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The batrachocenosis of springs in hilly Prealpine areas. The example of Mount Barro and the Mount of Brianza (Lombardy, Italy)

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Abstract: the aim of this work is to analyse the batrachofauna of springs in hilly Prealpine areas, where the fact that lentic biotopes are uncommon can limit the presence of suitable spawning sites. Two Lombardian areas, the regional Park of Mount Barro and the adjacent Mount of Brianza, have been investigated from 2004. The breeding activity of 4 species of Amphibians has been recorded. Generally speaking the species that are more associated with the springs of the two areas studied are *S. s. salamandra*, which lays its larvae in typology of springs very different to each other, and *R. temporaria* which is less widespread.

Riassunto: Ambienti sovente trascurati in quanto spesso legati ad attività umane divenute retaggio di tempi e usanze che sono ormai relegati nell'ambito delle memorie e delle tradizioni, le sorgenti costituiscono pur sempre dei sistemi ecologici di notevole valore naturalistico. Il presente lavoro ha lo scopo di analizzare la batrachofauna riguardante questa tipologia di biotopi umidi nell'ambiente collinare e montano tipico delle aree prealpine dove la diffusione di siti riproduttivi idonei è solitamente limitata dalla rarità di aree umide di natura lentic. L'indagine è stata svolta a partire dal 2004 in due aree collinari e montuose della Lombardia, quali il Monte Barro ed il Monte di Brianza. È stata osservata la riproduzione di 4 diverse specie di Anfibi. Le due specie maggiormente legate a questi tipi di ambienti sono risultate *S. s. salamandra*, che è abbondantemente diffusa e la si rinviene in tipologie di sorgenti tra loro differenti e *R. temporaria* il cui utilizzo di questi habitat come siti riproduttivi è comunque meno frequente.

Introduction

Springs are biotopes nowadays often neglected because of their connection with some human activities become heritage of times and habits that have been relegated in the circle of memories and traditions. In spite of that, they have a great naturalistic value, being habitats of peculiar ecological characteristics. This work has the purpose to analyse their use by Amphibians in hilly

Prealpine areas. Lentic biotopes are in fact uncommon in this region, especially if they have big dimensions, only occurring in the valley bottoms or at the base of the mountains, can limit the presence of spawning sites.

The areas selected are located in the Province of Lecco and cover the regional Park of Mount Barro and the adjacent Mount of Brianza (Fig. 1). They are easily identifiable from a geographical point of view (Fig. 2). Their damp biotopes, including springs, together with the distribution of Amphibians, have been already studied in previous researches (BARATELLI 1999, FARINA & RIVA 2000, FEA *et al.* 2006, MANENTI 2002, 2003, 2004, in press, PEZZOLI 2003). The Mount Barro is a calcareous-dolomitic relief that reaches the altitude of 922 m asl and is completely isolated from the surrounding mountains. It constitutes a real outpost of Lombard Prealps towards the Po Valley. The Park covers the municipal land of 3 communes and includes a Site of Community Interest (S.I.C.). It lacks damp areas of great extension and the only two ponds existing have been artificially realized by the Park Authority to favor the reproduction of Amphibians (BARATELLI 1999, FARINA & RIVA 2000). Three species of Amphibians have been found here: *Salamandra s. salamandra* (Linneo, 1758), *Rana temporaria* Linneo, 1758, *R. kl. esculenta* Linneo, 1758 (BERNINI *et al.* 2004, MANENTI 2005). The springs of this area have already been studied and catalogued by NARDO & GUGLIELMIN (1996).

The area of the Mount of Brianza has been included in the list of the regional parks by the Lombardy District (regional law No 32 – November 8, 1996) as «Park St Genesisio – Colle Brianza» in 1996, but it has never been fully realized. The Park covers the municipal lands of 13 communes and has an altitude varying from 200 to about 900 m asl. In this area the following 9 species of Amphibians have been signalized (MANENTI 2002, in press): *S. s. salamandra*, *Triturus carnifex* (Laurenti, 1768), *T. vulgaris meridionalis* (Boulenger, 1882), *Bufo bufo* (Linneo, 1758), *Hyla intermedia* Boulenger, 1882, *Rana dalmatina* Bonaparte, 1838, *R. latastei* Boulenger, 1879, *R. temporaria* and *R. kl. esculenta* Linneo, 1758.

