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AGRICULTURAL LANDSCAPE AND HERPETOFAUNA. A CASE STUDY FROM THE ROMAN CAMPAGNA

AREE AGRICOLE ED ERPETOFAUNA. IL CASO STUDIO DELLA CAMPAGNA ROMANA (58° CONTRIBUTO ALLO STUDIO DELLA BIODIVERSITÀ DELLA CAMPAGNA ROMANA A NORD-EST DI ROMA)

Abstract - We discuss the herpetofauna of some small natural reserves in the Roman Campagna, also known as the "Mentanese Archipelago" district, northeast of Rome's suburban areas. These reserves were established mainly in 1997, and are part of a mosaic landscape composed of fragmentary woodlands, urban developments, and agricultural areas with scattered streams, water points and buildings. A field study with the main aim of recording the herpetological diversity of three protected areas was carried out over the course of twenty-five years. Species richness is as follows: 1) Nature Reserve Nomentum with 12 reptiles and 6 amphibians. 2) Nature Reserve Macchia di Gattaceca and Macchia del Barco including "Pozzo del Merro" (one of the deepest sinkholes of the world). This second reserve is split into three distinct fragments: the xeric area of Macchia di Gattaceca with 11 reptiles and 2 amphibians; the wet area of Macchia del Barco with 10 reptiles and 6 amphibians; and the pin-point sinkhole area of "Pozzo del Merro" with 7 reptiles and 5 amphibians. 3) Natural and Archaeological Park of Inviolata with 13 reptiles and 7 amphibians. Using *QGis* software, we were able to assign to each parcel (wood, agricultural land, still water, running water, buildings) its percentage value of extent. The results of the *QGis* application enabled us to infer a positive effect, in terms of conservation of the populations of native herpetofauna species, of expanding non-intensive agricultural land. In addition, the presence of water bodies such as pools, ponds and flooded sinkholes in agricultural patches plays an outstandingly important role for the maintenance of herpetological diversity in a fragmented landscape.
Keywords: Amphibians, reptiles, agricultural areas, wooded areas, *QGis* method, Roman Campagna.

Riassunto - *Le piccole riserve naturali della Campagna Romana, costituite principalmente nel 1997 con la denominazione di "Arcipelago Mentanese", a nord est dell'area sub-urbana di Roma, sono parte di un paesaggio a mosaico composto da frammenti di bosco, aree urbanizzate e agricole, con corsi d'acqua, punti d'acqua ed edifici. Uno studio di campo, con il principale obiettivo di monitorare la diversità erpetologica di tre aree protette, è stato realizzato nell'arco di venticinque anni. Il numero di specie/area è così risultato: 1) Riserva Naturale di Nomentum con 12 Rettili e 6 Anfibi; 2) Riserva Naturale Macchia di Gattaceca e Macchia del Barco, al cui interno è incluso "Pozzo del Merro", uno dei sinkhole più profondi al mondo, divisa in tre distinti frammenti: l'area xerica di Macchia di Gattaceca con 11 Rettili e 2 Anfibi; la zona umida di Macchia del Barco con 10 Rettili e 6 Anfibi; l'area del Pozzo del Merro con 7 Rettili e 5 Anfibi; 3) Parco Naturale ed Archeologico dell'Inviolata con 13 Rettili e 7 Anfibi. Utilizzando il software* QGis*, siamo stati in grado di assegnare ad ogni parcella di queste aree (bosco, agricoltura, acque ferme, acque correnti, costruzioni) il valore percentuale di estensione. I risultati dell'uso di* QGis *ci permettono di inferire in merito all'effetto positivo, in termini di conservazione delle popolazioni delle specie dell'erpetofauna autoctona, dell'estensione dei terreni ad agricoltura non intensiva; corpi d'acqua come laghetti agricoli, pozze e doline allagate nelle aree coltivate rivestono inoltre una rilevante importanza ai fini del mantenimento della diversità erpetologica in paesaggi frammentati.*
Parole chiave: Anfibi, rettili, aree agricole, aree boschive, metodi *QGis*, Campagna Romana.

