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SYNANTHROPISTATION AND SYNURBISATION OF RAVEN *CORVUS CORAX* IN POLAND: A REVIEW

ABSTRACT

The Raven *Corvus corax* is one of the oldest synanthropic bird species. Historical development of human settlements and cities was the reason of occupancy by ravens neighborhood of villages and town. Nowadays, suburban areas are, among forest and rural areas, habitats used by Ravens. Since end of middle ages Ravens began breeding in interior of towns in the Great Britain. During 20th century Raven occupied several big cities of Europe and North America. In Poland, the first attempts of colonization of cities took place in the 1950s in Warsaw and Kraków. During next decades Raven came back from centrum of cities and began colonized suburban zone, mainly big forests within the border of towns. Until now, Raven in Poland nest only in suburban zones. Observations of non-breeding pairs inside of cities are still rare. The biggest population in cities do not exceed 20 breeding pairs.

INTRODUCTION

The Raven *Corvus corax* is one of the oldest synanthropic bird species. Historical development of human settlements and towns were the reason of occupancy by Ravens neighborhood of villages and town. Ravens accompanied camps hunters in paleolith and formed associations with humans, using the remnants of their food (Marzluff and Angel 2005). The evidence of strong connections of Ravens and humans was „cycle of Raven”, present in the myths and beliefs of primeval tribes in North America and Asia (Szyjewski 1991). During the Middle Ages, a Raven nest on Tower of London was known (Ratcliffe 1997). During the 20th century Raven inhabited some cities in Europe and North America (Ratcliffe 1997, Boarman and Heinrich 1999). Raven expansion on deserts of North America and far North is closely linked with development of human settlements in these areas (Heinrich 1999).

The Raven is a species with wide range, including almost Europe, Asia, North America and north part of Africa (Ratcliffe 1997). It use wide spectrum habitats from natural and managed forests across non-forest open areas and human settlements, towns and cities (Zawadzka 2006). Raven is an omnivore, opportunist bird species,

characterized by unique intelligence (Ratcliffe 1997, Heinrich 1999). After extermination in greater part of Europe, also in Poland, in the beginning of 20th century, Raven rebuilt its range and number, and currently is a species widespread, reached high densities (Zawadzka 2006). In Poland, Raven is a common, numerous species, reaching total population number estimated at least 20.000 breeding pairs and local densities from 1-20 pairs/100 km², average 5-7. Additionally, there is a big non-breeding part of population in Poland, at a difficult to assess number (Zawadzka 2006). According to MPPL data, in 2000-2012 number of Raven increased twice, and index of a widespread this species equals 0,5 (www.monitoringptakow.gios.gov.pl). Raven is plastic in terms place of nesting. Built nests on trees, rocks, and, especially in vicinity of human settlements, on pylons, rather on buildings or another constructions. Theoretically, the Raven satisfies all conditions in order to nest inside cities. This paper contains a review of data about colonization the cities by ravens in Poland, based on published source and data from questionnaires.

NESTING OF THE RAVENS IN CITIES

During the 20th century the Raven began nesting inside the big cities in Europe and North America, where it built nests on the buildings. As a breeding species was noted e.g. in Chicago, Los Angeles, Lwów, Moskwa, Berno, Londyn (Konstantinov et al. 1996, Ratcliffe 1997, Boarman and Heinrich 1999). In Poland, during the 1950s and 1960s years 20th century, Ravens sparse started nesting on the edge of big cities, or even in the big, centrally located urban parks. During the middle of the 1950s, about 14 pairs nested in Warsaw and its neighborhood. In 1955-1956, broods of Raven were found in Łazienki Park in Warsaw, and in small forest on periphery of this city and in neighboring towns: Bielany, Młociny, Dziekanów Leśny, Jabłonna, Powsin, Świdler, Radość, Podkowa Leśna, Struga, Zielonka, Piaseczno i Grodzisk Mazowiecki (Dobrowolski et al. 1958). In the 1960s non-breeding Ravens were observed in the center of Warsaw, although since following decade were lack of those records (Nowicki 2001). During 1956-1957 Raven nested in the edge of Kraków: Bielany, Konary and Las Wolski (Dobrowolski et al. 1962). During the next years the process of colonization of big cities was stopped (Tomiałojć 1990). In Łódź, the first brood was recorded in Las Łągiwnicki Forest located in the edge of city. Since 1970 Raven nested there irregularly (Głubowski et al. 2009). All nests were located on trees. Data about attempts of nesting in suburban zones in Poland from the 1970s have been very scarce (Tomiałojć 1990, Tomiałojć and Stawarczyk 2003). During the 1980s there has been a significant increase in number of Polish population (Bednorz 1991, 2000b) and many cases of settle to Ravens on edge of the cities were recorded from almost all regions of Poland. From this period comes data about first regular broods from periphery different sizes of cities on east of country: Suwałki, Białystok, Łosice, Siedlce, Jasło, and also in the center (Łódź) and west (Poznań, Leszno). In 1986, two occupied nests were found in Rędzin region, on

