

BIOCULTURAL DIVERSITY: SACRAL MONUMENTS AS HABITATS FOR BIRDS

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Abstract

Biocultural Diversity is considered as a new emerging scientific concept under assessment both historical and natural heritage in European cultural landscapes. This study provides an insight into the Biocultural Diversity concept in the practice. Results of the long-term research (2016-2018) on bird species nesting in unusual types of habitats – sacral monuments such as chapels and churches - indicated high importance of the Biocultural Diversity concept in holistic understanding to joining of historical value of sacral monuments with its significance for natural heritage maintaining in cultural landscapes of the study area Olomouc Archdiocese (Czech Republic).

Key words: Bird diversity, Cultural Landscape, Sacral monuments

Introduction

Sacral buildings belong among the significant dominant architectural features of former settlements across various cultures. With regard to their spaciousness, segmentation, and dominant height, they often serve, apart from their clerical and cultural mission, as a refuge for a certain group of synanthropic animal species (Bezděčka et al. 2019). The habitation of sacral buildings by animals has had its own historical course and development. The first dated findings about the habitation of sacral buildings by barn owls in the Czech Republic come from the second half of the 19th century, and partial sporadic information is known from the first half of the 20th century. However, the majority of databases were collected during the course of the second half of the 20th century up till the present (Poprach 2010). The significance of sacral buildings functioning as refuges for synanthropic animal species has been gradually growing in the course of the 20th and 21st centuries, most probably in relation to extensive changes in the agricultural landscape of the country. The Czech Republic saw negative changes in the landscape of the agricultural countryside in the sense of the utilization of the landscape in the course of the 1950s and 1960s (merging blocks of arable land, the shrinkage of meadows, and scattered and attached greener in the countryside). These changes were reflected in village and farm architecture in the forms of tending and utilizing related buildings. After 1990, agricultural production was restructured and gradually intensified and further changes were made to the agricultural countryside. In connection with the intense application of chemical preparations, the agricultural landscape has become homogenous, with a significant decrease in its biodiversity (Reif & Vermouzek 2018). The alterations to the agricultural landscape might have had an impact on the successive synanthropization of some animal species and their tendency to utilize sacral buildings for their purposes. Species richness, abundance, and phylogenetic diversity were all higher in churches than farmsteads (Skórka et al. 2018). In this study, we analyse the results of the monitoring of sacral buildings in the Olomouc Archdiocese, Czech Republic. The data acquired, depicting the utilization of sacral buildings by endangered and protected animal species, plays a key role in providing them with protection and ensuring their survival.

Materials and methods

The monitoring of sacral buildings which was carried out on a part of the territory of the Czech Republic between 2016 and 2018 was targeted on the occurrence of all types of animals living in these buildings. Monitoring was conducted on the territory of the Olomouc Archdiocese (10 018 km²), where altogether 1275 sacral buildings (churches and chapels) are located in 418 parishes. A large part of the Olomouc Archdiocese lies in lowland areas (200–250 m a.s.l.), while the south-east part is covered by the uplands of the Vsetínské vrchy hills and White Carpathians and the northern part rises into the Nížký Jeseník uplands and Hrubý Jeseník Mountains (1491 m a.s.l.). The vast majority of local settlement systems house a sacral building of some type. What we conducted was the monitoring of the entire territory of the Olomouc Archdiocese, i.e., in regions with differing altitudes above sea level. When checking the sacral buildings, we monitored the occurrence of all species of vertebrates and traces of their habitation (used nests, droppings, vomit, etc.). The towers and attic areas of sacral buildings were always examined in detail, as was the occurrence of vertebrates in the exterior of the building (in embrasures, behind sculptures, etc.). We also recorded the occurrence of access openings leading to the towers and attic areas for individual animal species. In the course of

the monitoring, we checked a total number of 278 sacral buildings. Within the scope of this paper, we have evaluated the data that was acquired on the occurrence of all bird species in these sacral buildings.

Results

In the period between 2016 and 2018, we recorded the occurrence of the nesting of bird species in a total of 133 sacral buildings (47.8% of the buildings that were monitored) within the Olomouc Archdiocese. On a larger number of sacral buildings, only one nesting bird species was detected ($n = 105$); less often, two nesting species were detected ($n = 22$) and, exceptionally, three nesting species ($n = 6$). Altogether, 145 sacral buildings (52.2%) remained uninhabited by bird species.

