Numbers and breeding distribution of the Bee-eater *Merops apiaster* in province Voivodina (northern Serbia) between 1987 and 1990

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Based on the questionnaire survey it was established that 185 Bee-eater pairs nested at 28 localities in Voivodina (Serbia) in 1987, 184 pairs at 21 localities in 1988, 32 pairs at 5 localities in 1989, and 191 pairs at 20 localities in 1990. Since data were available from only about 20 % of the province, while conditions of nesting seemed suitable in almost the entire area, I estimated the Bee-eater population of the entire province at 1000-2000 pairs. Over 50 % of the nest sites were occupied by 1-5 pairs each. There were no differences between years in frequencies of colony sizes. 40 % of nest sites were in loess faces, 15 % in vertical riparian banks, 15 % in sand pits, 15 % in excavation sites of brick factories, 15 % at other types of earth excavations (constructions, road works). The most frequent co-nesting species of Bee-eaters were Sand Martin and Tree Sparrow, but House Sparrows, Starlings, Swifts, Wheatears and Kestrels were also found occupying the same nesting locations.

Key words: *Merops apiaster*, numbers, breeding distribution, Voivodina, Serbia.

1. Introduction

The total European population of the Bee-eater comprises 200,000-400,000 pairs (FRY 1994; KRIŠTÍN & PETROV 1997), only 5 % of which breed in Central Europe (KRIŠTÍN & PETROV 1997). Considerable numbers nest in Croatia, Hungary and Romania (FRY 1994; KRIŠTÍN & PETROV 1997). However, neither FRY (1994) nor KRIŠTÍN & PETROV (1997) mentioned this species nesting in Voivodina (northern Serbia), a province wedged between these three countries in the south-eastern part of the Carpathian basin. Yet, Bee-eaters do nest regularly in Voivodina (MATVEJEV 1950; MATVEJEV & VASIĆ 1973; VASIĆ 1995), primarily in steep riverbanks and earth faces (PELLE *et al.* 1977). Some earlier sources imply that Bee-eater numbers breeding in Voivodina are substantial even at a European scale. LOWIESER (1909) estimated the number of pairs nesting in the steep loess face of the Titel plateau, bordering river Tisa, to be around 400-500 in 1908. GROZDANIĆ (1955) counted 700 burrows in the loess face near the village Deliblato (although about 200 had collapsed or were old). According to ANTAL *et al.* (1973) the number of nesting pairs only within the Deliblato sandy steppe area was at least 1000.

To gain more information about Bee-eaters nesting in Voivodina, we sought to answer for the following questions by means of a questionnaire survey. (1) How large is the population nesting in Voivodina? (2) What are the colony sizes? (3) In what sort of places and in the company of which other bird species do they nest?

2. Study area and Methods

The province Voivodina (44°38'-46°10' N; 18°10'-21°15' E) is a predominantly flat region of northern Serbia (Yugoslavia), occupying the south-eastern part of the Carpathian basin. It is divided into three regions by the rivers Danube, Tisa and Sava (Fig. 1): Bačka is a wide plain bordered by the Danube, the Tisa and the Hungarian border (8956 km^2); Banat is bordered by the Tisa, the Danube and the Romanian and Hungarian border (8886 km^2); while Srem is the area between the Danube and the Sava (3838 km^2). There are four loess plateaus (Banatska, Tamiška, Titelska and Telečka), two sandy areas (Deliblatska and Subotičko-Horgoška) and two low mountains (Fruška gora in Srem at 539 m, and Vršačke planine in south-eastern Banat at 641 m a.s.l.; MARKOVIĆ 1990). More than 75 % of Voivodina is used agriculturally, only 6.6 % is covered by forests (MILUTINOVIĆ 1981).

In the springs of 1987, 1988, 1989 and 1990 questionnaires (40 each year) asking for information about Bee-eaters were sent to ornithologists around the province. In particular, we were interested in the exact location of nest sites and the number of breeding pairs. We also asked for information about nest sites and co-nesting bird species. It was predominantly members of the Bird Protection and

