are emerging as new ecosystems for wildlife, creating dynamic spaces for human-animal interaction (Fardell, Pavey, & Dickman, 2022; Magle, Hunt, Vernon, & Crooks, 2012). This is particularly true in - but not exclusive to - European cities, where, in addition to increasing urbanisation, rural areas have undergone rapid landscape and ecosystem changes that have favoured the return of wildlife and their successive expansion towards and into suburban and urban areas (Martinez-Abraín et al., 2020). Although the number and diversity of species living in urban areas ranges significantly, some animals appear to have a greater impact than others, particularly large mammals such as the wild boar (*Sus scrofa*). This large ungulate is found in several cities of central and southern Europe including Barcelona (Castillo-Contreras et al., 2018), Berlin (Stillfried et al., 2016), Warsaw (Jacubiak & Klich, 2021) and Rome (Primi et al., 2016). In addition to the wild boar, other common sightings in European cities are mammals such as red foxes (*Vulpes vulpes*) (Padovani, Shi, & Harris, 2020), eurasian otters (*Lutra lutra*) (Bouros, Bărbulescu, & Cioflec, 2020) and deer (Ciach & Fröhlich, 2019). Whilst certainly the source of delight for many, human-wildlife relations in

urban spaces have often been generally associated with potential conflicts and issues for both wildlife and people, although these vary depending on geographical, economic, and social reasons. Strategies to mitigate them should involve urban planners, wildlife practitioners, social scientists, and policymakers (Schell et al., 2020).

Many urban geographers have explored the notion of 'animal spaces, beastly places' (Philo and Wilbert, 2000), considering cities as fundamentally more-than-human environments. One of the more charismatic consequences has been the (re)appearance of diverse - often perplexing and peculiar - 'wild' animal species in 'domestic' 'human spaces' (Searle & Turnbull, 2021) rather than the nonhuman protagonists habitually encountered in urban spaces. Capturing the imagination of a distinctly immobile human population in recent years - owing to the COVID 19 pandemic - the animals' appearance in urban places were spectacular icons of what has been described as 'resurgent nature' (Searle & Turnbull, 2021); 'animal spaces' within 'human places'.

Although the notion of 'wilderness' has always constituted an essential component of the 'anima urbis' only in relatively recent times it has been the object of specific studies and research (Wolch, 2002) alongside concepts of 'synurbization', intended as the process of adaptation of animal species to the specific conditions formed by a city and

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'synantropization', which consists in the propensity of species to live in close relationship with people, regardless of whether such species live in or outside the city (Andrzejewski, Babińska-Werka, Gliwicz, & Goszczyński, 1978; Luniak, 2004). This new wild dimension of urban spaces, driven by processes of land take, climate change, deforestation and reforestation contribute to the definition of cities as new habitats and to re-shaping the boundaries - both physically and imaginatively - between humans and non-humans in urban contexts (Pampaloni & Brocada, 2022). In this sense, recent works in geographical research focussed on the importance of 'urban forests' (Brocada, 2022) and 'wild urban woodlands' (Kowarik, 2005), intended as spontaneously reforested spaces of former industrial, military, or agricultural areas in urban and *peri* urban environments lacking formal management. According to Tononi and Pietta (2021) such phenomena, effectively described as processes of 'urban rewilding', are increasingly crucial to current urban management policies and to an extent can be driven and actively planned. However, in most cases these are largely unplanned processes that can have different and contrasting impacts depending on geographical and environmental factors. 'Wild' elements in urban spaces can facilitate reconsideration of the links between urban and non-urban areas, contributing to improvements in the visual and structural aspects of unplanned and degraded areas, what Clément (2005) defined as 'third landscape'. More frequently, however, spontaneous rewilding is often negatively associated to abandonment and lack of planning; recently grown woodlands are often impenetrable due to extensive bramble and shrubs growth. In addition, the expansion of wood formations in previously managed areas and lack of woodland management is associated to loss of biodiversity due to the predominance of invasive species (Varotto, 2017). The return of some of these species has been considered problematic for human-nonhuman co-dwelling strategies throughout their shared ranges - including within the urban city limits - revealing conflicting agendas of biodiversity, on one hand, and biosecurity agendas on the other.

In the last decade, the coastal city of Genoa (NW Italy) has seen a progressive increase of wildlife in the urban area. The city is built along the coast but very near the Ligurian Apennines where spontaneous

rewilding processes have been taking place since the post-war period, following the abandonment of the countryside with the return of various animal species which are progressively settling in peri-urban and urban areas (Bongi, Baruffetti, Gazzola, & O'Mahony, 2023; Piana, Watkins, & Balzaretti, 2021). Past research on urban wildlife in the city concerned introduced exotic species such as the grey squirrel (*Sciurus carolinensis*) (Lioy et al., 2019; Perry, 2004) and parrots and parakeets (*Psittacula krameri*, *Amazona ochrocephala* and *Amazona aestiva*) (Ferretti et al., 2022; Gereschi, Galli, & Borgo, 2022), however very little has been written on Genoese urban wildlife from an urban geography perspective. This paper examines the human-wildlife relations in Genoa with reference to the geography of the city itself, first looking at recent rewilding dynamics in terms of landscape changes and wildlife comeback. It thereafter discusses the results of a survey circulated amongst Genoese residents with the intention of assessing the types of wildlife relations, the intensity of interactions and knowledge and perception of wildlife. Although the study was not limited to a single species, due to its importance for the city of Genoa (Hearn, 2018), a significant part of the paper examines the role wild boar have in shaping and being shaped by the urban landscape of the city.

## 2. Genoa, NW Italy

### 2.1. The city of Genoa; story of a distorted human-nature relation

Genoa is a city of 560.688 inhabitants and the capital of Liguria, a small region arching around the Ligurian Sea in northwest Italy, stretching for 350 km between Tuscany (East) and France (West) (Fig. 1). The city is strongly associated with the Republic of Genoa, a formerly independent naval power (1099–1797) whose territory broadly corresponds with that of current Liguria. As the city lost independence in 1815, its economic, social, and demographic evolution in the last two centuries was strictly tied with that of the Sardinian Kingdom (1815–1861) and the Italian Kingdom. From the late nineteenth century, Genoa underwent rapid industrial development whilst the port, one of the largest in the Mediterranean, greatly grew in size

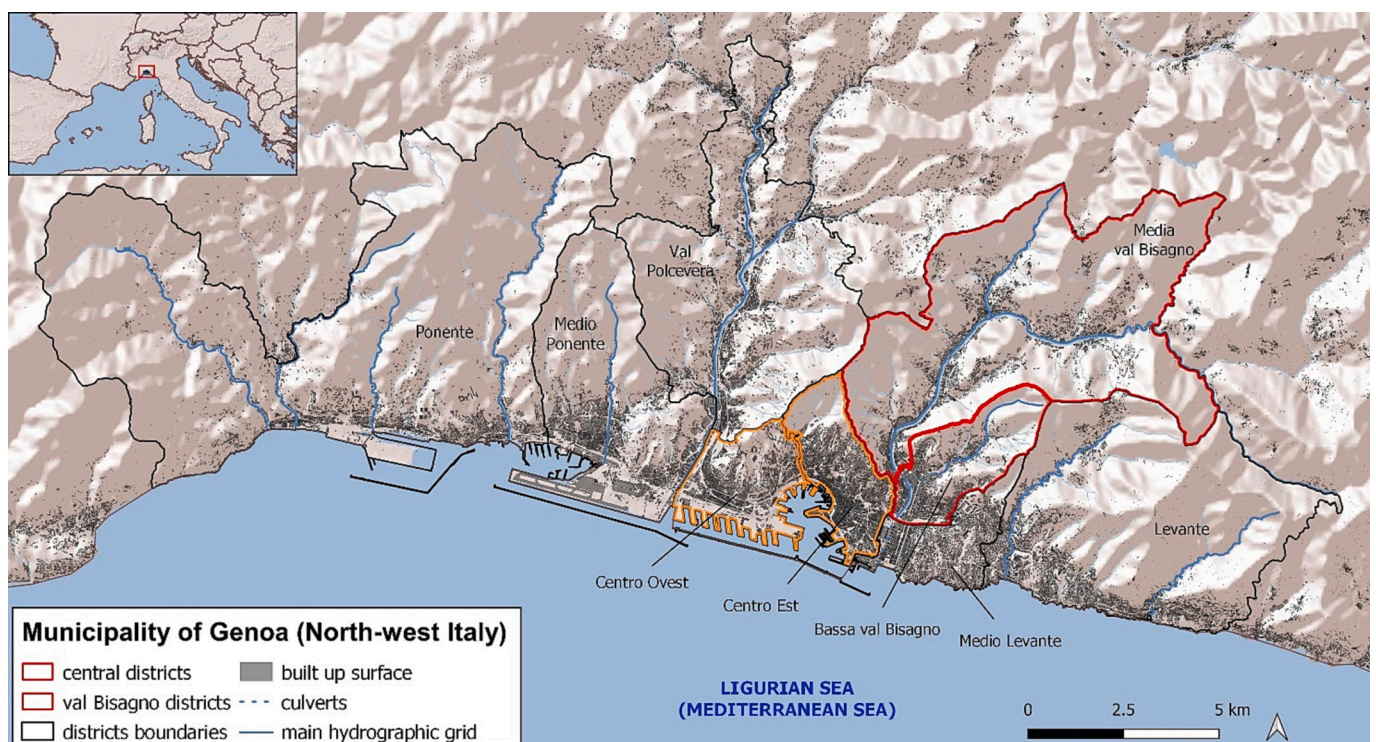


Fig. 1. The city of Genoa and its districts.