Introduction

The agricultural terrains derive from the shape that man, consciously and systematically, always impresses on the natural landscape mainly for the purposes of agro-forestry-pastoral development and production (Sereni 1961). Man-made water points for supporting agricultural practices perform ecological functions that favor the conservation of amphibian populations (Peria et al. 2016). One of the key problems in amphibian and reptile' conservation is the potential incompatibility between protected areas and agriculture. Solving this problem is of community interest, both national and local. In Italy, the recent establishment of parks and other protected areas in spaces which are confined by the physiographic characteristics of the land is often selected as an alternative to agricultural use of the area (CESTAAT 1996).

Latium and its provincial capital Rome are among the Italian regions with the highest number of pro-

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tected areas in which more or less extended patches devoted to agricultural and zootechnical usage are present. One example would be the percentages of the main classes of 1st Corine Land Cover level for the metropolitan area of Rome: artificial areas 12.8%, agricultural areas 58.5%, forest and semi-natural areas 27.2% (Blasi 2014). In this context, one of the leading examples is the Parco Naturale Regionale dei Monti Lucretili (EUAP0190, LR 41, 26/06/89) which extends for 18,000 ha north-east of the Rome city area, with 13 municipalities partially or completely included in the park area. Over 3,100 ha, 92.1% of the agricultural area inside the park, are included in the C zone, described as "area of protection with limited potential for combined use" and especially in the Ca zone, described as "area with landscape and cultural (historical) protection" (CESTAAT 1996).

The small natural reserves in what is known as the Campagna Romana, northeast of Rome's suburban and rural areas, are part of a mosaic of wood fragments and agricultural land, generally with dense building cover in their surroundings. Most were established from 1997 onwards (Locasciulli et al. 1999; Crucitti 2013). The so-called "Mentanese Archipelago" (no water is involved, so the "island effect" is a metaphore) is a sector of the Campagna Romana north-east of the Rome city area with five municipalities (Fonte Nuova, Mentana, Monterotondo, Sant'Angelo Romano, and Guidonia Montecelio). These are divided according to the following criteria: a) small, usually protected, areas (2-3 municipalities each) of conservation importance inside a strongly modified environment; b) wood fragments inside a scattered/compact matrix of agrosystems (Crucitti 2013).

Since 1997 our aim has been to census the species of amphibians and reptiles inside the so-called "Mentanese Archipelago" landscape (Crucitti et al. 2013; 2015). Our research has two primary objectives: 1, to draw up zonation maps of these areas which outline the extent of different patches; 2, to point up whether and how the agricultural patches could be favorable areas to host amphibian and reptile populations. In addition, we discuss some topics about the development of these areas in the immediate future in the light of further habitat modifications.

Methods

Study areas

Field investigations were carried out in five areas: Macchia di Gattaceca, Macchia del Barco, Pozzo del Merro, Nomentum and Inviolata. The main physiographic patterns of the selected sites have been described together with their location in close proximity with Rome municipality (Crucitti 2013; 2017) (Fig.1). Fig. 1 According to the classification of terrestrial ecoregions of Italy, these areas fall between the border of the Italian Tyrrhenian Province, Roman Area Subsection which embraces the southern sector of the Roman Magmatic province and the final section of the Tiber River clastic plains, and the Italian Apennine Province, Tuscan Basic Subsection, which includes the hilly sector of the Plio-Pleistocene post-orogenic depositional basin and the northern portion of the Roman Magmatic province (Blasi et al. 2018).

The Macchia di Gattaceca and Macchia del Barco Nature Reserve (EUAP1040, LR 29) (= Macchia di Gattaceca; Macchia del Barco; Pozzo del Merro) is located between Mentana, Monterotondo and Sant'Angelo Romano municipalities and is managed, like the next one, by the Protected Areas Service of the Metro-