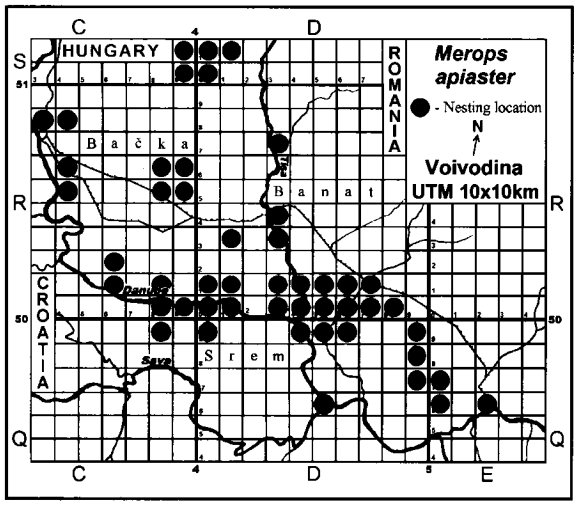

Fig. 1: Breeding distributions of Bee-eaters in 1987-1990, in province Voivodina, Serbia. – *Brutverbreitung des Bienenfressers in der serbischen Provinz Voivodina 1987-*

Study Society of Voivodina who reacted to our appeal: we received responses from 18 ornithologists in the first year, 13 in the second, 3 in the third, and 5 in the fourth year.

3. Results

Based on our survey, 185 pairs of Bee-eater nested at 28 localities in 1987, 184 pairs at 21 localities in 1988, 32 pairs at 5 localities in 1989, and 191 pairs at 20 localities in 1990. However, although most of the province appears suitable for Bee-eaters, the survey yielded data from only 20 % of the area (Fig. 1). We attempt to estimate the total size of the nesting population. The studied area (Fig. 1) covers approximately 250 UTM squares measuring 100 km^2 each. During the 4 years, nesting was reported from only 49 squares. If we assume that in one fifth of the entire province there are at least 200 Bee-eater pairs nesting each year, this yields a projection of 1000 pairs for the total area. We can also approach the problem in another way: 74 cases of nesting were recorded in the study period (Tab. 1), totalling 592 pairs (on average 8 pairs per case). If a density of 8 pairs per 100 km^2 is assumed, this would yield an estimate of 2000 pairs for the entire area. We therefore estimate the Bee-eater population nesting annually in Voivodina to be around 1000-2000 pairs.

Table 1: Frequencies of colony sizes of breeding Bee-eaters in Voivodina 1987-1990. – *Häufigkeit der Koloniegrößen brütender Bienenfresser in Voivodina 1987-1990.*

number of pairs	1987	1988	1989	1990	total	%
1-5	17	13	2	9	41	55.4
6-10	7	2	3	3	15	20.3
11-20	3	4	0	5	12	16.2
21-50	1	2	0	3	6	8.1
total	28	21	5	20	74	100.0

In more than 50 % of the cases only solitary pairs nested at the recorded site or only very small colonies (< 5 pairs) have established themselves (Tab. 1). There were no significant differences in the frequency of solitary versus colony nesters between years ($\chi^2 = 11.4$, df = 9, $p > 0.05$). We have detailed descriptions of 40 out of 62 nest sites (64.5 %): 40 % were in loess faces, 15 % in vertical riparian banks, 15 % in sand pits, 15 % in excavation sites of brick factories, 15 % at other types of earth excavations (constructions, road works). The bird species which were found nesting in the direct neighbourhood of Bee-eaters (i.e. co-nesters) were primarily birds that are able to take advantage of the specific features of these nest sites (burrows left from earlier years, crevices and hollows created by erosion, etc.). These included Sand Martin *Riparia riparia*, Tree Sparrow *Passer montanus*, House Sparrow *Passer domesticus*, Starling *Sturnus vulgaris*, Swift *Apus apus*, Wheatear *Oenanthe oenanthe*, Kestrel *Falco tinnunculus* with Sand Martins (24% of sites) and Tree Sparrows (13%) being most frequent. Whereas Sand Martins nested in self-excavated burrows, Tree Sparrows mainly used the burrows abandoned by Bee-eaters and Sand Martins.

4. Discussion

The Bee-eater population in countries neighbouring Voivodina comprises several thousand pairs, e.g. 1000-5000 in Croatia (FRY 1994; LUKAČ 1998) and 12,000-20,000 in Romania (WEBER *et al.* 1994). The questionnaire survey in Hungary in 1949 yielded 1200 nesting pairs (SZIJJ 1955), but TAPFER (1957) estimated 2000 pairs in 1955. Recently surveys in Hungary yielded 4113 pairs in 1997(on 17,062.5 km^2), and 6357 pairs (on 26706.2 km^2) in 1998 (GYURÁCZ & NAGY 1999). In view of these figures, our estimate for Voivodina does not seem unrealistic. GYURÁCZ & SZANYI (1994) report that the number of Bee-eaters nesting in Hungary and in other areas of Europe had declined until the late 1970s, after which the species extended its range again and a slow population growth has occurred. KINZELBACH *et al.* (1997) showed that the Bee-eater is a sensitive indicator of mild winters and above-average spring temperatures.