(Assereto & Doria, 2007; Piana et al., 2021). Due to the city's flourishing economy, similar to other industrial centres in northwest Italy, the population constantly grew from the late nineteenth century peaking in 1965 (848,121). The increased need for housing due to immigration meant that the city greatly expanded and grew in size, progressively incorporating coastal and inland villages now constituting part of Genoa's urban area.

From the post-war period, in the years of the Italian economic boom, the suburbs of the city surrounding the original medieval centre underwent rapid and often unregulated urbanisation processes. Poor urban planning measures, lack of landscape maintenance, and recent shifts in hydrological trends due to global climate change in an already fragile landscape directly contributed to the increased occurrence of floods in Genoa (Piana et al., 2019). Urban expansion phases during the 20th century involved large hillside areas with massive increase of soil sealing. At the same time, various rivers were culverted in their final stretches, or their riverbeds narrowed. Probably the most significant case is that of the Bisagno stream, the final stretch of which, between Brignole railway station and the mouth, was culverted in the 1930s (Faccini et al., 2016). Here, as in many other valleys of the Genoese area, rivers became marginal, neglected spaces if not completely erased from the urban landscape, as part of an explicit desire of the post-war urban administrators to separate urban from wild spaces; the human from the non-human. The temporary removal from Genoese's everydayness to the expense of their safety and sense of security during the very frequent heavy rain episodes hitting the city, particularly in the Autumn.

Whilst the flood of the Polcevera, Bisagno, and several other minor streams on the 7th October 1970 is still considered to have been the most destructive owing to the high number of fatalities (43), the city has encountered many other events ever since, particularly in the Val Bisagno (Faccini et al., 2016). Successive floods over the last 50 years have contributed to a general sense of insecurity and discontent amongst a large part of the population, particularly those living in flood risk areas, corresponding to 11 % of the total population. This coincides with economic depression of the most affected areas, as well as a general sense of social and environmental injustice due to a general absence of community involvement in the decision-making process. Particularly in suburbs and internal areas, the Val Bisagno being a significant case, previous qualitative research has shown a general opposition and social contestation to top-down technocentric approach to flood risk reduction following large scale measurements promoted at national level (Bonati, 2022). In recent years, these same areas have become the front line of a new challenge: namely, the increasing presence of urban wildlife, resulting from the fast and apparently irreversible rewilding processes occurring in the rural and urban areas of the Genoese municipality.

## 2.2. Rewilding rural and urban spaces

In the post-war period, as cities were growing, inland areas underwent rapid and dramatic depopulation with consequent losses of traditional agro-silvo-pastoral practices (Cevasco, 2007). One of the most immediate effects was the remarkable growth of secondary vegetation in formerly open areas, usually grasslands or wooded pastures (Piana et al., 2021). In the Val Bisagno, whose medium-lower stretch is included within the borders of the Municipality of Genoa, the wooded surface increased from 29 % in 1855 to 44 % in 1970 and 54 % in 2018 (Piana et al., 2019). Today, Liguria is Italy's most wooded region in relation to its size, with trees covering 80,8 % of its surface, a value which is well above national average (39,3 %). Woodland occupies 65,4 % of the Metropolitan Area of Genoa and 38 % of the municipality, a figure which is expected to furtherly grow as another 20 % of surface is characterised by shrubby vegetation and abandoned agricultural fields (11 %) (Brocada, Mondino, & Priarone, 2022). The landscape of Genoa is characterised by a neat separation between densely built-up surfaces along the coast and the main valley floors with hardly any green areas and the rest of municipal surface with woods, shrublands and abandoned fields

(Figs. 2 and 3). This division is not always clearly distinct, as spaces of mutual contamination are found along the edge of the urban area on the hills surrounding the city and along the riverbeds.

Similarly to the case of Barcelona (Castillo-Contreras et al., 2018) these 'rurban' environments have acted as ecological corridors for various animal species that move from the countryside to urban and suburban areas (Fig. 3). Several colonies of wild boar (*Sus scrofa*) are found in the middle and lower Val Bisagno (Fig. 1), but they are frequently sighted in other parts of the city, including the commercial and historical centre, while roe deer (*Caproleus caproleus*) is increasingly spotted in urban riverbeds. In September 2021, the first wolf (*Canis lupus italicus*) was seen in the bed of the Bisagno, probably a dispersed young individual attracted by the many ungulates in the area (Giordana, 2021).

Eurasian wild boar is historically endemic in the NW Italian region of Liguria, its presence attested to in diverse sources and to which a strong iconography associated with the symbolism of the 'hunt' was attached (Hearn, Watkins, & Balzaretto, 2014). However, in tracing the species history of the wild boar in Liguria, it is widely thought that the 'last' wild boar was hunted at Bardineto near Savona in 1814 (De Beaux & Festa, 1927). The disappearance of the wild boar coincided with a period of rapid population growth and associated intensification of agro-silvo-pastoral practices in the rural Ligurian hinterlands, with the populace of the interior increasing from 584,940 to 1,086,433 between 1805 and 1901 (Felloni, 1961); the Ligurian landscape became conspicuously 'dewilded' and various other 'wild' species similarly disappearing.

The return of the wild boar to Liguria was first detected following World War One, the species generally thought to have first naturally recolonised western Liguria from south-east France because of wartime military activities forcing wild boar populations over the Maritime Alps (De Beaux & Festa, 1927). These number of the species present in these early populations were augmented by translocations and reintroductions by hunting communities – both by local fraternities and the national *Federazione Italiana della Caccia* – during the twentieth century. However, whilst the return of the species to Liguria resulted from the combination of natural recolonisation of former territories and translocation reintroductions, these wild boars were advancing into increasingly empty territory, particularly from the 1950s when processes of rural depopulation and abandonment impacted the Ligurian interior. Ultimately representing a reversal of the 'dewilding' that led to the disappearance of the species in nineteenth century, the rapid depopulation and abandonment converted formerly intensive agro-silvo-pastoral landscapes into dense woodland as the hinterlands became rewilded creating the spaces and resources for the recolonisation by wild boar and other mammals (Hearn et al., 2014).

Such processes inevitably place considerable pressures on agriculture, with an ever-increasing onus being placed on local authorities to manage the spiralling numbers through a range of strategies, from the extension and refinement of long-established damage compensation schemes and selective trapping, to increased hunting quotas, prolongations of hunting seasons, and year-round extermination and proposed serialisation programmes. However, whilst the ever-ballooning – and seemingly unimpeded – numbers of wild boar pose myriad management dilemmas for rural Liguria, the increasingly pronounced and highly visible presence of the species is currently proving problematic and contentious in not only peri-urban areas, but also in decidedly urban contexts, particularly in the streets of Genoa (Hearn, 2018). Indeed, whilst the COVID-induced 'Anthropause' (Rutz et al., 2020) drew the gaze of many commentators to the appearance of incongruously 'wild' animals and more-than-human presences in the 'domestic' city (Marchi et al., 2022; Searle & Turnbull, 2021), the city of Genoa has long played host to a population of 'urban' wild boar, their presence in the city mirroring or even predating some of the more publicised presences of the species in other European cities.

The first notable presence of 'cinghiali urbani' in Genoa was in 2009, with the now 'famous' animal Pierino in the Castelletto quarter of the



**Fig. 2.** Landscape of the lower stretch of the Val Bisagno showing the contrast between the intense urbanisation of the urban areas and the surrounding woodland (photo by the authors).

city. 'His' presence in the city was variously attributed to the encroachment of woodland in the peri-urban areas of Genoa, the density of the species in the hills surrounding the city, the ready availability of food, and even nefarious behaviours of environmental groups. Since Pierino's mysterious disappearance, Genoa's wild boar population has long since extended beyond the original territories at Oregina, Righi, Marassi, and the Bisagno riverbed, footage and photos of the animals consistently featuring in local press and on social media, frequenting all manner of urban contexts in Genoa, and even on beaches and in the sea along the Ligurian rivieras.

Despite the often humorous and surreal appearances of the wild boar in increasingly incongruous urban contexts, the animals are a contentious presence, and one warranting attention, not only for the issues posed to the safety of the public, property, and domestic animals, but most recently in terms of their role in spreading African swine fever during outbreaks in early 2022 in northwest Italy (Iscaro et al., 2022). This outbreak resulted the initial cancellation of hunting activities, and use of many woodlands and their associated economic and leisure activities in the affected areas. Moreover, the impact of a poorly conceived cull of innumerable pigs kept in domestic and market-oriented contexts, will surely be felt for years to come, whilst the wild boar population remains unimpeded.

### 3. Research design

This paper discusses the results of a survey conducted between 3rd December 2021 and 12th January 2022 circulated via various social networks (Instagram, Facebook, Whatsapp). The intention of this questionnaire was to explore and extrapolate the attitudes, perceptions, and relationships between residents of the city of Genoa with different wildlife species, particularly in regard to the following issues;

- A) **Observation** - If, how much, where and when they have seen wild boars and roe deer in their area of residence, and if they have seen - at least once - other animals;
- B) **Behaviours and feelings** - in particular, regarding the need to kill wild boars present in urban areas so as to ensure the safety of citizens; on how much the habit of feeding wild boars contributes to consolidating their presence in the city, and on the sensations experienced by sighting them in the city;
- C) **Awareness** - regarding the reasons for the increase in the number of animals in the city;
- D) **Additional thoughts** - opportunity was provided for respondents to express themselves freely on the subjects raised by way of open questioning.

Whilst the call for participants was circulated by way of the aforementioned networks, including over local radio, respondents were also derived via snowball sampling, and although it is a non-probabilistic sample, the methods adopted attracted a sample representative of the population under scrutiny. Given the overall population of Genoa, the number of responses obtained (456) is statistically significant (Krejcie & Morgan, 1970). Considering that most of internet users fall in the most represented age group (25–65), the sample is significant also from this point of view (Fig. 4). In terms of gender, females are more represented (60 % of the total sample). These data appear in line with the higher participation to online surveys by female respondents pointed out by Smith (2008). As is often the case for online surveys, the level of education is generally higher than the target population as 58 % of interviewees declare to have a degree (Duffy, Smith, Terhanian, & Bremer, 2005; Saloniki et al., 2019, Fig. 5). In terms of employment 62 % of interviewees are civil servants, private employees and self-employed, whilst workmen and artisans are less represented (less than 6 %).

