

Breeding Biology of the Hooded Crow *Corvus corone* in the Anzali wetland, Northern Iran

Abbas Ashoori^{1*} & Yaqoub Rakhsh-Bahar¹

1) Gilan Provincial Office of the Department of the Environment, Rash, Iran.

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Abstract

Breeding biology of the Hooded Crow *Corvus corone* was studied during 2008 to 2011 breeding seasons in the Anzali wetland. In this study, nests have been monitored in the hatching, nestling and fledgling stages. Nest parameters were also measured. The average clutch size (totally 63 eggs from 13 nests) was 4.66 ± 0.49 . The hatching and fledging success in the present study was more (92.06% and 90.4%, respectively) than other studies. The higher mortality rate (10.5%) has occurred after fledglings left the nest. Human presence and activity around nest-sites were found as factors affecting on the nest building and breeding success of the Hooded Crow.

1. Introduction

The Hooded Crow *Corvus corone* is a resident bird species distributed throughout Iran, except in the south of the country (Scott *et al.* 1975; Mansoori 2013). This species breeds in open woodlands, on moors and wooded shores, in tree clumps in farming areas and in larger city parks. It builds its open sticky nest in the tree crown (Mullarney *et al.* 1999).

Reproduction is one of the main factors influencing population size of species (Krebs 2001). For crows, both breeding and non-breeding factors may limit the breeding success (Zduniak & Kuczynski 2003).

Although many studies have been carried out on the breeding biology of the Hooded Crow (Dolenec 2006), there is no important study on breeding of this bird in Iran. The aim of the present study was to conduct a preliminary study on the breeding biology and breeding success of the Hooded Crow in Anzali wetland, northern Iran.

2. Materials and Methods

2.1. Study Area

Anzali wetland, Gilan province, southern Caspian Sea covers an area of about 19,485 ha ($37^{\circ}25' - 37^{\circ}30'N$, $49^{\circ}25' - 49^{\circ}30'E$) and is an international wetland, but had been listed in the Montreux Record of wetlands, where change of ecological characters occurred (Ramsar Convention 2011, Ashoori & Abdoos 2013).

* Corresponding: abbasashoori67@gmail.com

This site encompasses four main parts, west, east, central and south (Siahkeshim Protected Area). Some willow *Salix* spp. trees are found in parts of East, Central and Siahkeshim. The wetland has also been identified as an Important Bird Area by BirdLife International (Evans 1994).

2.2. Methods

This survey was carried out from 15 March to 25 May 2008 to 2011. At least one nest was found at each part of East, Central and South in Anzali wetland every year. Nests (Fig. 1) were detected from a boat, while the observer was using a pair of 8×32 Swarovski binoculars. When a nest was found, it was tagged by a numbered wooden plaque. Nests and their contents were monitored at intervals of 3, 5, 6 and 7 days. During each visit, nest contents were recorded and nest parameters, including outer diameter, inner diameter, nest height and cup height were measured by a measuring tape. The length and width of eggs were also measured using a Vernier callipers. The mass and egg shape index were calculated by the formula: $V(cc) = K \times L (cm) \times B^2 (cm)$, where L indicates maximum length, B is maximum breadth and K is constant (0.51), as the Egg shape index = $B/L \times 100$ defined by Hoyt (1979). Nestlings (Fig. 2) were divided in three categories and defined as newly-hatched and downy nestlings (unable to move and eyes semi-open – usually up to 10 days old), pre-fledglings (eyes open and feathers appeared – usually aged between 10 and 25 days still unable

to fly) and fledgling (able to fly and usually aged between 25 and 40 days- with parents around the nest).

The breeding success was calculated by the number of eggs and nestlings compared to the number of chicks in different breeding stages (Smith & Renken 1993).

3. Results

3.1. Breeding biology

Thirteen nests were built between 16 March to 28 March. All these 13 studied nests were built on willow *Salix* spp. trees. Main structure of the nests had been built with twigs of the willow but internal parts of the nests was mostly covered with mosses (95%) covered about 5 cm of diameter and some other softer materials, e.g. stuff, nylon and strings. The mean height of nests above the waterlevel was 4.7 ± 0.86 m (Min. 4.3, Max. 5.6, N= 13) (Table 1).

The first egg was laid on 20 March and the last one on 26 March. The clutch size averaged 4.66 ± 0.49 . The mean length of eggs was measured as 43.57 ± 2.8 mm (N=13, Max. 50.2, Min. 40.25), and the mean width of eggs was 30.03 ± 1.23 mm (N=13, Max. 30.8, Min. 29). The mean egg volume was 19.78 ± 1.01 and the average egg shape index was calculated as 1.43 ± 0.12 (Table 2).

The first egg hatched on 10 April and hatching continued until 16 April. Chicks were altricial and their eyes were still semi-open after 8 days. Chicks reached the pre-fledgling stage on 8–11 May. On 18–21 May, the first fledglings flew (Fig. 3). The period between the hatching and fledging stages was estimated about 7–8 weeks. None of the studied nests were used by the Hooded Crow in the subsequent years of the study, because they were ruined by the snow and winds.

Table 1. Mean \pm SD of nest parameters of Hooded Crow in 2008–2011 at Anzali wetland.