Materials and methods

Between 2004 and 2006, from February to November, 89 springs have been surveyed at least two times every year in order to verify the breeding activity and the presence of Amphibians; 46 of these springs are situated on the Mount of Brianza while 43 belong to the territory of the Mount Barro. When their limits were not easily definable, like in the case of the sources of little water courses, the Amphibians attributed to the spring had to be sampled within a distance of 10 metres of the point where the water was gushing out. The use of the sources as breeding sites has been checked by the occurrence of egg clutches, tadpoles and larvae. The springs have been distinguished in five different categories according to the way which they are caught and to the base of the biotope they create:

- 1 houses of intake
- 2 draining galleries
- 3 springs free or caught that form lotic biotopes
- 4 springs free or caught that form natural lentic biotopes
- 5 springs free or caught that form artificial lentic biotopes

The typology of the springs (historical, temporary or perennial) has been defined using the existing bibliography and by direct observation during the period of data collecting.

To localize Mount Barro's springs the map realized by NARDO & GUGLIELMIN (1996) in their study has been of great help, while to localize those of Mount of Brianza the information collected in previous studies (MANENTI 2002, 2004, PEZZOLI 2003) has been integrated with a systematic exploration of the territory.

Tab. 1 – The observed springs of the Regional Park of Monte Barro. The number in the column «Spring» refers to those reported by NARDO & GUGLIELMIN (1996). The number in the column «Characteristics» refers to the 5 categories quoted in the text.

Abbreviations: SALSAL = *Salamandra s. salamandra*, RANTEM = *Rana temporaria*.

Spring	Commune	Locality	Typology	Characteristics	Altitude (m asl)	Amphibians breeding	Other species
1	Galbiate	Alpe Castelli	Historical	1	340		
2	Galbiate	Cavrett Valley	Temporary	3	505		
3	Galbiate	Between Sant'Alessandro and Alpe	Historical	3	360		
4	Pescate	Pescalina	Temporary	3	250		
5	Galbiate	Between Alpe and San Michele	Temporary	3	440		
6	Galbiate	Taccolino	Perennial	3	375		
7	Galbiate	San Michele	Temporary	3	380		
8	Galbiate	San Michele	Perennial	5	335	SALSAL	
9	Galbiate	Cà del Gianon	Temporary	1	320		
10	Galbiate	Faè Valley	Temporary	3	732		
11	Galbiate	Faè Valley	Temporary	3	695		
12	Galbiate	Faè Valley	Temporary	3	630		
13	Galbiate	Faè Valley	Perennial	2	635	SALSAL	RANTEM
14	Galbiate	Faè Valley	Perennial	2	615	SALSAL	RANTEM
14 bis	Galbiate	Faè Valley	Perennial	3	615		
15	Galbiate	Faè Valley	Perennial	3	475	SALSAL	
15 bis	Galbiate - Valmadrera	Faè Valley	Perennial	3	400	SALSAL RANTEM	
16	Galbiate	Faè Valley	Temporary	3	470		
17	Galbiate	Faè Valley	Temporary	3	445		
18	Galbiate	Faè Valley	Temporary	3	440		
19	Galbiate	Restaurant Madonnina	Temporary	4	525		
20	Galbiate	Camporeso	Perennial	5	400		
20 bis	Galbiate	Camporeso	Perennial	3	400	SALSAL	
21	Galbiate	Camporeso	Temporary	3	400		
22	Galbiate	Selvetto	Temporary	1	285		
23	Galbiate	Selvetto	Temporary	3	290		
24	Galbiate	San Simone	Temporary	3	240		
25	Galbiate	San Simone	Temporary	3	240		
26	Galbiate	Roccolo	Temporary	5	630	SALSAL	
27	Galbiate	Quarry of the Buffa	Temporary	3	430		
28	Galbiate	Poagnano	Perennial	1	400		
29	Galbiate	Val Cavrett	Temporary	3	610		
30	Galbiate	Cà del Gianon	Temporary	3	310		
31	Galbiate	Lorenzina	Temporary	3	290		
32	Galbiate	Valogia	Temporary	1	330		
33	Galbiate	Faè Valley	Temporary	3	430		
34	Galbiate	Faè Valley	Temporary	1	400		
35	Galbiate	Val Faè	Temporary	3	430		
36	Galbiate	Quarry Oscura Valley	Temporary	3	280		
37	Galbiate	Quarry Oscura Valley	Temporary	3	315		
38	Galbiate	Senticro di Mezzo	Temporary	3	680		
39	Galbiate	Sanatorio	Historical	5	725		
40	Galbiate	Prà Puzzett	Historical	3	595		
41	Galbiate	Cascina Novella	Temporary	3	470		
42	Galbiate	Solaro	Temporary	1	320		
43	Galbiate	Sala al Barro	Temporary	1	245		

Tab. 2 – The observed springs of the Mount of Brianza. The number in the columns of the categories refers to those quoted in the text. Abbreviations: SALSAL = *Salamandra s. salamandra*, BUFBUF = *Bufo bufo*, RANTEM = *Rana temporaria*, RANDAL = *R. dalmatina*, RANLAT = *R. latastei*, RANESC = *R. kl. esculenta*.