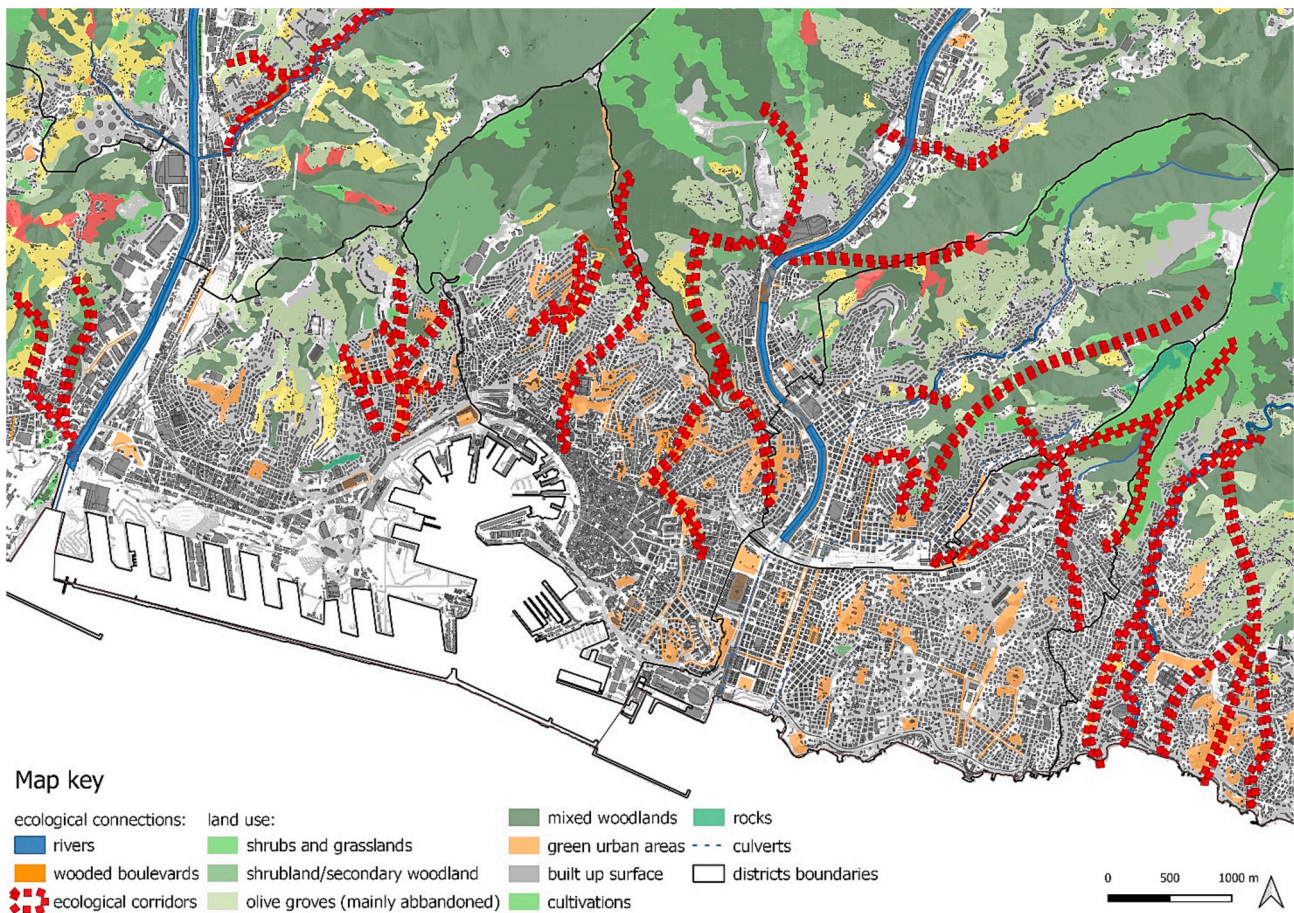


Fig. 3. Land use map and ecological corridors in the city of Genoa.

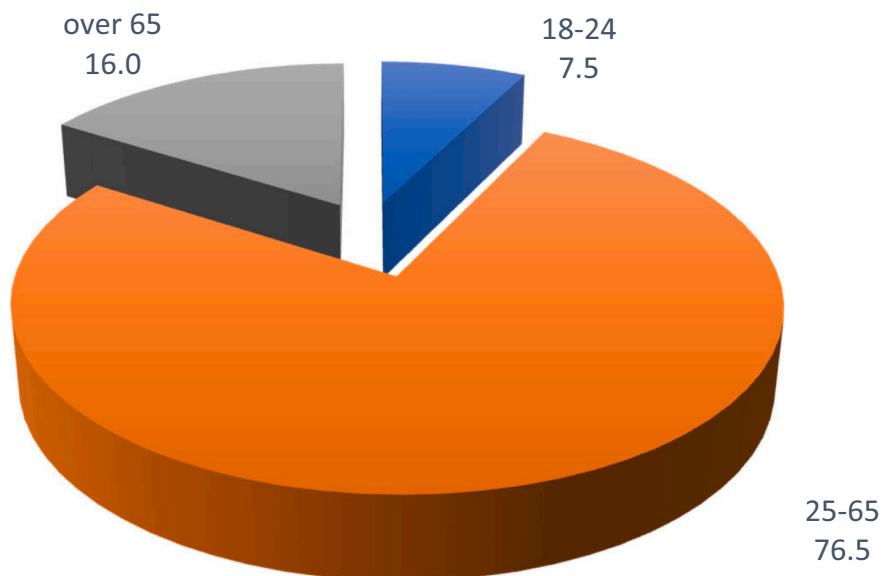


Fig. 4. Sample by age.

Retired people are just above 17 % while students are 10 %. The survey was addressed to adults residing in the municipality of Genoa, but the focus of the research was on two specific areas of the city, notably Central Genoa and the Val Bisagno (Fig. 1). While Central Genoa is only partly characterised by the presence of urban animals, the Val Bisagno is

the most affected area of the city. This geographical subdivision was considered functional to measure the intensity of interactions in different geographical areas and to assess whether people's perspectives on the theme varied according to their area of residency. Overall, 150 respondents (32,9 %) are from the Val Bisagno and 163 (35,7 %) from

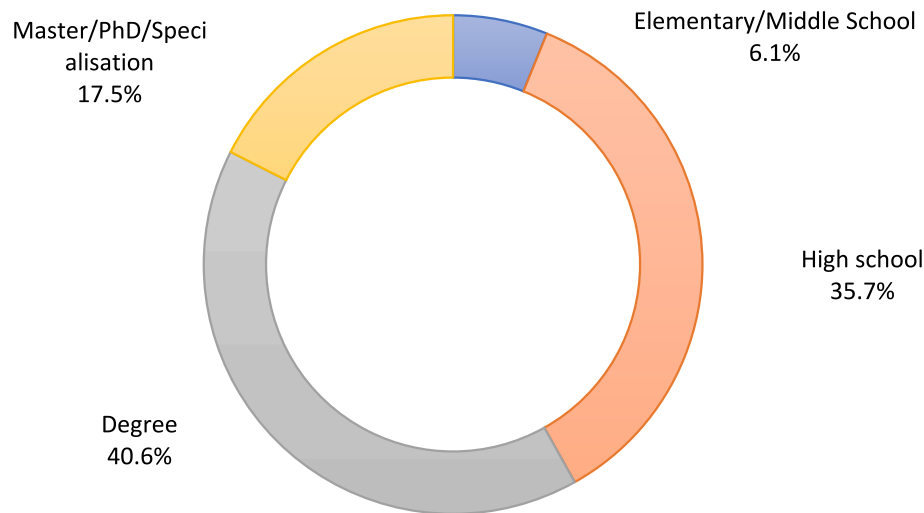


Fig. 5. Level of education.

Central Genoa.

#### 4. Results

##### 4.1. Urban animals and everyday life

A set of questions aimed at defining and quantifying the intensity of people-animals interaction in the city related to two particularly representative species of large mammals; wild boar and roe deer. The breakdown by geographical areas in the city shows how more than half of respondents of the Val Bisagno encountered wild boar in their area multiple times daily (36,7 %) or once a day (27,3 %), while only 0,7 % had never seen a wild boar (Fig. 6). Central Genoa shows almost opposite results, with 27,0 % and 28,8 % who respectively reported to only having seen wild boar once a year or never.

In terms of where wild boar were more frequently spotted, riverbeds

prevailed amongst residents of the Val Bisagno (85,3 %) and for the city in general (46,5 %), whilst trash areas and green spaces showed similar percentages (around 30 %) in all the geographical sectors (Fig. 7). A significant percentage of respondents residing in central Genoa saw wild boar in roads and squares (17,8 %). Sightings of wild boar were reported during the day and night, particularly in the Val Bisagno (52,7 %), but the answer prevailed also for the two remaining areas (Fig. 8). Only in central Genoa were the percentage of sightings at night slightly higher (26,4 %). One potential explanation is that wild boars look for food in built-up areas during the night, when they are usually more active, while during the day they retire to the hills or in riverbeds.