We recorded the nesting of nine bird species ($n = 167$ cases of occurrence) in these sacral buildings. The most common and, at the same time, the most numerous bird species was the domestic pigeon, *Columba domestica* ($n = 49$). In most cases, the pigeons nested in the exteriors of sacral buildings ($n = 33$), especially in buildings where the interior was protected against the entrance of birds. In accessible parts of sacral buildings (towers, attic areas), pigeons nested both in the interiors ($n = 12$) and in both the interiors and exteriors of these buildings ($n = 4$). Domestic pigeons are, as far as their nesting conditions are concerned, highly adaptable. Another regularly nesting species that was detected was the common kestrel *Falco tinnunculus* ($n = 44$), which builds its nests in the top parts of towers, and in sporadic cases also in the attic areas of churches. In most of the sacral buildings, common kestrels nested on the exteriors of towers ($n = 37$), individual pairs also in interiors ($n = 7$) per pair, and only in three buildings were there two pairs. Another regularly occurring species is the common swift, *Apus apus* ($n = 22$), nesting in the interiors of roof areas, with very small openings being sufficient for them to gain access into the interior. Less commonly, the house sparrow, *Passer domesticus* ($n = 16$), and black redstart, *Phoenicurus ochruros* ($n = 14$), were recorded, nesting in the interiors as well as the exteriors of buildings. We also registered the common house martin, *Delichon urbica* ($n = 13$), nesting exclusively on exteriors, on the walls of the sacral buildings. In the interiors of the buildings, we also discovered the nesting of the western jackdaw, *Corvus monedula* ($n = 6$), white wagtail *Motacilla alba* ($n = 2$), and barn swallow, *Hirundo rustica* ($n = 1$); see Table No. 1. We did not detect nesting of the barn owl, *Tyto alba*, or traces of its habitation (fresh as well as older vomit, wooden drill dust under the nests) during our monitoring of the sacral buildings. In spite of that, barn owls used to nest in 63 sacral buildings in the past (around 20 years and more). Out of 130 sacral buildings with fly-in openings sufficient for a barn owl, 36 buildings (27.7 %) were accessible and suitable for this bird species but not inhabited by the owl.

Tab. 1: List of recorded bird species and frequency of their nesting occurrence in sacral buildings within the Olomouc Archdiocese region (Czech Republic) in the period 2016 – 2018

Bird species	Amount of detected nesting sites in sacral monuments (n)	%
<i>Columba domestica</i>	49	29,3
<i>Falco tinnunculus</i>	44	26,3
<i>Apus apus</i>	22	13,2
<i>Passer domesticus</i>	16	9,6
<i>Phoenicurus ochruros</i>	14	8,4
<i>Delichon urbica</i>	13	7,8
<i>Corvus monedula</i>	6	3,6
<i>Motacilla alba</i>	2	1,2
<i>Hirundo rustica</i>	1	0,6
Total	167	100,0

Discussion

From the results that were gained it follows those sacral buildings, or rather the tower and attic areas of such buildings, represent a significant refuge for synanthropic bird species, including specially protected species. In and on the sacral buildings, we recorded the nesting of nine bird species altogether. The most common and numerous species was the domestic pigeon. This species ranks, at the same time, among the most problematic species inhabiting sacral buildings, because of the extensive contamination of the buildings' interiors as well as exteriors with droppings and veterinary risks. Because of these aspects, the owners and administrators of sacral buildings tend to close