N	Commune	Locality	Typology	Characteristics	Altitude (m asl)	Amphibians breeding	Other species
1	Castello Brianza	Cascinette Nere	Temporary	3	330	SAL	
2	Castello Brianza	Cemetery of Brianzola	Perennial	5	400	SALSAL, RANDAL	RANESC
3	Castello Brianza	Ceppo Superiore	Perennial	2	420	SALSAL	BUFBUF, RANLAT, RANDAL
4	Castello Brianza	Sorda Valley	Perennial	2	400		
5	Castello Brianza	Sorda Valley	Perennial	1	410		
6	Castello Brianza	Behind the Church of Brianzola	Perennial	5	390	RANESC	BUFBUF
7	Castello Brianza	Via San Lorenzo	Perennial	5	391		
8	Castello Brianza	Brianzola, spring of Beverino Stream	Perennial	3	420	SALSAL	
9	Castello Brianza	Roncaccio	Historical	5	destroyed in 2002 by a landslide		
10	Dolzago	Meadow of Hoé	Perennial	1	405		
11	Dolzago	Meadow of Hoé	Temporary	4	400		
12	Dolzago	Meadow of Hoé	Perennial	4	400	SALSAL	
13	Dolzago	Meadow of Hoé	Perennial	4	400	SALSAL, RANDAL, RANTEM	
14	Dolzago	Lake of Cogoredo	Perennial	3	445		
15	Dolzago	Lake of Cogoredo	Perennial	3	380		
16	Dolzago	Cavonio	Perennial	5	459		
17	Colle Brianza	Bestetto	Perennial	3	505	SALSAL	
18	Colle Brianza	Campanone of Brianza	Perennial	5	550	SALSAL	
19	Colle Brianza	Panizzera Farmhouse	Perennial	4	480	SALSAL, RANDAL, RANTEM	
20	Colle Brianza	Val Chignolo	Perennial	3	570	SALSAL	RANTEM
21	Colle Brianza	Panizzera Farmhouse	Perennial	5	470		
22	Colle Brianza	Panizzera Farmhouse	Temporary	3	460		
23	Colle Brianza	Panizzera Farmhouse	Temporary	3	475		
24	Colle Brianza	Ravellino	Perennial	5	589		
25	Colle Brianza	Campsirago	Temporary	3	665	SALSAL	
26	Colle Brianza	Madonna of the Sasso	Perennial	1	660		
27	Colle Brianza	Footpath between Bestetto and Brianzola	Temporary	3	470		
28	Colle Brianza	Giovenzana	Temporary	5	650		
29	Airuno	Between Aizurro e Veglio	Temporary	3	496	SALSAL	
30	Airuno	Veglio	Perennial	5	500		
31	Ello	Marconaga	Temporary	5	395		
32	Ello	After Cascina Vedizero	Perennial	3	405	SALSAL	
33	Ello	Fura	Perennial	2	400	SALSAL	
34	Galbiate	Polgina	Perennial	1	666		
35	Galbiate	Monte Crocione	Perennial	3	690	SALSAL	
36	Galbiate	Monte Crocione	Perennial	3	715	SALSAL	
37	Galbiate	Mozzana	Perennial	3	517	SALSAL, RANTEM	
38	Olginate	Consonno	Temporary	3	600		
39	Olginate	Between Consonno & Dozio	Temporary	3	630		
40	Valgrehentino	Cerè	Perennial	3	270	SALSAL	
41	Valgrehentino	Dozio	Perennial	5	580		
42	Valgrehentino	Ca Muiacca	Temporary	3	480	SALSAL	RANTEM
43	Valgrehentino	Biglio Superiore	Perennial	5	560		
44	Olgiate Molgora	Ocellera	Perennial	5	290		RANDAL
45	Olgiate Molgora	Monastriolo	Perennial	3	430	SALSAL, RANTEM	
46	Santa Maria Hoé	Mirabella	Perennial	3	450	SALSAL	

Results

Results are shown in table 1 and 2. In the second area only 10 sources are perennial while the others are historical or temporary; in 7 springs, for instance 2 draining galleries, 2 public washhouses and 3 beginning stretches of little water courses, the presence of *S. s. salamandra* larvae has been recorded; in one spring that origins a little stream egg-clutches and tadpoles of *R. temporaria* have also been observed. Some young specimens of this *taxon* have been found in April 2005 in one draining gallery.