Although their number in the Apennines is growing, the level of interaction between respondents and roe deer is not comparable to wild boar. Due to their nature as an herbivore and elusive behaviour, roe deer seem to be less capable of permanently settling in urban areas. However, in some parts of the city this ungulate is frequently spotted, although not

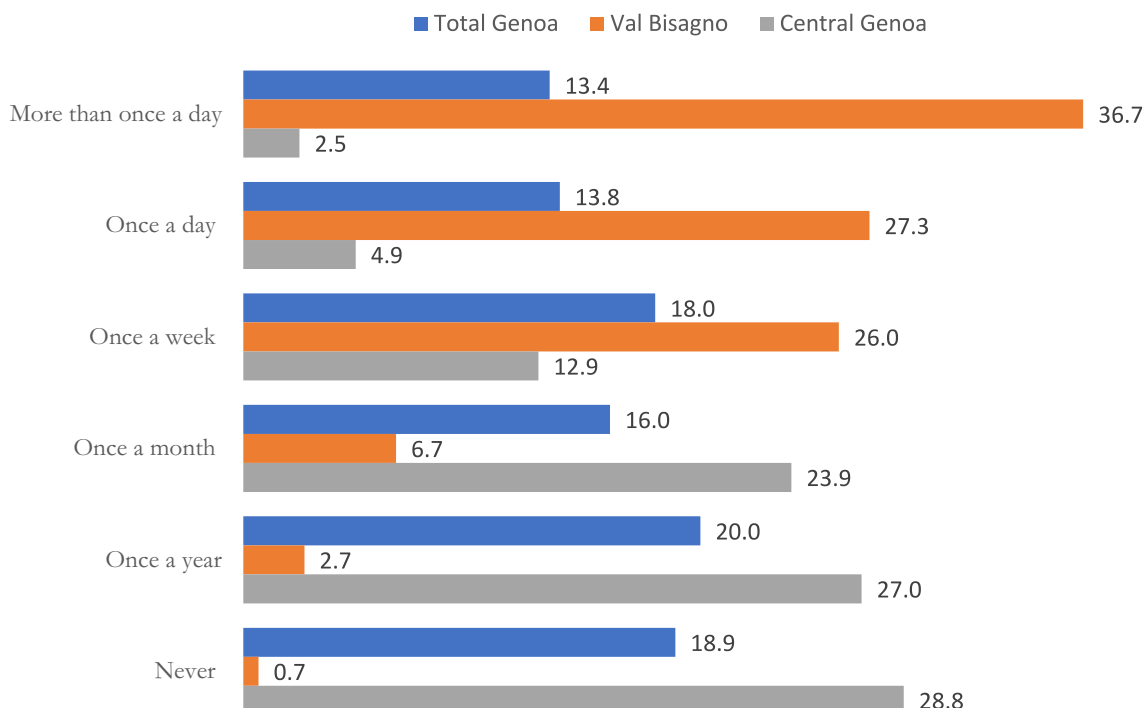


Fig. 6. How frequently do you see wild boars in your area of residence?

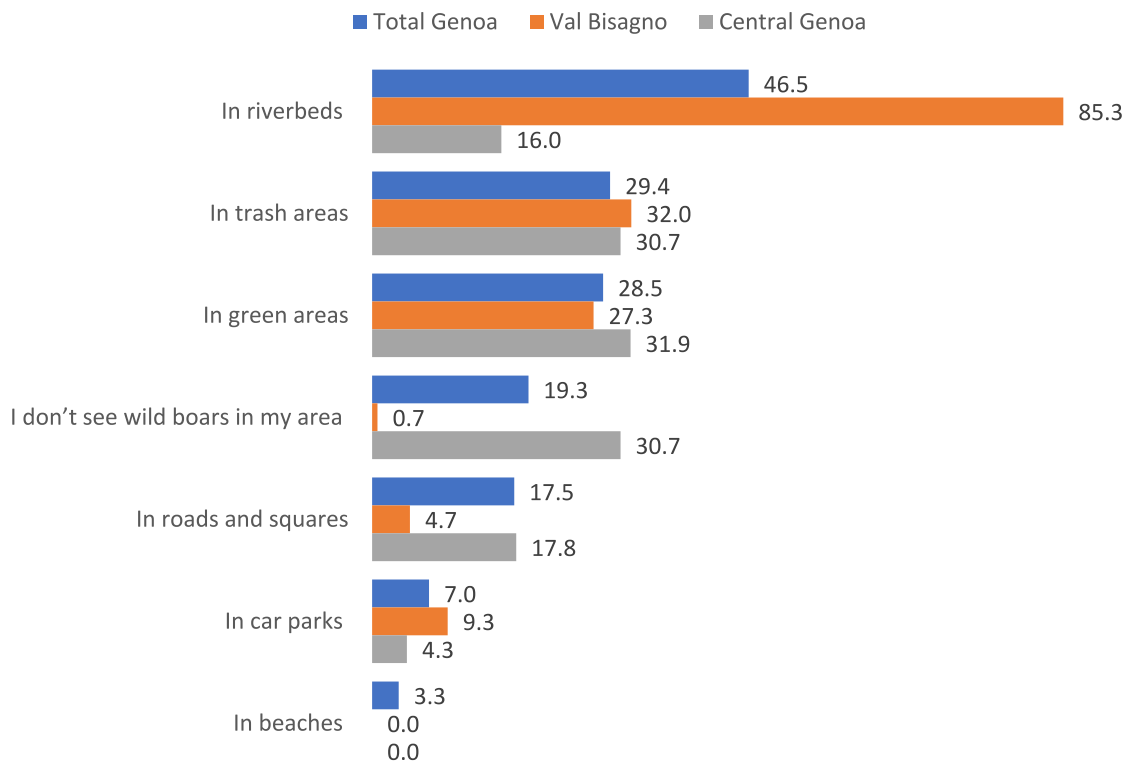


Fig. 7. Where do you see wild boars more frequently in your area of residence?

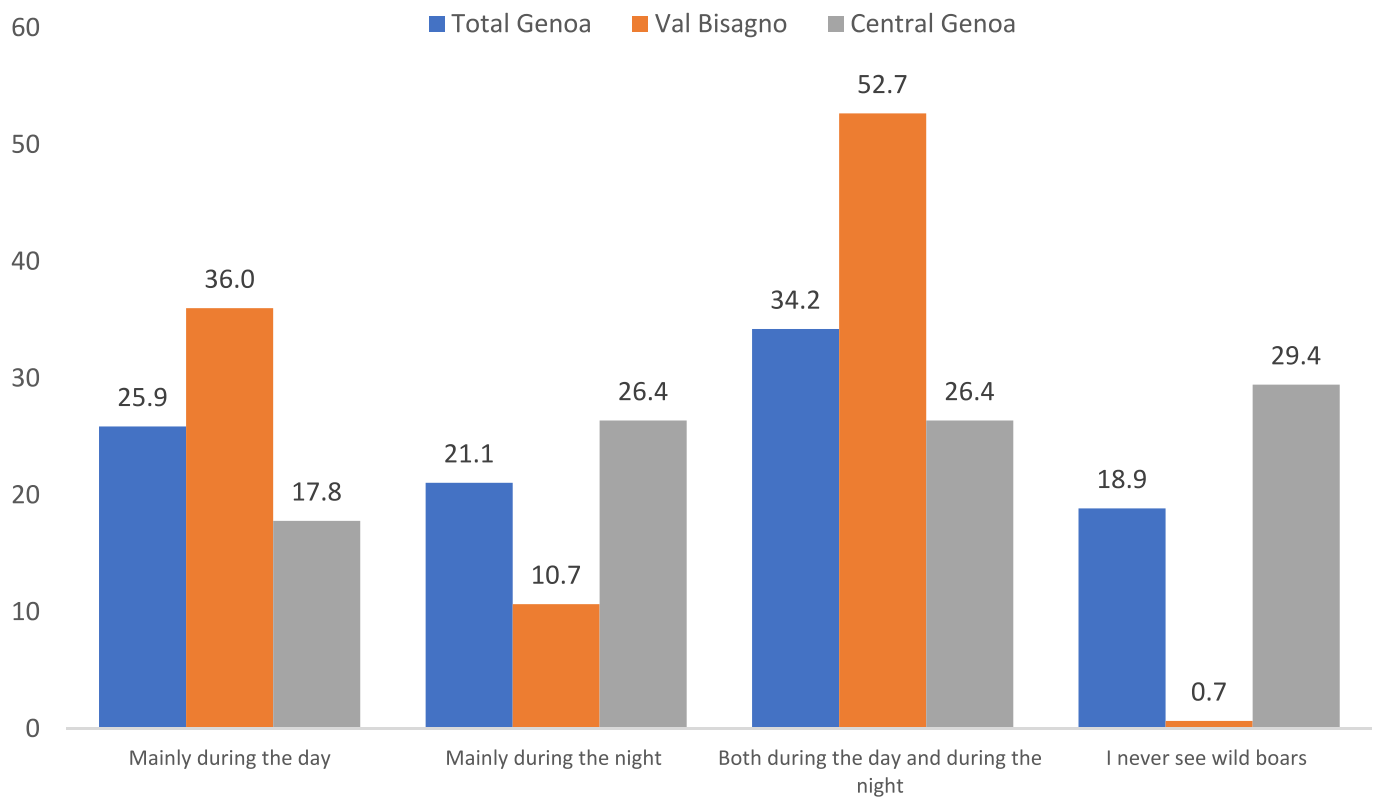


Fig. 8. At what time of the day do you see wild boars in your area of residence?

as regularly as wild boar. Even in this case, the Val Bisagno exhibits the highest intensity of interactions, with 4,7 % of respondents declaring to have seen roe deer once a week and 15,3 % once a month. However, the majority of respondents declared that they had never seen a roe deer in

their area of residence, a value which is high in central Genoa (89,0 %) and in the city overall (75,9 %) and lower in the Val Bisagno (58 %). Areas where roe deer are more commonly sighted are riverbeds (22,7 % in the Val Bisagno) and green areas (22,7 % in the Val Bisagno and 16,2

% at city level). This data confirms that unlike wild boar, roe deer are still mainly connected to natural or semi natural spaces in urban contexts, avoiding heavily built-up areas.