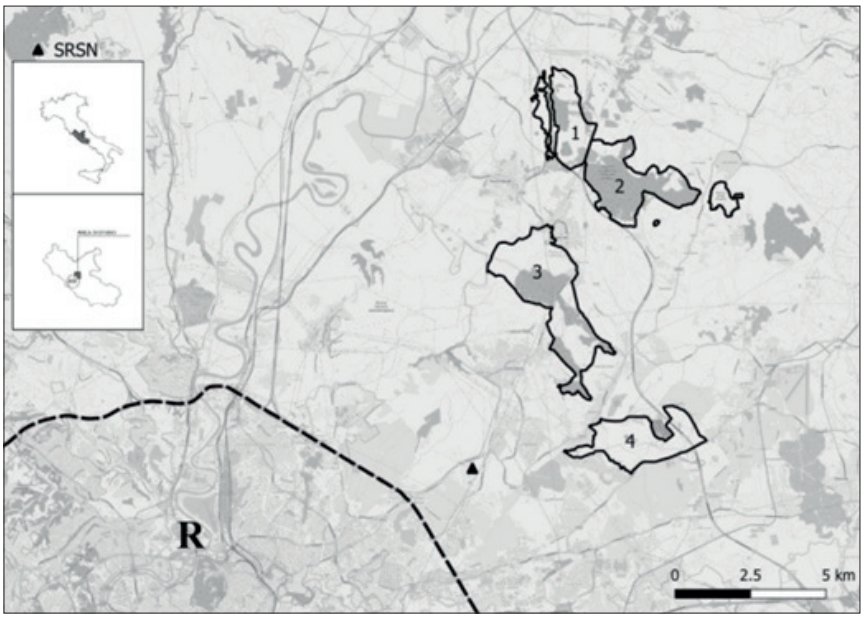

Fig.1 - Study area with the position of the four selected sites. The dashed line marks the northeastern limit of the GRA (Grande Raccordo Anulare) a ring which represent the border of Rome city municipalities. 1: Macchia del Barco; 2: Macchia di Gattaceca; 3: Nomentum; 4: Inviolata. The position of the SRSN registered office near the selected sites is marked with the triangle.
- *Area di studio con la posizione dei quattro siti selezionati. La linea tratteggiata segna il limite nord-orientale del GRA (Grande Raccordo Anulare), un anello che rappresenta il confine dei comuni della città di Roma. 1: Macchia del Barco; 2: Macchia di Gattaceca; 3: Nomentum; 4: Inviolata. Con il triangolo è evidenziata la posizione della sede legale della SRSN in prossimità dei siti selezionati.*

politan Area of Rome. The reserve includes the isolated sinkhole of Pozzo del Merro, 462m deep, of which 392 m are flooded (ROV Dive Prometheus, March 2002), an example of a limestone (karst) cave system, and until recently the deepest - known flooded sinkhole of the world (Caramanna 2012). The Nomentum Nature Reserve (EUAP1039, LR 29) (= Nomentum) is located between Fonte Nuova, Mentana and Monterotondo municipalities. The Inviolata Natural and Archaeological Park (EUAP1032, LR 22) (= Inviolata) is located inside the area of Fonte Nuova and Guidonia Montecelio municipality and has been managed since 2016 by the Natural and Regional Park of the Lucretili Mountains (Crucitti et al. 2016).

Protocol in the field

Surveys were carried out from 1997 to 2019 with a grand total of 380 monitoring sessions in as many different days. From 1997 to 2003 a total of 66 surveys were conducted inside the Nomentum Nature Reserve. From 2003 to 2008 there were 40 surveys dedicated to the whole herpetofauna of Macchia del Barco, 2012 to 2015, 122 surveys dedicated to the study of the *Salamandrina perspicillata* population of "Fosso del Barco" (inside Macchia del Barco); from 2014 to 2019, 152 surveys inside the Inviolata Natural and Archaeological Park. Field research was carried out from January to December during the years 2002, 2007, 2014, 2018, over a complete daily span (morning, afternoon, night-time), particularly on dates falling within spring and autumn periods.