In the area of Mount of Brianza, 33 of the investigated springs are perennial. The breeding activity of 4 species of Amphibians has been recorded for 22 biotopes. *S. s. salamandra* occurs in 21 of them such as 14 beginning stretches of little streams, 3 springs feeding little natural ponds, 2 draining galleries and 2 laundries. Less widespread seem to be the other species with *R. temporaria* that

breeds in 2 beginning stretches of little streams and in 2 springs feeding little natural ponds where it is sympatric with *R. dalmatina* that also breeds in a little artificial basin. *R. kl. esculenta* breeds in a 25 metres long basin fed by three little sources. Interesting the finding inside a draining gallery of a male of *R. latastei*.

Discussion

The fact that Amphibians only breed in a limited number of springs of Mount Barro is very likely due to the fact that few of them are suitable for their reproduction. Generally speaking the species that are more associated with the sources of the two areas investigated are *S. s. salamandra* followed by *R. temporaria*. The other species recorded on the Mount of Brianza avoid the springs preferring extended lentic habitats, irrigation channels or temporary ponds that easily heat up (MANENTI 2002).

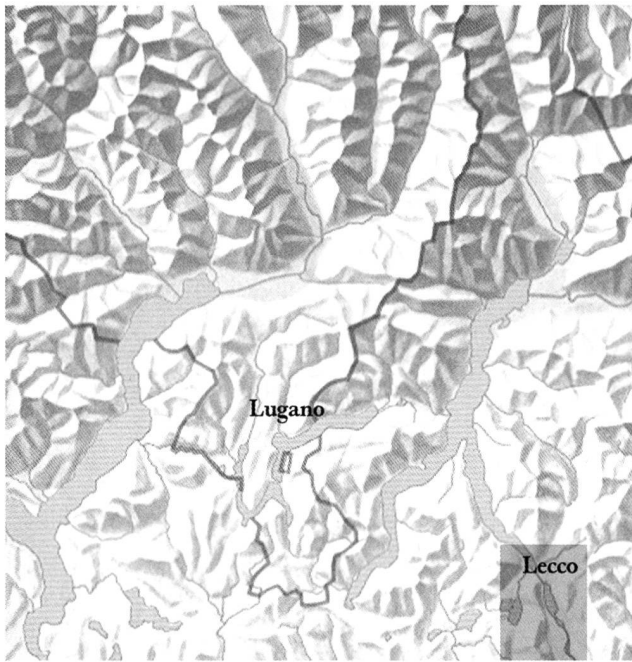


Fig. 1 - Location of the two areas studied.

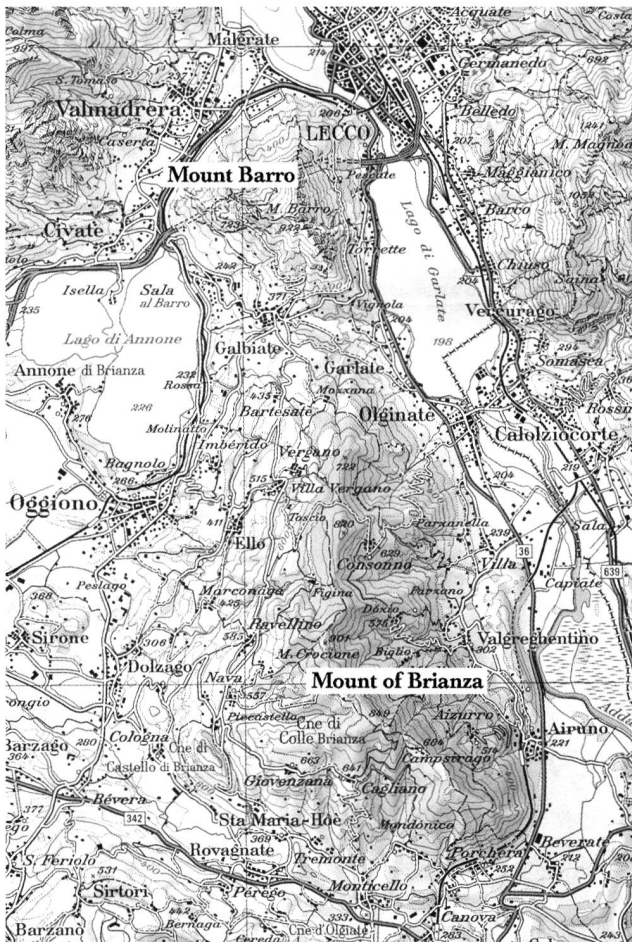


Fig. 2 - The Mount Barro and the Mount of Brianza.

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