A final set of questions was aimed at identifying other commonly sighted animals in the urban area. Respondents were asked to indicate animals that they saw at least once in their area of residence, based on a list of species, divided into medium-large mammals, small mammals, birds and reptiles/amphibians, with the option to indicate other species not included in the list. The most interesting responses are summarised in Table 1. Amongst the larger mammals, wild boar and roe deer were the most commonly spotted species, followed by foxes (16 % of total respondents and 22 % of Val Bisagno residents). Other species such as badger (10,5 % total, 11,3 % Bisagno) and fallow deer (6,6 % total, 12,0 % Bisagno) also featured. The wolf is rarely seen in the urban area, with sightings concentrated in the Val Bisagno (3,3 %). Interestingly, 18 % of respondents and 27,0 % of those living in the centre declared not to have seen any large mammal in their area of residence, while in the Val Bisagno this value is 0.0 %. Arguably, due to their mainly diurnal activity, their attractive colours and their sounds, birds are easily spotted in cities, although their species are often difficult to identify by non-experts. In addition to pigeons, doves and seagulls, whose long-lasting presence in the city is well-known, the data on parrakeets are particularly significant. These birds are seen by a large majority of Genoa residents (75,2 %), but unlike previous cases sightings are particularly concentrated in the centre (79,1 %) and less in the Val Bisagno (65,3 %), similarly to what reported by Ferretti et al. (2022). Other representative birds are the pheasant, regularly spotted in the Bisagno riverbed (53,3 % of Bisagno residents saw it at least once vs 28,5 % of the total) and diurnal and nocturnal prey birds.

#### 4.2. Knowledge and perception of urban wildlife

Having established baseline understandings concerning the interaction with large mammals and typologies and distribution of diverse species, a set of questions investigated what the Genoese considered as the main causes of the increase of animals in the city (Fig. 9). Respondents were asked to provide their level of agreement against a set of potential explanatory factors, according to a Likert scale. While for some factors there was a strong level of consensus, others were considerably more varied. For example, more than half of respondents (59,1 %) strongly disagreed that the restriction of hunting laws explained the increase in urban animals. Instead, a large majority (strongly agree: 49,4 %, agree 38,0 %) thought that the availability of food contributed

**Table 1**  
Which animals did you see at least one time in your area of residence? (% out of respondents by geographical area).

Animal	Total Genoa		Val Bisagno		Central Genoa	
	a. v.	%	a. v.	%	a. v.	%
Mammals						
Wild boar	360	78,9	147	98,0	114	69,9
Roe deer	100	21,9	54	36,0	19	11,7
None of these large mammals	82	18,0	0	0,0	44	27,0
Fox	73	16,0	33	22,0	25	15,3
Badger	48	10,5	17	11,3	11	6,7
Fallow deer	30	6,6	18	12,0	2	1,2
Wolf	7	1,5	5	3,3	1	0,6
Birds						
Parrot	343	75,2	98	65,3	129	79,1
Pheasant	130	28,5	80	53,3	20	12,3
Diurnal bird of prey (Buzzard, Kestrel, etc)	117	25,7	44	29,3	35	21,5
Nocturnal bird of prey (Tawny owl, Little owl)	76	16,7	21	14,0	30	18,4
Magpie	24	5,3	10	6,7	8	4,9
Jay	17	3,7	3	2,0	7	4,3

to this phenomenon. ‘Reduction of natural habitats’ had a high level of agreement, whilst ‘abandonment of countryside’ and ‘reintroduction’ contrasted more. In particular for the latter, more than half of respondents either strongly disagreed (28,4 %) or disagreed (32,7 %).

A third set of questions explored perception of urban wildlife and opinions on management strategies. The assumption here is that perspectives varied in relation to the intensity of human-wildlife interaction in Genoa's different areas. Through a Likert scale questionnaire, respondents indicated their level of agreement with three core statements (Table 2, 3 and 4). In general, respondents had contrasting opinions on selective hunting, although the majority of them considered it controversial measure: at city level 31,8 % strongly disagreed, 18,6 % and 23,7 % agreed and strongly agreed with the fact that wild boars should be killed for safety reasons (Table 2). In central Genoa, where less interaction between people and wild boar occurs, the levels of disagreement were higher than the total. The data of the Val Bisagno, instead, showed that even in an area where more than half of respondents see wild boar daily, there was no clear-cut opinion on selective hunting, although those in favour of selective hunting are 26,7 %, the highest figure of all.

One of the main issues public institutions have faced is people purposely feeding wild boar despite this being forbidden by a municipal law and widely discouraged (Comune di Genova, 2011). The large majority of respondents (76,5 %) strongly agreed that feeding wild boar was wrong as this contributed to their presence in the city, a percentage higher in the Val Bisagno (82,7 %) and lower in central Genoa (68,7 %). A very minor share of people strongly disagreed with this statement; in the Val Bisagno, where the practice of feeding wild boars is more common, the percentage is slightly higher than the total, although still very low (4,7 % vs 3,3 %). The majority of respondents strongly disagreed (61,2 %) or disagreed (27,9 %) with the statement that the presence of wild animals indicates an improvement in the environmental conditions in the city.

A final question related to people's feelings and reactions in case of interactions with wild boars, introducing a series of different scenarios. Table 5 shows that the level of fear and general intolerance towards wild boars is slightly higher amongst residents in the Val Bisagno. Here 42,7 % of interviewed residents referred to be afraid by wild boars if they are close to them, a percentage which is lower amongst interviewees overall (37,3 %) and residents in central Genoa (34,4 %). A significant share of people is afraid to encounter wild boars at night, particularly in the Val Bisagno, where they are 38,7 % of the total, a percentage significantly higher than the figure at city level (29,2 %) and in central Genoa (23,9 %). The Val Bisagno is the area of Genoa where more people are afraid of wild boars if they are walking with their dogs or when they are carrying food. At the city level, 18 % of interviewees are indifferent towards wild boars, while 15,6 % is interested on them, a percentage which is higher in the Val Bisagno (25,3 %) and even more in central Genoa (34,4 %). Only 8,7 % of residents in the Val Bisagno are surprised by seeing wild boars, the percentage being significantly lower than the city overall (14,0 %) and central Genoa (15,3 %); such low percentages provide evidence that the majority of Genoese people are used to what is quite a common sighting either in their area of residence or in other districts of the city. A relatively low percentage of respondents feel anger when they see wild boars (12,3 %): the percentage is higher in the Val Bisagno where it reaches 18,0 %, while it is lower in central Genoa (8 %).

The survey had a final open-ended section to allow respondents to add further thoughts about urban nature in Genoa. Although this was an optional part of the questionnaire, a fair number of respondents (n = 77) shared views on the theme, confirming the interest of the topic amongst the public. The diverse range of answers and perspectives on the management of nature and animals in urban spaces showed contrasting opinions in terms of perception and potential solutions. In general people acknowledged that urban wildlife is a very significant issue in Genoa, some species being more problematic than others, but a significant quota of comments shows positive attitudes towards urban animals. Wild boars are seen as a serious problem to traffic, particularly as



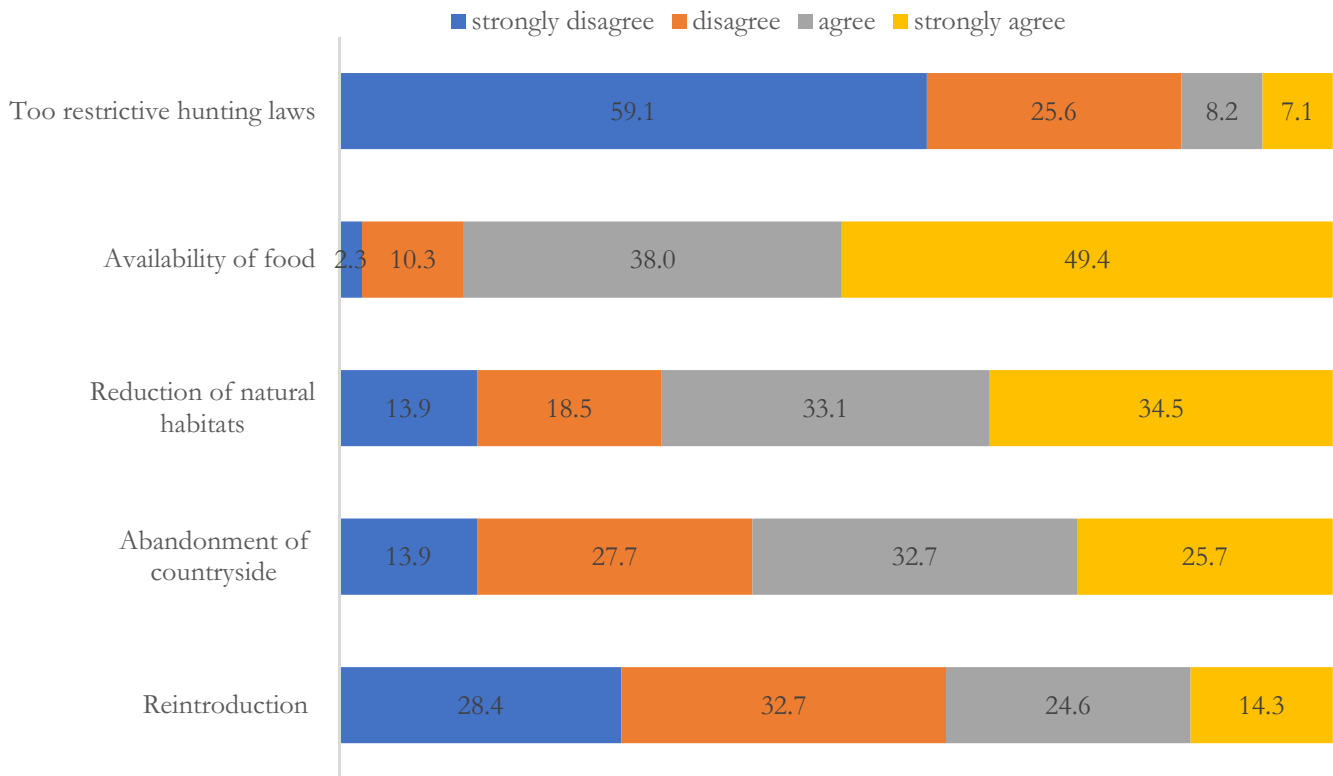


Fig. 9. What are the main reasons of the increase of animals in the city of Genoa?

