

BIRD COMMUNITIES IN THE SUBURBS AND TOWN CENTRE OF ŽALEC (LOWER SAVINJA VALLEY, SLOVENIA)

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Abstract

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Breeding birds were censused using the territory mapping method in the suburbs and town centre of Žalec (Lower Savinja valley, Slovenia). The highest species density was found in the suburbs (15 species) rather than in the town centre (11 species). The estimated number of breeding pairs was lower in the town centre (90.8 pairs/10 ha) than in the suburbs (122.8 pairs/10 ha), but the differences were not considered significant. On both plots the most abundant species was House Sparrow (*Passer domesticus*), with a very high density of 85.4 and 62.0 pairs/10 ha respectively.

Key words: *bird communities, urban bird fauna, Žalec, Slovenia.*

Introduction

Cities represent the extreme of human-modified environments and are characterized by low numbers of species (Bezzel, 1985). In Europe a relatively large number of studies have been devoted to urban avifauna. However, most of the urban studies were carried out in western and northern Europe, predominantly in parks (e.g. Tomiatóje & Profus, 1977; Luniak, 1980, 1981; Bezzel, 1985; Luniak et al., 1986; Taylor et al., 1987; Degen & Otto, 1988; Suhonen & Jokimaki, 1988; Nowicki, 1992; Kooiker, 1994 and references therein), whereas data from other regions are scarce (e.g. Biagioni et al. 1996) or represent only qualitative data (e.g. Micevski 1989, 1990).

My main purpose in this study was to compare the abundance and diversity of bird communities in the suburbs and the centre of Žalec.

Study area

Town Žalec (46°15'N 15°10'E) was located in the Lower Savinja valley. With a population of 5364, Žalec is one of the smallest towns of Slovenia (Statistical Office of Republic of Slovenia, 1996). The surrounding landscape was dominated by intensive, arable agriculture, the main crop being hop.

Two plots, one in the centre and another in the suburbs were randomly selected. In the suburbs houses with gardens predominated. There were also a few small blocks of flats.

Coniferous and deciduous trees were young and the undergrowth was managed. The area measured 12.4 ha.

In the town centre blocks with flats predominated. Green areas were small. The small park (about 0.4 ha) was managed and human interference was high throughout the centre. The area measured 9.5 ha.

Shrub layer was scarce on both plots. Nest-boxes were not present on any of the plots.

Methods

Each plot was censused for breeding birds by territory mapping (Bibby *et al.* 1992, Gibbons *et al.* 1996). Both plots were visited eleven times during early morning (mainly from sunrise to 10 a.m.) between mid March and mid June. All bird observations were recorded on maps at a 1:5000 scale. Birds observed just outside the plots were included in order to assess whether a territory was situated within or outside a plot. Territories across the border of a plot were counted as half territories when more than half of the observations fell inside its borders. Both plots were censused during the same morning in random sequence to avoid effects of time on the conspicuousness of the birds. Territory mapping method is less suitable for birds breeding in colonies or semi-colonial aggregations, (e.g. Berg & Part, 1994). For censusing the only colonial species in my area, I made three additional censuses specially devoted to the House Sparrow (*Passer domesticus*).

The detected density of Magpie (*Pica pica*) and House Martin (*Delichon urbica*) were estimated only on the base of found nests.

The values for bird weights were taken from Cramp *et al.* (1988–1994).

Species	Suburbs	Centre	Average
<i>Streptopelia decaocto</i>	10.5	3.1	7.3
<i>Delichon urbica</i>	1.6	6.3	3.6
<i>Motacilla alba</i>	0.8	-	0.4
<i>Turdus merula</i>	2.4	-	1.3
<i>Phoenicurus ochuros</i>	2.4	2.1	2.3
<i>Sylvia atricapilla</i>	2.4	2.1	2.3
<i>Muscicapa striata</i>	1.6	-	0.9
<i>Parus major</i>	1.6	2.1	1.8
<i>Sitta europaea</i>	0.8	-	0.4
<i>Pica pica</i>	1.2	2.1	1.6
<i>Serinus serinus</i>	7.3	6.3	6.8
<i>Carduelis carduelis</i>	1.6	1.1	1.4
<i>Passer domesticus</i>	85.4	62.0	75.3
<i>Carduelis chloris</i>	1.6	3.1	2.3
<i>Fringilla coelebs</i>	1.6	0.5	1.1
Total	122.8	90.8	108.8

Table 1. Density (pairs/10 ha) of breeding birds in two plots in the town Žalec.
1. táblázat. A költő párok denzitása (pár/10 ha) Žalec két megfigyelési területén.