The areas here considered were explored by means of linear transects or, more rarely, transects walked in both directions, several hundred meters long. The species were identified by the following methods. The first was a Visual Encountering Survey (VES), i.e. detection by direct, immediate visual observation, sometimes accompanied by animal capture and manipulation, limited to the time strictly necessary for their identification and for the detection and recording of some biometric data, supplemented by searches for concealed animals by rock-rolling and by examination under bark, stumps of wood and rotting plant fragments and artificial materials (plastic, wood, cardboard). The second method was Casualty Survey (CS), i.e. detection and determination of individuals found dead both within the study area and in the adjacent areas. Individuals were never removed from the sampling sites. Research operations included Citizen Science activities and two Bio Blitzes (2012 at Nomentum; 2018 at Inviolata) in the context of the SRSN "BioLazio Project". The herpetofauna of Macchia di Gattaceca, Macchia del Barco and Pozzo del Merro were considered separately, owing to the different physiographic characteristics of these areas and the isolated location of Pozzo del Merro (Table 1). Data on the distribution and the number of species have been checked from Capula et al. 2008; Cervoni et al. 2017-2018; Crucitti & Bufalieri 2012; Crucitti et al. 2009; 2013; 2017; 2019; Doglio et al. 2013; Giardini 2012a; 2012b; Tringali et al. 2015. For the systematic position and nomenclature of the species we followed Sindaco et al. 2006; Lanza et al. 2007; Corti et al. 2011; and Di Nicola et al. 2019. For the conservation status of each species, we referred to IUCN Red List categories (IUCN 2022). We used the map of each area available for the Latium Region, especially for the borders and vegetation shape files. Partition of each area was realized through the QGis software (3.4 version). For our analysis, each area was subdivided as follows: wooded (including shrubs); neighboring man-made environment especially densely-packed buildings (including urban centers, roads, gardens and recreation areas); agrosystems (including agricultural, rural and agro-forested-pastoral patches); hydrographic networks; still waters.

Results

The presence and number of reptile and amphibian species in each area are summarized in Tables 2 and 3 respectively. Overall, the five areas, Macchia di Gattaceca, Macchia del Barco, Pozzo del Merro, Nomentum and Inviolata harbor between 7 to 13 species of reptiles and 2 to 7 species of amphibians. Two allochthonous species of aquatic turtles have been detected too (see Table 2); *Pseudemys concinna*, observed only in one occasion in the Inviolata Park, while *Trachemys scripta*

AREA	Extension (ha)	Altitude (m)	Description
Macchia del Barco	**375**	**100 - 241**	**Humid Lowland Zone**
Macchia di Gattaceca (1)	**620**		**Xeric (calcareous) landscape**
Nomentum	**828**	**60 - 200**	**Valley floor**
Inviolata	**535**	**50 - 120**	**Humid Lowland Zone**

Table 1 - The main features of the areas considered in the present work, "Pozzo del Merro" included.
- *Le principali caratteristiche delle aree considerate nel presente lavoro, compreso il "Pozzo del Merro".*

has been found in almost all sites of the area; this last species is generally considered an invasive one. The uncertainty about the number of species of Nomentum is due to the fact that *Salamandrina perspicillata* and *Rana dalmatina* were found, each with a single specimen, at the beginning of our research (1997-1999) and no more observed in the following years. Results based on the application of the *QGis* software are summarized in Figs. 2, 3, 4 and in Table 4. The relation between the extension of the agricultural areas and the number of species of amphibians and reptiles is shown in Fig. 5.

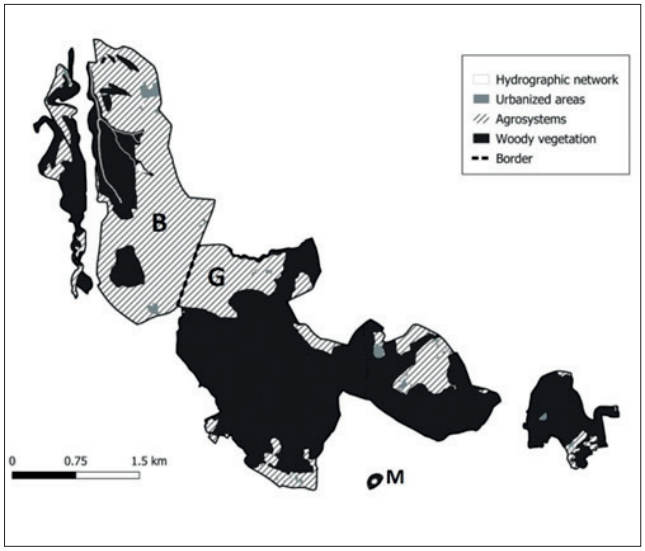

Fig. 2 - Zonation based on the QGis application to the Natural Reserve of Macchia di Gattaceca and Macchia del Barco. B: Macchia del Barco; G; Macchia di Gattaceca; M; Pozzo del Merro.
- *Zonazione basata sull'applicazione QGis alla Riserva Naturale Macchia di Gattaceca e Macchia del Barco. B: Macchia del Barco; G; Macchia di Gattaceca; M; Pozzo del Merro.*