Table 2

Wild boar should be killed for safety reasons (1: strongly disagree; 2: disagree; 3: agree; 4: strongly agree).

Score	Total Genoa		Val Bisagno		Central Genoa	
	a.v.	%	a.v.	%	a.v.	%
1	145	31,8	52	34,7	53	32,5
2	118	25,9	29	19,3	55	33,7
3	85	18,6	29	19,3	25	15,3
4	108	23,7	40	26,7	30	18,4
Overall	456	100,0	150	100,0	163	100,0

Table 3

Feeding wild boar and other animals is wrong and it contributes to the problem of urban wildlife (1: strongly disagree; 2: disagree; 3: agree; 4: strongly agree).

Score	Total Genoa		Val Bisagno		Central Genoa	
	a.v.	%	a.v.	%	a.v.	%
1	15	3,3	7	4,7	5	3,1
2	40	8,8	10	6,7	20	12,3
3	52	11,4	9	6,0	26	16,0
4	349	76,5	124	82,7	112	68,7
Overall	456	100,0	150	100,0	163	100,0

Genoa has a very high incidence of scooters and motorbikes, one of the highest of the country. Some respondents stated that the constant presence of wild boar generated a sense of insecurity and carelessness ('seeing rivers full of vegetation makes me angry...but overall, I am very scared to see wild boars, even at day and on beaches [...] F, 25–65, San Fruttuoso, Val Bisagno). Others argued that wild boar contributed to landscape disruption in an area already affected by hydrogeological instability. An interviewee from the Val Bisagno stated: 'I live in the heights of Staglieno, where there is an invasion of wild boars, which are causing increasing damages to private property lands. They destroy dry stone walls when they dig looking for food, including the walls in my

Table 4

The presence of wild animals in Genoa is a sign of the improvement of environmental conditions in the city (1: strongly disagree; 2: disagree; 3: agree; 4: strongly agree).

Score	Total Genoa		Val Bisagno		Central Genoa	
	a.v.	%	a.v.	%	a.v.	%
1	279	61,2	88	58,7	104	63,8
2	127	27,9	49	32,7	42	25,8
3	37	8,1	10	6,7	14	8,6
4	13	2,9	3	2,0	3	1,8
Overall	456	100,0	150	100,0	163	100,0

Table 5

What is your reaction when you see wild boars? (% out of total of each geographical area).

Feelings and reactions	Total Genoa		Val Bisagno		Central Genoa	
	a.v.	%	a.v.	%	a.v.	%
If you are close to them, you are scared	170	37,3	64	42,7	56	34,4
If you see them at night, you are scared	133	29,2	58	38,7	39	23,9
You are indifferent	82	18,0	26	17,3	31	19,0
You are interested	71	15,6	38	25,3	56	34,4
If you are with your dog, you are scared	70	15,4	27	18,0	18	11,0
If you are carrying food, you are scared	64	14,0	25	16,7	19	11,7
You are surprised	64	14,0	13	8,7	25	15,3
You feel anger	56	12,3	27	18,0	13	8,0

property, with consequent high economic damage [...] it is impossible to stay in my garden, I once counted nine of them' (F, 25–65, San Fruttuoso, Val Bisagno).

According to 13 respondents out of 77, animals should be removed from the city centre and discouraged from living in urban spaces, for example by creating fences and gates along riverbeds. Such perspectives show that people are worried about public safety and forced coexistence in heavily built-up areas such as the Val Bisagno, but at the same time they document how most of respondents are also concerned about animals' welfare. This is confirmed by several comments of people in favour of more sustainable urban planning projects, the creation of green areas near the city and respect for the environment, particularly rivers that should be restored. In this sense, a change of paradigm at public opinion level through 'correct environmental education and environment protection awareness' (F, over 65, Sestri Ponente, rest of Genoa), 'starting from schools' (F, 25–65, Sturla/Quarto, rest of Genoa) is considered crucial.

As also shown by other answers to the survey (Table 2), opinions on hunting are very diverse and only 3 respondents are in strong favour of selective hunting. A respondent from Struppa, Val Bisagno referred to "hope that in the future hunting will not be an (expensive) 'hobby', a sport or a macabre entertainment (for some rare cases) but, like in countries with a higher ecological awareness such as the United Kingdom, will be a job carried out by professionals who work for the overall ecosystem conservation" (M, 25–65, Struppa, Val Bisagno). Two people suggested that wild boar should be neutered, while the availability of food is often seen as the main cause behind the presence of wildlife in urban spaces in accordance with the results of Table 3 and with what experts argue (Ferretti & Chiaranz, 2021).

There are also very positive considerations on urban wildlife, evidencing the diverse responses of the public opinion to this controversial theme. The sight of urban animals is a source of entertainment and 'a spectacle to the eyes' (M, 25–65, Sampierdarena, Central Genoa) and 'the city would be a sadder place without them' (F, 25–65, Prè-Molo-Maddalena, Central Genoa). Another respondent from San Fruttuoso, Val Bisagno, declared that 'I don't mind these urban guests, but we have to find a balance and stop rural depopulation, which does not help

landscape maintenance for hydrogeological stability' (F, 65+, San Fruttuoso, Val Bisagno). A respondent from Struppa in the Val Bisagno regarded the presence of urban wildlife as a sign of better environmental conditions than in the past: 'some progresses were made for what concern pollution: in the 1980s the Bisagno was full of foam and the water was reddish, now things are way better and the presence of wildlife in the riverbed is a good measure of such improvement' (M, 25–65, Struppa, Val Bisagno) (Fig. 10). Finally, a respondent from Sturla pointed out that the presence of animals in riverbeds should be enhanced through the establishment of birdwatching sheds that it should be used by schools 'to educate school children to nature respect and appreciation' (F, over 65, Sturla/Quarto, rest of Genoa).

## 5. Discussion and conclusions

Following the depopulation of mountain and hillside areas, Liguria is undergoing a process of spontaneous rewilding which is manifesting in the rapid regrowth of secondary vegetation and the reappearance of wild animals, including wild boar, roe deer and the wolf. In recent times, once 'dewilded' urban spaces, notably coastal cities, Genoa being a significant example, are increasingly populated by a growing number of wild animals whose distribution range has significantly expanded, the wild boars and the wolves being two significant examples. Following their reappearance in the early twentieth century, today some 1.5 million wild boars are estimated in Italy (ISPRA, 2023), and more than 80,000 in Liguria, although such figure might be underestimated (Genova24, 2021). From the 1970s, wolves have progressively expanded north along the Apennines ridge (Bongi et al., 2023) and according to ISPRA (2021), today 102 wolf packs are found in the Western Alps and Liguria, a number which is constantly rising and includes a growing number of animals living around the city of Genoa, particularly the Val Bisagno (Giordanella, 2021; Rossi, 2023). Given the increasing number of urban animals, in 2011 the Municipality of Genoa established a regulation for the protection and wellbeing of animals in the city



Fig. 10. A solitary wild boar in the Bisagno riverbed at Marassi, Central Genoa (photo by the authors).

(Comune di Genova, 2011) related to both domestic and wild species. The document acknowledges that today animals are a constant presence in the urban landscape and that the active involvement of the population is increasingly important. This is also confirmed by some citizen science projects carried out by the municipality on the presence of various species including parakeets (Ferretti et al., 2022) and magpies (Borgo, Galli, Galuppo, Maranini, & Spanò, 2005).

Given a general lack of existing academic literature on the Genoa case, the present paper sought to expand studies on urban wildlife summarising the recent evolution of urban animals' expansion in the city and the resulting human-wildlife relations. The results document high interaction with several animals, particularly mammals (wild boars, but also roe deer, foxes, badgers) and birds (parrots, pheasants, birds of prey), with differences between species and geographical areas, documenting the importance of people's involvement in urban wildlife studies. Although the study was not limited to a single species, particular emphasis was put on the wild boar. Such ungulate today is a constant presence in several parts of the city and 78,9 % of respondents saw a wild boar at least one time in their area of residence, but in the Val Bisagno the percentage is almost 100 % (Table 1).

One of the premises of this study was that the level and intensity of interaction with urban wildlife varies in relation to the area of residency and that this influences the way people perceive this phenomenon and their opinion on how to manage it. The results show that in some parts of the city a high percentage of citizens have daily encounters with wild boars (64 % of respondents living in the Val Bisagno) but the figures vary significantly to the extent that at city level this percentage is 9.9 %. Occurrence and intensity of encounters confirm that riverbeds in Genoa are crucial ecological corridors where urban wildlife gathers and moves along (Figs. 2 and 3). Riverbeds in the Val Bisagno is where animals (wild boars, but also roe deer and pheasants) are spotted the most, but many sightings also occur in trash areas, roads and squares. This raises management questions due to public health, road accidents and potential attacks to domestic animals but local administrations should not neglect that such a situation is ambivalent and also affects animal welfare due to the many road killings and unnatural feeding habits.