borders of Wrocław and in 1987 in small forest on the edge of Zielona Góra (Dyrzcz et al. 1991). Raven nested mainly in suburban zone inside administrative boundaries of towns and cities. Birds nested then in big parks or suburban forests on trees and also in open areas on the electric pylons. Nests were located in the vicinity of attractive places of feeding (slaughterhouses, butchers, garbage dumps, breeding farms). During this time, almost across the whole Polish range, Raven appeared as sparse breeding bird only in suburban zones around towns. Flaying birds in downtown were observed very rare. In winter and non-breeding season Ravens rarely were recorded on the edge of towns, in ruderal and industrial areas (Kuźniak 1996, Stój and Dyczkowski 2002, Ptaszyk 2003, Zawadzka 1996, 2006, Glubowski et al. 2009, M. Rzępała unpubl. data, A. Zbyryt unpubl. data). Attempts of synurbization in this period was connected with the rapid increasing in numbers in the whole species' range and progressing process of the colonization of farmland and synanthropic, but non-urban areas.

In the 1990s Raven gradually colonized cities edge, only slightly increasing low number on periphery, mainly in parks, forests and industrial areas. During those period, in several cities increased frequency of birds appearance in suburban zone during post-nesting period and winter. Within the administrative boundaries of Warsaw nested only 5 pairs, exclusively in suburban zone (Luniak et al. 2001). In Łódź, number breeding pairs increased form 2 in the half of the 1980s. to 7-8 in 2002. Ravens nested only in suburban zone, did not show synubization symptoms. Las Łagiewnicki Forest, located on the edge of this city, was permanent place of breeding (Glubowski et al. 2009). Similarly, in Poznań number of Raven in the 90s did not exceed 15 pairs. Birds were observed singly or rather in small groups on periphery (Ptaszyk 2003). There were lack of evidence of center colonization, but penetration of Raven in built-up areas in suburban zone were recorded (Winiński 2005). Increase of Raven population during the 1990s. was recorded within Olsztyn boundaries. In 1993, 4 pairs nested in larger forests within the administrative boundaries, but in 2006 there were found 10 pairs. Non-breeding birds were also observed just more frequently (Nowakowski et al. 2006). In the end of the 1990s brood of one pair of Raven was found in cemetery in Szczecin (Tomiałojć and Stawarczyk 2003). Single breeding pair was recorded on the periphery of Jasło (Stój and Dyczkowski 2002) and Kielce (Szczepaniak 2005). After 2000s the rate of cities settlements by Raven basically not change. At present, in Warsaw only over a dozen pair nests, exclusively on the periphery zone. Still lack of Raven records in the center of capital, also during post-breeding season and winter (M. Luniak, unpubl. data). On the east of Poland, Raven retreated from before settled suburban zone in Białystok (A. Zbyryt, unpubl. data) and Suwałki (authors' data). During last decade, number of Ravens in lot of Polish town do not increase or even declined. Data about 1-4 breeding pairs, only from peripheral zone, comes from towns across Poland, e.g.: Lublin (Biaduń 2005), Jelenia Góra (B. Gramsz, unpubl. data), Cieszyn (Jagiello and Linert 2010), Częstochowa (Czyż 2008), Radom (authors' data), Siedlce (M. Rzępała, unpubl. data), Zielona Góra (P. Czechowski, unpubl. data), Leszno (S. Kuźniak, unpubl. data),

Bydgoszcz (P. Indykiewicz, unpubl. data). In the west part of country, nests are built on trees, in big parks or forests in peripheral zone. In the center and east of country, Raven bred mainly in open areas, on electric pylons. Last years, attempts of single pairs settle in urban park in Legnica and Wrocław were recorded, although active breeding places, still are located only on periphery (L. Tomiałoć, unpubl. data).