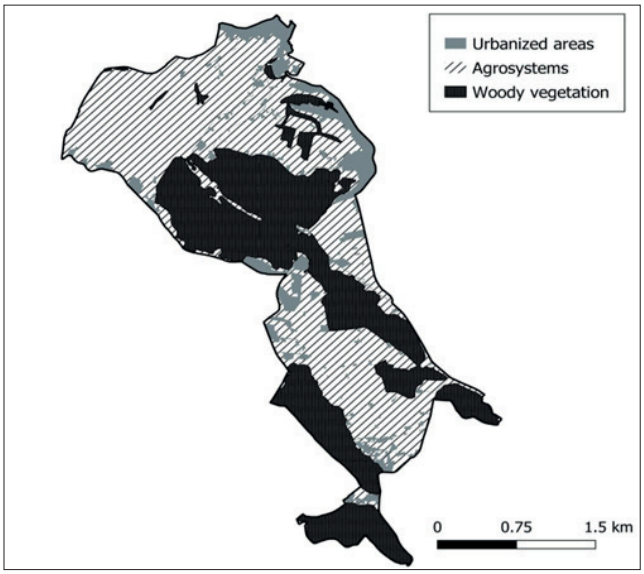

Fig. 3 - Zonation based on the QGis application to the Natural Reserve of Nomentum.
- *Zonazione basata sull'applicazione QGis alla Riserva Naturale di Nomentum.*

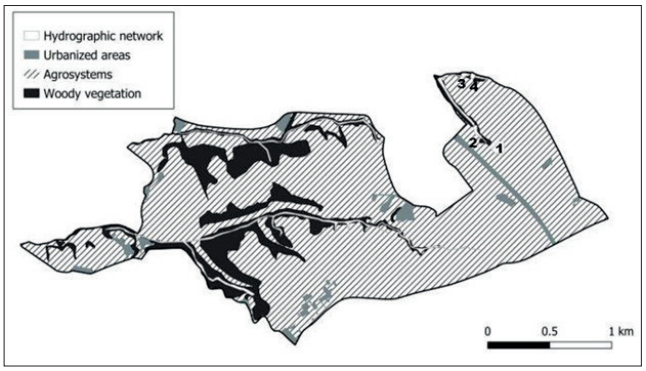

Fig. 4 - Zonation based on the QGis application to the Natural Archaeological Park of Inviolata. 1, 2, 3, 4: the four "lakes" at the north-east sector of the area.
- *Zonazione basata sull'applicazione QGis al Parco Archeologico Naturale dell'Inviolata. 1, 2, 3, 4: i quattro "laghi" del settore nord-orientale dell'area.*