In recent times anti-wild board trash bins and fences along riverbeds have been established in the Val Bisagno (Meoli, 2021), but such measurements are not sufficient and selective hunting is often regarded as the only solution. Following the emergency of an African swine fever outbreak in Liguria and southern Piedmont (including Genoa) from January 2022, the 2023 budget law (Gazzetta Ufficiale della Repubblica Italiana, 2022) has modified article 19 of law 157 (1992) introducing the possibility of hunting in urban and protected areas. In June 2023 Liguria regional authority promoted large scale wild boar hunting involving 800 hunters in the swine flu "red zone" and selective hunting operations already took place in central Genoa (Meoli, 2023). However necessary selective hunting is for some specific situations, such measurement, if not correctly carried out, might not solve the problem in the long term (Milner, Nilsen, & Andreassen, 2007) and alternative solutions are necessary.

In addition, the results of the survey show that although where wild boars are more numerous people have the highest level of fear and hanger towards them, hunting is not considered a solution by most respondents (Fig. 9 and Table 2). In the Val Bisagno people in favour of hunting are slightly more and this might be due to the higher intensity of interactions; however, the number of respondents from the Val Bisagno completely against hunting is even higher.

A large majority of respondents regard the availability of food as a reason of the presence of urban animals (Table 3). Alternative and more popular solutions amongst interviewees were provided in the free comments sections. Several interviewees suggest other management policies that would also improve animal welfare including relocation, river restoration and creation of green areas. Such positions should not be disregarded by local administrators and raise questions about broader urban and countryside landscape management strategies in the medium

and long term. In addition, several free comments show that there is a general positive attitude towards urban wildlife. Wild boars are generally seen as problematic, as also pointed out by previous research for Genoa (Ferretti & Chiaranz, 2021; Hearn, 2018) and elsewhere (Primi et al., 2016; Stillfried et al., 2016), but for some people their sight in rivers is positive and their presence an occasion of educational activities for school children (Calandri, 2023). Even more positive attitudes are shown towards other animals in the city, particularly animals in riverbeds and birds. Such results are in line with what outlined by those Ferretti et al. (2022) and show that such animals are generally well tolerated by the population.

Overall, the research has shown the complexity of city wildlife management in the context of urban and rural rewilding processes in Genoa and Liguria. Answers and opinions are diverse and show that people do not have a clear-cut perception and idea of urban animals and how to manage it. In some cases, there is a link between the area of residency and people's feelings and reactions; people living in the Val Bisagno have a higher level of fear and intolerance towards wild boar, while people living in the centre, where the interaction is lower, are less likely to be upset. As such, geographical approaches to explorations of the animal presence in urban areas provide profound insights into interspecies relationships. In general, it should be noted that there is no clear opposition towards urban wildlife and that people are concerned about sustainable forms of urban and landscape management that promote a peaceful coexistence with animals. Whilst consistently applying national and European regulations aimed at guaranteeing public safety, local institutions should be aware of and consider the emotional response of the population on such a multilayered theme. As one of the first European cities to face the phenomenon of urban wildlife, Genoa can act like a laboratory where to develop participatory management practices that take into consideration the geographical and social context.

#### CRediT authorship contribution statement

**Pietro Piana:** Conceptualization, Investigation, Methodology, Writing – original draft, Writing – review & editing, Supervision. **Lorenzo Brocada:** Methodology, Resources. **Robert Hearn:** Conceptualization, Methodology, Writing – original draft. **Stefania Mangano:** Investigation, Methodology, Visualization, Writing – original draft.

#### Declaration of competing interest

The authors confirm that there are no conflicts of interests.

#### Data availability

Data will be made available on request.

#### References

- Andrzejewski, R., Babińska-Werka, J., Gliwicz, J., & Goszczyński, J. (1978). Synurbization processes in population of *Apodemus agrarius*. I. Characteristics of population in an urbanization gradient. *Acta Theriologica*, 23(20), 341–358.
- Assereto, G., & Doria, M. (Eds.). (2007). *Storia della Liguria [History of Liguria]*. Roma, Italy: Laterza.
- Bonati, S. (2022). Contested flood risk reduction: An analysis of environmental and social claims in the city of Genoa. *Journal of Disaster Risk Reduction*, 67, Article 102637. <https://doi.org/10.1016/j.ijdrr.2021.102637>
- Bongi, P., Baruffetti, M., Gazzola, A., & O'Mahony, K. (2023). Coexistence in ecological corridors: Understanding tolerance of wolves in the northwestern Apennines, Italy. *Human Dimensions of Wildlife*, 28, 53–69. <https://doi.org/10.1080/10871209.2021.2010288>
- Borgo, E., Galli, L., Galuppo, C., Maranini, N., & Spanò, S. (2005). *Atlante ornitologico della città di Genova*. Centro Stampa OFFSET: Università degli Studi di Genova.
- Bouros, G., Bărbulescu, D., & Cioflec, V. (2020). Urban otters of Bucharest, Romania: Threats and conservation. *OTTER. Journal of the International Otter Survival Fund*, 66–82.
- Brocada, L. (2022). Selve urbane e aree rinaturalizzate di Genova: analisi preliminare e percorsi di ricerca. In A. Primi, & L. Brocada (Eds.), *Selve urbane, percorsi di ricerca* (pp. 183–198). Genoa: Genoa University Press.