Parameter	Mean \pm SD	Min.–Max.
External greater diameter of nests (cm)	49.4 ± 9.43 (N=13)	38–59
External lesser diameter of nests (cm)	21.5 ± 0.5 (N=13)	14–24
External height of nests (cm)	38.33 ± 1.52 (N=13)	37–40
Internal height of nests (cm)	13 ± 1 (N=13)	12–14
Height of nests above water surface (m)	4.7 ± 0.86 (N=13)	4.3– 5.6
Height of canopy above nests (m)	2.13 ± 0.83 (N=13)	1.84–2.7

Table 2. Egg parameters of Hooded Crow *Corvus corone* in 2008–2011 at Anzali wetland.

Clutch size	Length (mm)	Width (mm)	Egg V (cm ³)	Egg shape Index
4–5	43.57 ± 2.8	30.04 ± 0.65	19.78 ± 1.01	1.43 ± 0.12



Fig. 1. View of a nest of Hooded Crow in the Anzali wetland.



Fig. 2. Nestlings of Hooded Crow in the Anzali wetland.

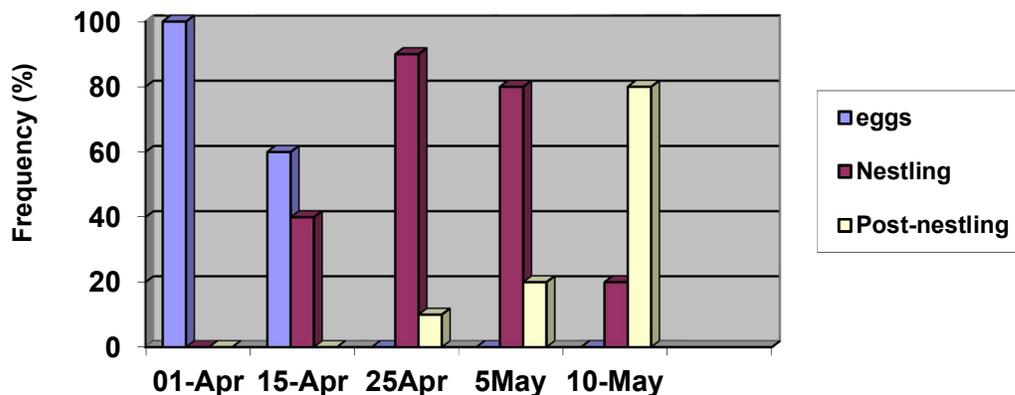


Fig. 3. Breeding phenology of the Hooded Crow in 2008–2001 in the Anzali wetland.

3.2. Breeding success

Of 63 eggs, 58 eggs were hatched and 57 nestlings reached their pre-fledgling stage, resulting in a breeding success of 90.5%. The mortality rate during the hatching period was 7.9%, while during the nestling period it was 1.7%. The juveniles were with parents around nest-site about 8–12 days after leaving the nest. The corpse of six juveniles (10.5%) was found in the fledging stage.

4. Discussion

Breeding of the Hooded Crow in the Anzali wetland during 2008–2011 was started from mid-to late March and lasted about 50 to 57 days. In a comparison, habitat in Ujście Warty” National Park, West Poland, in the 2001 breeding took place from early to middle April and lasted 82 days in 2001 and 70 days in 2002 (Zduniak & Kuczynski 2003).

The mean clutch size of 4.66 in the present study was more than found 4.1 eggs in Switzerland reported by Tompa (1975), 4.3 eggs in Scandinavia by Sondell (1976) and Loman (1980), 4.43 eggs in West Poland reported by Zduniak & Kuczynski (2003) and falls into the range 4.4–4.8 eggs in central Europe reported by Wittenberg (1968) and Grabiński (1996).

Dimensions of eggs reported here are larger than those of noted by Rofstad & Sandvik (1985), Grabiński (1996) and Zduniak & Kuczynski (2003), where the mean measurements were 41.9 mm x 29.4 mm, 18.4

cm³, 41.8 mm x 29.4 mm, 18.1 cm³ and 41.2 mm x 29.1 mm, 17.8 cm³ for the length, breadth and volume, respectively.

Of all eggs (63 eggs), 92.06% (58 eggs) hatched, 90.4% (57 chicks) reached post-nestling stage. The breeding success of Hooded Crow in the Anzali population was higher than populations in Switzerland (88%, Parker 1985), Sweden (87%, Tompa 1975) and West Poland (86%, Sondell 1976), and also 76% hatching success in West Poland (Zduniak & Kuczynski 2003) and total survival rate of 84.1% in Ismailia, Egypt (Mostafa *et al.* 2015).

Ten nests left by juveniles had the most percentage of the mortality rate (10.5%). These juveniles probably left the nest earlier, compared to other studies. More studies are necessary on the breeding success of this species in other ecosystems. Also, causes of the mortality of juveniles in the Anzali wetland, and the impact of human activities on the breeding success of the Hooded Crow is not clear. Meanwhile, it is necessary to find out effects of breeding population of the Hooded Crow on the breeding success of waterbirds in the Anzali wetland, such as the Whiskered Tern *Chlidonias hybrida* (Ashoori *et al.* 2019).

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