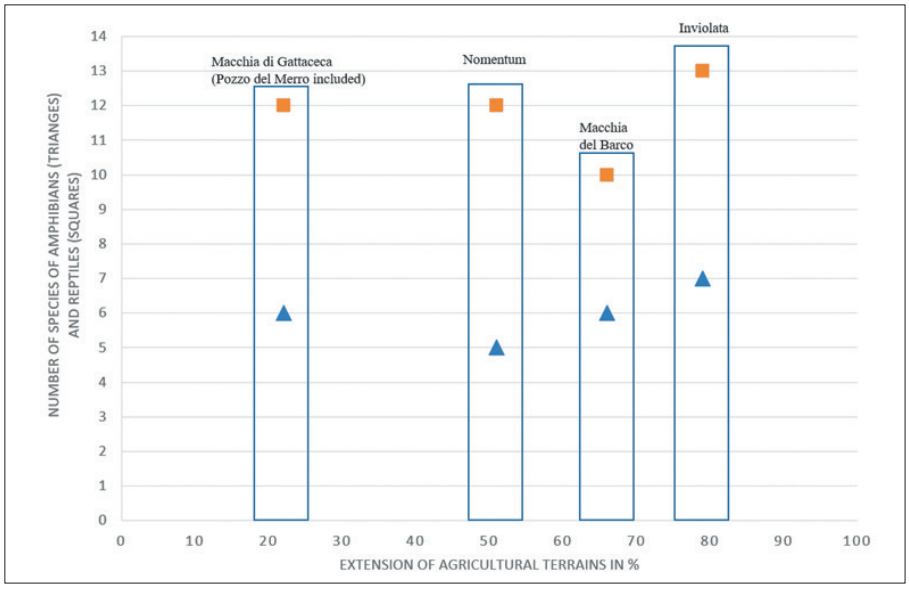

Fig.5 - The relation between the extension of the agricultural terrains in % (abscissa) and the number of species of amphibians (triangles) and reptiles (squares) (ordinate); pair of values related to Macchia di Gattaceca (Pozzo del Merro included), Macchia del Barco, Nomentum and Inviolata (from left to right).
- *Il rapporto tra l'estensione dei terreni agricoli in % (ascissa) e il numero di specie di anfibi (triangoli) e rettili (quadrati) (ordinate); coppia di valori relativi a Macchia di Gattaceca (incluso Pozzo del Merro), Macchia del Barco, Nomentum e Inviolata (da sinistra a destra).*

REPTILES	Macchia del Barco	Macchia di Gattaceca	Pozzo del Merro	Nomentum[1]	Inviolata[2]	Status
***Hemidactylus turcicus* P**	X			X	X	LC
Tarentola mauritanica				X	X	LC
Chalcides chalcides	X	X	X	X	X	LC
Anguis veronensis* P	X	X		X	X	LC
Lacerta bilineata* P	X	X	X	X	X	LC
***Podarcis muralis* P**	X	X	X	X	X	LC
***Podarcis siculus* P**	X	X	X	X	X	LC
Elaphe quatuorlineata*		X				LC
***Hierophis viridiflavus* P**	X	X	X	X	X	LC
***Natrix helvetica* P**	X	X		X	X	LC
Natrix tessellata*	X					LC
Zamenis longissimus		X		X	X	LC
Vipera aspis	X	X	X	X	X	LC
Testudo hermanni		X				EN
***Pseudemys concinna* +**					X	NT
***Trachemys scripta* +**	X		X	X	X	NA
Total number of species	**11**	**11**	**7**	**12**	**13**	

Table 2 - Sampled species of reptiles in each considered area * = Species of marked conservation interest; + = Introduced species; P = Protected species 1 = Mainly represented by Macchia Trentani 2 = Marco Simone area included.
- *Specie di rettili campionate in ciascuna area considerata * = Specie di spiccato interesse conservazionistico; + = Specie introdotte; P = Specie protetta; 1 = Rappresentata principalmente da Macchia Trentani; 2 = Inclusa l'area Marco Simone.*

AMPHIBIANS	Macchia del Barco	Macchia di Gattaceca	Pozzo del Merro	Nomentum[1]	Inviolata[2]	Status
Lissotriton vulgaris	X		X	X	X	NT
Salamandrina perspicillata*	X			?		LC
Triturus carnifex	X		X		X	NT
Bufo bufo* P	X	X	X	X	X	VU
Bufotes viridis balearicus*					X	LC
Rana dalmatina ** P				?		LC
Rana italica* P	X		X	X	X	LC
Pelophylax bergeri & P. kl. hispanicus	X		X	X	X	LC
Hyla intermedia* P		X		X	X	LC
Total number of species	**6**	**2**	**5**	**5-7**	**7**	

Table 3 - Sampled species of amphibians in each of the considered areas (symbols as in Table 1).
- *Specie di anfibi campionate in ciascuna delle aree considerate (simboli come in Tabella 1).*