PATTERN AND PERSPECTIVES OF CITIES COLONIZATION

During last half of century the Raven expanded its range on the whole Poland area, and its number and densities increased several times (Dobrowolski et al. 1962, Bednorz 1991, Tomiałoć and Stawarczyk 2003, Zawadzka 2006). It is a species frequent in both: forested habitats as well as open, farmland areas, colonized during latest 30 years. Number of nests located in open landscape on pylons increased markedly (Bednorz 2000a, Zawadzka 2006). Across the whole country, flocks of non-breeding, nomadic birds are present, probably more frequent in the west. The first trials of synurbization of Raven in Poland were recorded in big cities in the 1950s. They were connected with development of Raven population, extension of its range and changes behavior in related to humans (Dobrowolski et al. 1958, 1962). Nests were located also in big urban parks and in peripheral zones. During the next decade Raven have removed from center of cities, and during following years very slowly inhabited only edges and periphery. This process run most visibly in the 1980s, almost do not show geographical diversification nor dependence on town size. Raven appeared this period in forests within the administrative boundaries and periphery with loose build. Increase in number during next decades followed very slowly. Nowadays number of Raven breeding pairs do not exceed 20 in the biggest Polish cities, but usually is significantly lower. Densities are extremely low, especially in compared in densities vital urban populations other Corvids. Regional increase of breeding pairs is accompanied slight increase of records of non-breeding and wintering Ravens, still mainly in suburban zone. Sporadic, in some towns take place single records in downtown zone. Observations of single birds or pairs dominated. On the cities in the west of Poland are recorded few attempts of urban park colonization.

Very poor synurbization of Raven surprise on the background unusual ecological plasticity of species, his omnivorous, and also in comparison with other Corvids species, almost all strong synurbic (Magpie *Pica pica*, Hooded Crow *Corvus cornix*, Jackdaw *Corvus monedula*, Rook *Corvus frugilegus*, and last time also Jay *Garrulus glandarius*) (review in: Jerzak et al. 2005). One of factors could inhibit colonization of Raven in urban zones may be strong competition with Hooded Crow, which numbers reached in towns from 15-50 pairs in Częstochowa (Czyż 2008), 56-60 in Leszno (Kuźniak 1996), 110 in Łódź and Olsztyn (Glubowski et al. 2009, Nowakowski et al. 2006) to 1.500 pair in Warsaw (Luniak 2001). Direct attacks Ravens by flocks of Hooded Crow were observed in urban parks in Legnica and Wrocław (Tomiałoć 2009). Raven

find optimal conditions for feeding in periphery zone, where garbage dumps, breeding farms, food waste and farms constitute the main feeding places are located (Zawadzka 2006). Thus, center of towns are still less attractive for as feeding ground than its edges, although Ravens take food among cars on urban parking places were recorded in USA (Heinrich 1999). Settle in towns is for many bird species a way to avoidance predators, although Raven practically has any enemies except humans. Colonization of cities as new habitats may be affected by high density non-urban populations. In this case, probably density of Raven in Poland are not so high, in order to birds to have look for new breeding areas within towns. Migration into urban zone may be caused by competition with other species. The Raven is a dominant in relationships in other Corvids, and also often with some birds of prey (Selva et al. 2005, Zawadzka 2006). There are no species in nature, who may displace Raven from periphery to urban area, but cities may be defended against colonization by Raven by others frequent Corvids populations, nested inside cities. On the other hand, there are not the main reason affected for stopping of colonization cities by Ravens. Urbanization of Ravens should be precede by significant increase both: population number in peripheral zone, as well as non-breeding flocks in urban center. Until now, there is a lack of those process symptoms, although it is possible. Colonization of town may run in stages. In Poznań, settled city by Hooded Crow lasted above 40 years, and was divided for clear stages in gradient from periphery to center (Ptaszyk 2003). Similar may be model of colonization of interior of town by Ravens. This process needs permanent monitoring.

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