- Brocoda, L., Mondino, L., & Priarone, E. (2022). La Città Metropolitana di Genova: analisi di aspetti geografici e criticità per un riordino territoriale. In F. Amato, V. Amato, S. de Falco, D. La Foresta, & L. Simonetti (Eds.), *Catene/chains, Memorie geografiche NS 21* (pp. 925–932). Firenze: Società di Studi Geografici.
- Calandri, M. (26/04/2023). Gita scolastica con vista sui cinghiali: Nelle città possiamo imparare a convivere. La Repubblica Genova, [https://genova.repubblica.it/cronaca/2023/04/26/news/cinghiali\\_gita\\_scuola-397625367/](https://genova.repubblica.it/cronaca/2023/04/26/news/cinghiali_gita_scuola-397625367/). (Accessed June 28, 2023).
- Castillo-Contreras, R., Carvalho, J., Serrano, E., Mentaberre, G., Fernandez-Aguilar, X., Colom, A., ... López-Olvera, J. R. (2018). Urban wild boars prefer fragmented areas with food resources near natural corridors. *Science of the Total Environment*, 615, 282–288. <https://doi.org/10.1016/j.scitotenv.2017.09.277>
- Cevasco, R. (2007). *Memoria Verde: un nuovo spazio per la geografia*. Reggio Emilia: Diabasis.
- Ciach, M., & Fröhlich, A. (2019). Ungulates in the city: Light pollution and open habitats predict the probability of roe deer occurring in an urban environment. *Urban Ecosystems*, 22(3), 513–523. <https://doi.org/10.1007/s11252-019-00840-2>
- Clément, G. (2005). *Manifesto of the third landscape*. Lund: Trans Europe Halles.
- Comune di Genova (2011). Regolamento per il benessere e la tutela degli animali in città, <https://smart.comune.genova.it/node/943>.
- De Beauvois, O., & Festa, E. (1927). La ricomparsa del cinghiale nell'Italia settentrionale occidentale. *Memorie della Società italiana di scienze naturali e del Museo civico di storia naturale di Milano*, 9(3), 263–324.
- Duffy, B., Smith, K., Terhanian, G., & Bremer, J. (2005). Comparing data from online and face-to-face interviews. *International Journal of Market Research*, 47(6), 615–639. <https://doi.org/10.1177/147078530504700602>
- Faccini, F., Paliaga, G., Piana, P., Sacchini, A., & Watkins, C. (2016). The Bisagno stream catchment (Genoa, Italy) and its major floods (1822, 1970 and 2014): Geomorphic and land use variations in the last three centuries. *Geomorphology*, 273, 14–27. <https://doi.org/10.1016/j.geomorph.2016.07.037>
- Fardell, L., Pavey, C., & Dickman, C. (2022). Backyard biomes: Is anyone there? Improving public awareness of urban wildlife activity. *Diversity*, 14(4), 263. <https://doi.org/10.3390/d14040263>
- Felloni, G. (1961). *Popolazione e sviluppo economico della Liguria nel secolo XIX*. Torino: I.L.T.E.
- Ferretti, S., & Chiaranz, G. (2021). *Manuale di gestione della fauna urbana*. Il Piavere, Genova: Approccio alla biodiversità e all'ecologia in città.
- Ferretti, S., Doria, G., Borgo, E., Caracciolo, D., Ottonello, D., Soddu, L., ... Galli, L. (2022). Parrots and parakeets in Genoa (northwestern Italy): Preliminary report of a census and population dynamics analysis through citizen involvement. *Biogeographia—The Journal of Integrative Biogeography*, 37(1). [https://doi.org/10.21426/B637154915\\_s008](https://doi.org/10.21426/B637154915_s008).
- Gazzetta Ufficiale della Repubblica Italiana. (2022). N. 447 (legislative update of article 19, law 11 february 1992, n. 157).
- Genova24 (December 15, 2021). Coldiretti stima oltre 80 mila cinghiali in Liguria e chiede numeri aggiornati alla Regione, <https://www.genova24.it/2021/12/coldiretti-stima-oltre-80-mila-cinghiali-in-liguria-e-chiede-numeri-aggiornati-alla-regione-287330/>. Accessed July 3, 2023.
- Gereschi, V., Galli, L., & Borgo, E. (2022). Studies on the rose-ringed parakeet *Psittacula krameri* colony of Genoa (Liguria, NW Italy). *Avocetta*, 46, 19–28. <https://doi.org/10.30456/AVO.2022105>
- Giordanella, N. (01/09/2021) Lupo avvistato nel Bisagno: un giovane esemplare a spasso nel greto del torrente. Genova24, <https://www.genova24.it/2021/09/lupo-avvistato-nel-bisagno-giovane-esemplare-a-spasso-nel-greto-del-torrente-274009/>. (Accessed July 3, 2023).
- Hearn, R. (20/09/2018). *Wild boars run amok in the city of Genoa, as abandoned rural areas are «rewilded»*, <https://theconversation.com/wild-boars-run-amok-in-the-city-of-genoa-as-abandoned-rural-areas-are-rewilded-102752>.
- Hearn, R., Watkins, C., & Balzaretto, R. (2014). The cultural and land use implications of the reappearance of the wild boar in north West Italy: A case study of the Val di Vara. *Journal of Rural Studies*, 36, 52–63. <https://doi.org/10.1016/j.jrurstud.2014.06.004>
- Iscaro, C., Dondo, A., Ruocco, L., Masoero, L., Giammaroli, M., Zoppi, S., ... Feliziani, F. (2022). January 2022: Index case of new African swine fever incursion in mainland Italy. *Transboundary and Emergency Diseases*, 69(4), 1707–1711. <https://doi.org/10.1111/tbed.14584>
- ISPRA (2021). La popolazione di lupo nelle regioni alpine Italiane 2020-2021. Relazione tecnica dell'Attività di monitoraggio nazionale nell'ambito del Piano di Azione del lupo ai sensi della Convenzione ISPRA-MITE e nell'ambito del Progetto LIFE 18 NAT/IT/000972 WOLFALPS EU.
- ISPRA (2023). Press release, <https://www.isprambiente.gov.it/files2023/area-stampa/comunicati-stampa/comunicatocinghiali-1.pdf>. Accessed July 3, 2023.
- Jacubiak, A., & Klich, D. (2021). The cost of living in the city. Causes of incidents with mammals and factors that influence their frequency in Warsaw. *Hystrix, the Italian Journal of Mammalogy*, 32(2), 191–195. <https://doi.org/10.4404/hystrix-00426-2021>
- Kowarik, I. (2005). Wild urban woodlands: Towards a conceptual framework. In I. Kowarik, & S. Körner (Eds.), *Wild urban woodlands, new perspectives for urban forestry* (pp. 1–32). Berlin: Springer.
- Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, 30(3). <https://doi.org/10.1177/001316447003000308>
- Lioy, S., Marsan, A., Balduzzi, A., Wauters, L. A., Martinoli, A., & Berolino, S. (2019). The management of the introduced grey squirrel seen through the eyes of the media. *Biological Invasions*, 21, 3723–3733. <https://doi.org/10.1007/s10530-019-02084-9>
- Luniak, M. (2004). Synurbanization – Adaptation of animal wildlife to urban development. In *proceedings of 4th international symposium on urban wildlife*, 50–55.
- Magle, S., Hunt, V. M., Vernon, M., & Crooks, K. (2012). Urban wildlife research: Past, present and future. *Biological Conservation*, 155, 23–32. <https://doi.org/10.1016/j.biocon.2012.06.018>
- Marchi, V., Speak, A., Ugolini, F., Sanesi, G., Carrus, G., & Salbitano, F. (2022). Attitudes towards urban green during the COVID-19 pandemic via twitter. *Cities*, 126, Article 103707. <https://doi.org/10.1016/j.cities.2022.103707>
- Martinez-Abraín, A., Jiméñez, J., Jiméñez, I., Ferrer, X., Llana, L., Ferrer, M., ... Oro, D. (2020). Ecological consequences of human depopulation of rural areas on wildlife: A unifying perspective. *Biological Conservation*, 252, Article 108860. <https://doi.org/10.1016/j.biocon.2020.108860>
- Meoli, E. (December 14, 2021). Genova, cassonetti blindati e fototrappole contro l'invasione dei cinghiali. Il Secolo XIX, <https://www.ilsecoloxix.it/genova/2021/12/14/news/genova-cassonetti-blindati-e-fototrappole-contro-l-invasione-dei-cinghiali-1.41030062>. Accessed July 3, 2023.
- Meoli, E. (June 16, 2023). Liguria, via libera agli abbattimenti dei cinghiali. “Pronti all'azione 800 cacciatori”. Il Secolo XIX, [https://www.ilsecoloxix.it/genova/2023/06/16/news/liguria-abbattimenti\\_cinghiali\\_pronti\\_allazione\\_800\\_cacciatori-12861132/](https://www.ilsecoloxix.it/genova/2023/06/16/news/liguria-abbattimenti_cinghiali_pronti_allazione_800_cacciatori-12861132/). Accessed July 3, 2023.
- Milner, J. M., Nilsen, E. B., & Andreassen, H. P. (2007). Demographic side effects of selective hunting in ungulates and carnivores. *Conservation Biology*, 21(1), 36–47. <https://doi.org/10.1111/j.1523-1739.2006.00591.x>
- Padovani, R., Shi, Z., & Harris, S. (2020). Are British urban foxes (*Vulpes vulpes*) “bold”? The importance of understanding human-wildlife interactions in urban areas. *Ecology and Evolution*, 11(2), 835–851. <https://doi.org/10.1002/ece3.7087>
- Pampaloni, C., & Brocoda, L. (2022). Urban wildlife. L'inselvaticamento dello spazio urbano. In A. Primi, & L. Brocoda (Eds.), *Selve urbane, percorsi di ricerca* (pp. 15–28). Genoa: Genoa University Press.
- Perry, D. (2004). Animal rights and environmental wrongs, the case of the grey squirrel in northern Italy. *Essays in Philosophy*, 5(2), 327–342. <https://doi.org/10.5840/eip2004526>
- Philo, C., & Wilbert, C. (Eds.). (2000). *Animal Spaces, Beastly Spaces*. London and New York: Routledge.
- Piana, P., Faccini, F., Luino, F., Paliaga, A., Sacchini, A., & Watkins, C. (2019). Geomorphological landscape research and flood management in a heavily modified Tyrrhenian catchment. *Sustainability*, 11(17), 4594. <https://doi.org/10.3390/su11174594>
- Piana, P., Watkins, C., & Balzaretto, R. (2021). *Rediscovering lost landscapes, topographical art in north-West Italy, 1800–1920*. Woodbridge, UK: Boydell Press.
- Primi, R., Viola, P., Serrani, F., Balzarani, M., Tiberi, C., Rossi, C. M., & Amici, A. (2016). Update on wild boar (*Sus scrofa*) distribution in the Metropolitan City of Rome. Cesena: In *Poster III Congresso Nazionale Fauna Problematica*.
- Rossi, E. (2023) Genova, avvistato un lupo sul sentiero dell'Acquedotto storico: “Un incontro incredibile”. Il Secolo XIX (05/02/2023), [https://www.ilsecoloxix.it/genova/2023/02/05/news/genova-avvistato\\_un\\_lupo\\_sul\\_sentiero\\_dellacquedotto\\_storico\\_un\\_incontro\\_incredibile-12624722/](https://www.ilsecoloxix.it/genova/2023/02/05/news/genova-avvistato_un_lupo_sul_sentiero_dellacquedotto_storico_un_incontro_incredibile-12624722/) (last accessed 03/07/2023).
- Rutz, C., Loretto, M. C., Bates, A., Davidson, S. C., Duarte, C. M., Jetz, W., Johnson, M., Kato, A., Kays, R., Mueller, T., Primack, R. B., Ropert-Coudert, Y., Tucker, M. A., Wikelski, M., & Cagnacci, F. (2020). COVID-19 lockdown allows researchers to quantify the effects of human activity on wildlife. *Nature Ecology & Evolution*, 4, 1156–1159. <https://doi.org/10.1038/s41559-020-1237-z>
- Saloniki, E.-C., Malley, J., Burge, P. Lu, H., Batchelder, L., Linnosmaa, I., Trukeschitz, B & Forder, J. (2019). Comparing internet and face-to-face surveys as methods for eliciting preferences for social care-related quality of life: Evidence from England using the ASCOT user measure. *Quality of Life Research* 28 (8), 2207-2220, doi:<https://doi.org/10.1007/s11136-019-02172-2>
- Schell, C., Stanton, L. A., Young, J. K., Angeloni, L. M., Lambert, J. E., Breck, S. M., & Murray, B. M. (2020). The evolutionary consequences of human-wildlife conflict in cities. *Evolutionary Applications*, 14(1), 178–197. <https://doi.org/10.1111/eva.13131>
- Searle, A., & Turnbull, J. (2021). After the anthropause: Lockdown lessons for more-than-human geographies. *Geographical Journal*, 187, 67–77.
- Smith, W. G. (2008). Does gender influence online survey participation? *ERIC Document Reproduction Service No. ED 501717*. <https://files.eric.ed.gov/fulltext/ED501717.pdf>.
- Stillfried, M., Fickel, J., Börner, K., Wittstatt, U., Heddergott, M., Ortmann, S., ... Frantz, A. (2016). Do cities represent sources, sinks or isolated islands for urban wild boar population structure? *Journal of Applied Ecology*, 54, 272–281. <https://doi.org/10.1111/1365-2664.12756>
- Tononi, M., & Pietta, A. (2021). Rinaturalizzazione urbana e mitigazione dei rischi. Il ruolo di un parco cittadino [Urban renaturalization and risk mitigation. The role of a city park]. *Geotema, Suppl.*, 2021, 208–217.
- Varotto, M. (2017). *Montagne del Novecento: Il volto della modernità nelle Alpi e Prealpi Venete [twentieth-century mountains: The face of modernity in the venetian Alps and pre-Alps]*. Cierre edizioni: Verona.
- Wolch, J. (2002). Anima Urbis. *Progress in Human Geography*, 26(2), 721–742. <https://doi.org/10.1191/0309132502ph4000a>