For comparisons of similarities between bird communities in the two plots the density similarity index was used (Tomialojć & Wesolowski, 1990):

$$DS = \{2 \sum \min (d_{1i}, d_{2i}) / D_1 + D_2\} \times 100\%$$

where d_{1i} , d_{2i} are the densities of the i -th species in the communities 1 and 2, and $D_1 + D_2$ are total densities of communities 1 and 2 respectively. The index varied between 0 (no species common) and 100 (identical densities of all species).

Statistical analyses were performed with non-parametric Mann-Whitney U test, since data did not show normal distribution (Sokal & Rohlf 1995). All statistical tests were performed with the SPSS 6.0 statistical package. A P -value < 0.05 was considered significant.

Results

A total of 15 nesting species was recorded in the town centre and 11 species in the suburbs. Out of the 15 species acknowledged as breeding in the studied plots, as many as 11 nested in both plots; another 4 species (White Wagtail – *Motacilla alba*, Blackbird – *Turdus merula*, Spotted Flycatcher – *Muscicapa striata*, Nuthatch – *Sitta europaea*) nested exclusively in the suburbs. Predominant species (participation $> 5\%$) in the bird community of the suburbs were House Sparrow, Collared Dove (*Streptopelia decaocto*) and Serin (*Serinus serinus*), whereas in the town centre were House Sparrow, House Martin and Serin.

The overall bird density varied between 90.8 pairs/10 ha in town centre and 122.9 pairs/10 ha in the suburbs (Table 1), although the difference was not significant (Mann-Whitney U test = 65.0, $P > 0.05$).

House Sparrow was the most numerous species in both plots, moreover in both plots more than a half of all birds belonged to this species. Density similarity index between the plots were 18.4.

The total biomass of adult birds in the described communities were 6693 g/10 ha in the town centre and 10 945 g/10 ha in the suburbs respectively. Nevertheless the differences between plots is not significant (Mann-Whitney U test = 81.5, $P > 0.05$).

In the bird communities studied, the limited representation of cavity-nesting species is a reflection of the lack of tree holes and nest-boxes. In both plots species nesting in trees at heights of over 1.5 m were dominant. Eight of the species were mainly omnivorous, five carnivorous and two herbivorous. Altogether 8 species were non-migratory.

Discussion

The list of 15 species occurring in the town of Žalec is much lower to those reported from other Central European cities (e.g. *Degen & Otto, 1988; Iankov, 1992; Nowicki, 1992; Biadun, 1994; Kooiker, 1994; Biagioni et al., 1996* and references therein). Nevertheless it must be taken into account that all these cities are much bigger and with much more diverse habitats than Žalec. According to this it seems that the number of species increased, following the general rule, with increasing sample size is valid in this case, too. However the list of 15 species occurring in the town Žalec is perhaps not complete, because only a part of the town was surveyed.

According to *Luniak et al. (1990)* some species, e.g. Blackbird, often inhabited big towns earlier than small towns in the same regions. The same holds true also for some other species which normally live in agricultural landscape, e.g. Kestrel (*Falco tinunculus*), Woodpigeon (*Columba palumbus*), Jay (*Garrulus glandarius*), Carrion Crow (*Corvus corone*), Magpie (*Pica pica*), Starling (*Sturnus vulgaris*) (*Bezzel, 1985; pers. obs.*). Most of these species do not breed in Žalec what contributes to the lower species density.

An analysis of the bird communities described from the town centre and the suburbs shows that in respect of the number of species, number of breeding pairs and biomass these two bird communities are comparable. However my study is in agreement with previous studies demonstrating that the number of species declines with increasing urbanization (e.g. *Huhtalo & Jarvinen, 1977; Bessinger & Osborne, 1982; Bezzel, 1985*). It seems that the decline is not so strong in small cities (see results).

Increased human activity causes drastic changes in the environment, e.g. decreases in vegetation cover (*Bessinger & Osborne, 1982*) what was obviously the case also in the centre of my study area vs. suburbs. For example in town centres those species breeding in the shrub layer have lower densities than in the suburbs.

The House Sparrow had markedly higher densities (85.4 and 62.0 pairs/10 ha respectively) when compared to those found by e.g. *Dyer et al. (1977)* and *Heij (1985; cit. Indykiewicz & Summers-Smith, 1997)*, *Luniak (1981)*, *Bezzel (1985)*, *Biadun (1994)*. This difference may result from the influence of geographical location, urbanization, habitats, predators and availability of food (e.g. *Tomialojć, 1982; Lancaster & Rees, 1979*).

Based on the dominance values, the House Sparrow and Serin were the most numerous dominant species in both plots. This statement is in agreement with e.g. *Bezzel (1985)* who pointed out that in urban bird communities only few species (usually 3-5) are dominant, but these comprise about 65–90% of the individuals in cities. In my case these two species comprise about 75% of the individuals in both plots. These superabundant species (e.g. House Sparrow), nesting mostly in the buildings, have adapted early to the urban habitat and are superior in competition to other species (*Lancaster & Rees, 1979*).

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Vogrin, M.

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