AREA	W ha	W %	M ha	M %	H ha	H %	S ha	S %	A ha	A %
Macchia del Barco	120.3	32	6.00	2	1.87	0	0.84	0	246.01	66
Macchia di Gattaceca (1)	477.2	77	6.06	0	0.00	0	0.27	1	138.43	22
Inviolata	73.77	13	17.51	3.2	6.23	1.1	1.27	0	361.23	67
Nomentum	314.8	38	87.11	11	0.00	0	0.00	0	426.12	51

Table 4 - Area zonation in absolute and percent values according to the QGis software analysis. W = wooded extension; M = bordering man-made environment; H = hydrographic network; S = still waters; A = agrosystems; (1) "Pozzo del Merro" included.
- *Zonazione dell'area in valori assoluti e percentuali secondo l'analisi del software QGis. W = estensione boscosa; M = ambiente antropizzato confinante; H = rete idrografica; S = acque ferme; A = agrosistemi; (1) Incluso "Pozzo del Merro".*

Discussion

As predicted, although the aforesaid areas are very close to each other, at most a few kilometers as the crow flies, their herpetofaunas are quite different, both qualitatively and quantitatively (Crucitti et al. 2013; 2015). Initially we will discuss amphibian and reptile communities separately.

A. Amphibians. The number of species ranges from 2 (Macchia di Gattaceca) to 7 (Inviolata). The area with the highest number of species is very rich in streams, and also contains four recent (no older than 70 years) small agricultural "lakes" (max. perimeter 330 m, max. area 7,400 m). The latter belong to the category of ponds and pools reservoirs resulting from deep-water stagnation and surface flooding typical of a clay substratum. Inviolata harbors at least six species of amphibians; the Italian smooth newt *Lissotriton vulgaris*, the Italian crested newt *Triturus carnifex*, the common toad *Bufo bufo*, the Apennine green toad *Bufotes viridis balearicus*, the Italian treefrog *Hyla intermedia*, the two green frogs of the genus *Pelophylax* (*Pelophylax bergeri* and *P.* kl. *hispanicus*) and the Italian brown frog *Rana italica*; this last species is rather abundant along the streams inside gallery woods of agricultural plains. "Fosso del Barco" inside Macchia del Barco harbors one of the most abundant populations of Savi's spectacled salamander *Salamandrina perspicillata* within the Province of Rome; this species and *R. italica* are strictly synthopic along the stream which flows in a miniature gorge a few meters deep, with an average width of 2-3 m (0.9-12 m), disrupted by small waterfalls and surrounded by a mixed wood with *Quercus cerris* as dominant species (Tringali et al. 2015). By contrast, xeric areas such as Gattaceca, devoid of permanent waters, harbor two species. One drinking trough inside Macchia del Barco contains a small population of the Italian Crested Newt *Triturus carnifex*, a species apparently in marked decline in the whole territory of the Campagna Romana northeast of the Rome city area (Crucitti et al. 2019).