access points into the interiors of sacral buildings and protect them against pigeons, which, however, results in other nesting species not being able to enter these buildings either. The occurrence of domestic pigeons in historical and sacral buildings is a world-wide problem. In Europe, pigeon populations have colonized smaller and large towns and cities, even including some villages. It is estimated that on the territory of the capital, Prague, the pigeon population numbers over 100,000 birds. For some cities, however, pigeon populations are typical and supported (they are regularly fed by people) – such as Venice, Rome, London, Krakow, and others. Between 1985 and 1989, the number of wild domestic pigeons in the Czech Republic was estimated at from 800,000 up to 1,600,000 pairs. The European nesting population numbers over 9.3 million pairs (Šťastný et al. 2006). Such numerous populations of the domestic pigeon have a negative impact on the utilization of sacral buildings and their accessibility for other bird species. Larger openings into the interiors of sacral buildings are also required, on the basis of our findings, by the barn owl, western jackdaw, and common kestrel. On the contrary, small roof openings are sufficient for the common swift, just as they are for other songbirds that were recorded during our monitoring. Together with the above-mentioned research, we also focused on searching the sacral buildings for representatives of the Chiroptera family. We detected the occurrence of a total of ten species of the Vespertilionidae family and one species of the Rhinolophidae family. Minuscule openings in the roof construction, which can easily be overlooked visually, are sufficient for bats and horseshoe bats to enter the interiors of sacral buildings. It follows from our data that 27.7% of the sacral buildings were, in the period that was monitored between 2016 and 2018, accessible and suitable for barn owls, but, in spite of this, barn owls did not occupy any of them as no fresh traces of their habitation were visible. At present, in the Czech Republic the barn owl nests mostly on the premises of farms (Poprach 2010). The most significant factor that could have caused the transfer of the barn owl from sacral to agricultural buildings might be strong predatory pressure by, especially, the beech marten, *Martes foina*, which has synanthropized in the Czech Republic. Schönfeld and Girbig (1975) state that the beech marten occurred in 13% of the churches monitored by them. They also indicate that the barn owl returned and started nesting in church towers which the beech marten ceased to visit. The reason why the barn owl selects its nests in the top parts of church towers (the belfry) might be the fact that these places are difficult to access for their predators and thus offer them sufficient safety for nesting (Kopij 1990). In the past, sacral buildings made up a significant part of nesting places for the barn owl on the broader territory of Europe. In France, monitoring of sacral buildings was carried out 1970-1995 (Baudvin & Jouaire 2001), revealed 18.5% of the 951 investigated churches (n = 176) were not accessible for barn owls. Out of the total number of 775 accessible churches, barn owls nested regularly in 34.7% (n = 269), 20.8% of the churches (n = 161) were used as a daily location, in 12.1% of the churches (n = 94) old traces of habitation by barn owls were found, and in 32.4% of the churches (n = 251) no traces of habitation were detected. Out of the nests found in churches, 81% were located in the church towers and 19% in the attic areas.

An alternative protective measure for the barn owl is the installation of nesting boxes into towers of sacral buildings. The problem is, however, that even these nesting boxes might be inhabited by domestic pigeons and might later be closed by the owner of the sacral building. Extensive changes to the agricultural landscape might gradually influence the synanthropization of some animal species and, at the same time, the utilization of sacral buildings by these species. As shown in the results of the monitoring of 101 churches and the same number of sacral buildings in Poland, the species composition differed between types of buildings, but functional diversity was similar in both types of buildings. The richness and abundance of the bird species correlated with the age of the church age. Churches may be important for the conservation of local bird diversity (Skórka et al. 2018).

Conclusion

Results of this study provide an insight into the Biocultural Diversity concept in the practice. Applying of this emerging scientific concept to the management practice in cultural landscape is based on long-term field monitoring of bird species nesting in unusual types of habitats – sacral monuments such as chapels and churches. Results of the research indicated high importance of the Biocultural Diversity concept in holistic understanding to joining of historical value of sacral monuments with its significance for natural heritage maintaining in European cultural landscapes.

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Souhrn

Práce prezentuje hlavní výsledky studie významu sakrálních objektů (kostelů, kaplí) v historickém regionu Olomoucké arcidiecéze jako biotopů pro ohrožené druhy ptáků. Monitoring sakrálních objektů v letech 2016–2018 prokázal že 167 sakrálních objektů má kromě svého primárního religiózního účelu i význam jako hnízdní biotop pro ohrožené ptačí druhy kulturní krajiny. Toto zjištění dokládá význam nově vznikajícího konceptu „Biokulturní diverzity“ v praxi pro propojení oborů památkové péče i ochrany přírody. Sakrální objekty (kostely, kaple) v kulturní krajině tvoří velmi často historické dominanty, jejichž význam však v holistickém pojetí není pouze kulturně-historický, ale přesahuje i do zájmů na udržení některých prvků přírodního dědictví evropských kulturních krajin.

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