It appears that changes have also occurred in the social nesting strategy. Colonies numbering several hundred pairs (e.g. SZIJJ 1955; GROZDANIĆ 1955) have disappeared; nesting in small colonies is more widespread today. This is confirmed by our results which show that over 50 % of the nesting localities were occupied by 1-5 pairs each. In sand pits of Vas

county, Hungary, sites occupied by only 1-2 pairs each made up 61 % of nest sites in 1991 and 48 % in 1993 (GYURÁCZ & SZANYI 1994). This was confirmed by findings of MUŽINIĆ *et al.* (1993) in Croatia and by surveys in Hungary in 1997-1998 (GYURÁCZ & NAGY 1999).

As for nesting sites, extensive loess plateaus and sandy steppes are found in large parts of Voivodina, i.e. soil conditions are favourable for nesting Bee-eaters. MATVEJEV (1950) emphasised that Bee-eaters are most frequent where there are steep banks (e.g. riverbanks, sand dunes, etc.) and since most such habitats were found in Voivodina, Bee-eaters were most numerous here. As regards the location of nesting sites, our findings confirm those reported in the literature in almost all aspects (e.g. MATVEJEV 1950; SZIJJ 1955; TAPFER 1957; FRY 1991; KRIŠTIN & PETROV 1997; BANKOVICS 1998). When studying the occupation dynamics of artificially created banks, SZLIVKA (1980) observed that the first settlers were Sand Martins, followed by Tree Sparrows and House Sparrows, then other birds like Bee-eaters, Wheatears, Starlings and even the Little Owl *Athene noctua*. GYURÁCZ & SZANYI (1994) established that the most frequent co-nesters of Bee-eaters were Tree Sparrows, while the most numerous co-nester was Sand Martin. GREGORI (1990) in Slovenia also mentions Black Redstarts *Phoenicurus ochruros* as co-nester. Our results are concordant with these reports except for Black Redstart, which only expanded into the province since the 1980s, but has now become a regular and frequent breeder (PURGER 1989).

Acknowledgements: I would like to thank the members of Bird Protection and Study Society of Voivodina (a,b,c): S. BLAŽIĆ, M. DEVIĆ, J. DÓZSAI, D. GLUVAKOV, A. HORVÁTH, I. HULLÓ, B. ILIN, E. JENEI, P. KRIZSÁN, J. LAKATOS, S. LUKÁCS, M. MIRIĆ, R. OBRADOVIĆ, I. PELLE, N. PETROVIĆ, P. ŠETALO, T. SÜTŐ, T. TERNOVÁC, L. TÓTH for collaboration, and V. F. VASIĆ for helpful comments on an earlier version of the manuscript.

5. Zusammenfassung

Purger, J.J. 2001: Häufigkeit und Verbreitung des Bienenfressers *Merops apiaster* in der Provinz Voivodina, Nord-Serbien, von 1987-1990. Vogelwelt 122: 279 – 282.

Der Bestand des Bienenfressers in der Provinz Voivodina wurde per Umfrage bei ornithologisch interessierten Personen und Vereinen ermittelt und auf die gesamte Provinz hochgerechnet. Im Jahr 1987 wurden 185 Bp. an 28 Stellen, 1988 184 Bp. an 21 Stellen und 1990 191 Bp. an 20 Stellen gemeldet. Die Meldungen betrafen jedoch nur etwa 20% der Provinzfläche, während die Habitatbedingungen fast in der gesamten Provinz geeignet erschienen. Der Gesamtbestand wird daher auf 1000-2000 Brutpaare geschätzt. Über die Hälfte der Paare brütete einzeln bzw. in Kleinstkolonien mit bis zu 5 Paaren. Die Häufigkeitsverteilung der Koloniegrößen unterschied sich nicht zwischen den Jahren. 40% der Brutplätze waren Lößsteilwände, 15% sonstige Steilwände an Flußufern, jeweils 15% in Sand- und Ziegeleigruben sowie weitere 15% an anderen künstlichen Erdaushubstellen (Baustellen). In unmittelbarer Nachbarschaft zu Bienenfressern brüteten am häufigsten Uferschwalben und Feldsperlinge (in alten Uferschwalbenhöhlen), weniger häufig Haussperling, Star, Mauersegler, Steinschmätzer und Turmfalke.

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Manuskripteingang: 21. Jan. 2000
Revision angenommen: 2. Jan. 2001

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