B. Reptiles. The number of species found varies according to area, from 7 (Pozzo del Merro) to 13 (Inviolata). Snakes are particularly difficult to sample, due to their secretive and elusive nature (Rugiero et al. 2020). The xeric habitat of Macchia di Gattaceca harbors 11 reptiles, up to 8 in a small patch near the main entrance at the top of a bluff relief, an open area with a substrate of limestone rocks and red soils; five species of lizards s.l. (Anguidae, Lacertidae, Scincidae) and three species of snakes (two Colubridae and one Viperidae). The Hermann's tortoise *Testudo hermanni* and the four-lined snake *Elaphe quatuorlineata* were found only here and are generally considered rather strictly thermophilic species, a supposition confirmed by their absence from other non-xeric areas of the Roman Countryside (Crucitti & Bufalieri 2012). Marco Simone near the Park of Inviolata harbors a huge population of the Italian three-toed Skink *Chalcides chalcides*; in its agricultural meadows it is possible to census dozens of individuals in a few minutes. *C. chalcides* is abundant in Macchia di Gattaceca while in the area of Inviolata this species was found in a site adjacent to a small pond; in the same site we found the Italian slow worm *Anguis veronensis*, a secretive species. It was recorded inside a small dry sinkhole adjacent to the arid meadows of Macchia di Gattaceca and a small wetland along the shore of a pond with *Eucalyptus camaldulensis* and *Salix alba*. The Mediterranean house gecko *Hemidactylus turcicus* and the Moorish gecko *Tarentola mauritanica* are quite abundant in uninhabited old buildings located in the Inviolata countryside. Our results uncover the different relationships between various types of agricultural exploitation (at different levels, intensive/subsistence) in each of the areas. Overall, the two extremes are primarily represented by the area of Macchia di Gattaceca, a xeric landscape, and the area of Inviolata, a water-rich agricultural district favorable to an amphibian life cycle. The Nomentum, Macchia di Gattaceca and Macchia del Barco areas are the most natural or least, anthropogenic presenting greater forest cover, but generally surrounded by a band of agricultural patches that penetrates the border. The Inviolata area, despite having the highest total number of species of amphibians and reptiles (20), is a landscape largely dominated by agricultural and livestock exploitation, but within which there are extensive private lands, including cultivated areas, with associated wetlands (such as ponds for water abstraction) and old abandoned buildings. Open areas with rocks (Gattaceca, Marco Simone) and ruined buildings such as old churches and castles (Inviolata) are of outstanding importance for the survival of many species of reptiles (Gekkota, Lacertidae, Scincidae, Anguidae), while pools and ponds are of remarkable importance for amphibians (Salamandridae, Bufonidae, Ranidae, Hylidae) and some reptiles (the grass snake *Natrix helvetica*). Wooded areas, especially thick woods, where little light penetrates, appear of less importance for the conservation of herpetofauna except for relatively open wood, and the ecotonal belt with open (shrubland) areas in which the asp viper *Vipera aspis* may be observed. As expected, data allow a possible overall classification of the present conservation status of the areas examined here. Nomentum, whose herpetofauna shows a marked decline, may be considered in poor to bad condition, constantly deteriorating from the time of its institution. Macchia di Gattaceca and Macchia del Barco, especially the second of these, demonstrated quite good conservation status. The status of Inviolata is consistent its being an area with a remarkable dedication to agro-forestry-pa-

storal use. From a conservation viewpoint, all the elements of a mosaic area may be of relevant importance for various components of animal diversity: *e.g.*, wooded area for insects, birds and mammals; ponds, pools and streams for insects and amphibians (Fig. 6); croplands, neglected patches with shrubs and old buildings for reptiles.

In this context, the recent expansion of forested areas (in Italy, forest cover has recently outstripped agricultural areas (Napoli et al. 2019) should not be considered as a favorable occurrence for certain groups, e.g., among reptiles, snakes, bearing in mind the uncontrolled proliferation of some problematic species such as the wild boar *Sus scrofa*, which is favored by the expansion of scrubs and woods. The expansion of dense areas of buildings is formally subject to strong legal constraints in the Campagna Romana, especially inside protected areas. However, the transformation of agricultural soils into artificial soils occurs continually in the neighboring non-protected territories. In this context, the present condition of Pozzo del Merro can be considered quite precarious, as it is the object of highly questionable developmental projects (Calamita & Giardini 2012). It is well known that traditional agroecosystems, characterized by the alternation of purely agricultural environments with natural and semi-natural ones, by non-invasive practices and less use of machinery (less often than other areas), have favored the spread of some species of amphibians and reptiles in many regions (Vanni & Biaggini 2017). Man-made water points for agricultural purposes, if properly managed, perform ecological functions that favor the conservation of amphibians (Peria et al. 2016). According to the primary goal of conservation action, *e. g.* to maintain a high level of biodiversity, the preservation of varied areas with extensive agricultural plots in a mosaic landscape does not seem to conflict with the maintenance of herpetological diversity, at least for the case investigated in this research.

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Fig.6 - The small agricultural 1st lake of Tor Mastorta inside the Inviolata Park, a biotope which harbor six species of amphibians in addition to 19 species of Odonata that alternate in flight during the whole year (Brocchieri & Crucitti 2021).
- *Il 1° laghetto agricolo di Tor Mastorta all'interno del Parco dell'Inviolata, un biotopo che ospita sei specie di anfibi oltre a 19 specie di Odonati che si alternano in volo durante tutto l'anno (Brocchieri & Crucitti 2021).*

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