

Следует отметить, что у отдельных пар сапсана в спектре питания доля грача достигала 30%, а галки до 40%. У беркутов, гнездящихся в северных районах края врановых среди добычи не было, единственная пара, обитавшая в южной половине региона специализировалась на грачах и серой вороне.

В то же время гнезда пяти видов пернатых хищников разоряет серая ворона (табл. 3). Чаще всего наблюдается гибель яиц и птенцов у пустельги и ушастой совы.

Таблица 3. Гибель яиц и птенцов в гнездах хищных птиц, разоренных серой вороной в период 1976-1996 гг.

Вид	Гибель					
	яиц	доля от всех погибших, (%)	птенцов	доля от всех погибших, (%)	всего	доля от всех погибших, (%)
Коршун	15	51,7	2	6,3	17	27,8
Канюк	18	31,0	2	5,0	20	20,4
Пустельга	31	19,6	18	16,1	49	17,8
Чеглок	12	55,5	1	12,5	13	43,3
Ушастая сова	32	18,8	19	13,2	51	20,6
Всего	108	24,4	42	12,1	150	21,1

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ADAPTATION ASSESSMENT OF TWO SYMPATRIC CROW SPECIES *CORVUS SPLENDENS* AND *CORVUS LEVAILLANTII* (AVES: CORVIADAE) IN THE ANTHROPOGENIC ECOSYSTEMS OF URBAN BANGLADESH

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Adaptations usually develop in response to a change in the organism's habitat. Both *Corvus splendens* and *Corvus leuillantii* are well adapted in the urban and semi-urban

areas of Bangladesh as they are less sensitive to human disturbance and they have wider ecological plasticity. Besides these, also for the following identified reasons, anthropogenic ecosystems of urban Bangladesh regarded as the perfect habitat and suitable breeding ground for both species: unplanned waste management system, availability of waste food material, same weather conditions throughout the year, absence of predation pressure, human attitudes, presence of old and large size trees around the cities. Between these two species *Corvus splendens* basically more adapted to live in the big metropolitan cities and *Corvus levaillantii* are basically prefer to live in semi-urban areas of Bangladesh.

For evolutionary biologists, some of the most obvious (and interesting) selective pressures in the world today are those created by humans as we alter land for agriculture and urbanize our cities (Anne, 2009). An increasing number of studies are exploring the reasons that animals function, or fail to function, in new, human-imposed environments. Anthropocentric pressures, whether directly or indirectly, are considered the primary threats to biodiversity loss across Bangladesh with numbers of animals decreasing from environmental change. However, some species such as *Corvus splendens* and *Corvus levaillantii* are more flexible in their behaviour which allows them to adapt to human altered ecosystems, where they thrive in close proximity to humans. Adaptive success of animals and plants provides researchers with valuable and sometimes unexpected insights into evolutionary and selective processes. Cities are, in some respects considered as the ideal laboratories for studying natural selection (Hunter, 2007).

In this regard, present study tried to identify the adaptive features of two sympatric crow species, which allow them to live in the urban ecosystems of Bangladesh. Birds like the higher vertebrates, have complex behavior, the developed system of social relations that are of considerable interest in respect of studying of the features of their adaptation to changing environment. There are some special group of birds in Bangladesh, is characterized by successful adaptation to human, quite frequently, urban environments. The adaptation of different bird species to human landscapes did not happen either simultaneously or in the same way. Members of the family Corvidae, is one of the most highly organized birds family and, thus, has a wide ecological plasticity and a very few birds have adapted to the urban lifestyle and many have perished from our life (Kolyakina, 2014). This two-crow species is however, a perfect example of urbanized bird. Once commonest of all, their absence would be treated as a dangerous sign of how humans are fast degrading the environment.

The following two methods were employed to assess the adaptation of crow species in urban Bangladesh. Visual encounter survey methods were conducted mainly for observing the study bird species over a wider urban area. These surveys generally comprised walking through various habitats to check for sheltering birds. Adaptive behaviors were also assessed based on observed behavior, interaction with human, captured photos, sighting time, weather condition, habitat type, rain condition, description of immediate location and by collecting other miscellaneous notes.

In addition to this method we also reviewed vast modern literature using different electronic databases and manual search. We again search additional published works regarding the birds adapted to urban environments that we found from literature cited section of each article found by electronic search.

Temperatures were recorded by using a mercury thermometer and photographs of the birds and habitat types were taken by using Nikon D3200 with Tamron70-300 mm, f/4-5.6 zoom lens

House crow (*Corvus splendens*) occurs mainly in the urban areas and villages all over the Bangladesh (Khan, 2008). They are also distributed in the forest edges close to human habitations. Both locally and globally the species is categorized as least concern because of its abundance and wide distribution (IUCN Bangladesh, 2015). The other species Jungle crow (*Corvus levaillantii*) is also widely distributed all over Bangladesh and both locally and globally the species is regarded as least concern in terms of conservation status (Khan, 2008; IUCN Bangladesh, 2015). Overall, status and distribution of this two-crow species are shown in the table 1.

Table 1. Conservation status and geographic distribution of crows (Aves: Corvidae) in Bangladesh

SI No.	Scientific name	English name	Local name	Status	Distribution
Order: Passeriformes Family: Corvidae					
	<i>Corvus splendens</i>	House crow	Pati Kak, Kauwa	LC	W
	<i>Corvus levaillantii</i>	Jungle crow	Dar Kak, Jangli Kauwa	LC	W

Status code: Least Concern (LC); Distribution Code: Widely distributed (W)

By our observation both crow species are well adapted to urban ecosystems of Bangladesh than of natural forest habitats. We tried to find out the exact reasons behind the preference of city life other than natural habitats. Our field experience suggested that the study species get benefited by living in the urban area of Bangladesh in many ways. The unplanned waste management systems and garbage sites of different city corporation is regarded as the best feeding ground for the omnivorous and scavenger birds family like corvidae. As we observed, everywhere in urban Bangladesh has open garbage sites which is always full of different waste food materials thrown by the city dwellers. That's why, in all seasons, during summer or in winter there were no shortage of foods for the crow species living in the cities. In natural habitat like forest during winter, natural food sources are always remain limited in quantity which also allows them to adapt in the city life. In all month of the year, the weather condition of metropolitan city like Dhaka remains the same. The winter and summer temperature doesn't vary so much which also favors the crow species to choose city as their main habitat. Besides these, the city parks of Bangladesh are full of different old and large trees like banyan (*Ficus benghalensis*), karoi (*Albeziaa procera*), rain tree (found in the Doyel chattar of University of Dhaka), pakur (*Thespesia populnea*) etc. Among these tree species some of them regarded as keystone species which supports lot of other wildlife species including two study crow species to live and breed successfully in the city life. Our observation also suggests that between these two crow species, *Corvus splendens* basically more adapted to live in the big metropolitan city of Bangladesh (eg. Dhaka, Chittagong, Khulna etc) but *Corvus levaillantii* are basically prefer to live in semi-urban areas. Lower predation pressure and peoples attitude towards crow species also make them well suited in the urban life. General peoples have no interest about these birds' species at all because of their ugly look and harsh voice.

Still the characteristics of species that have adapted to urbanisation are relatively poorly known (Diamond, 1986; Klausnitzer, 1989). Though most species do not tolerate urban habitat, but some species like crows persist and even they prefer to live in the cities. What characteristics differentiate the species that persist from those that cannot? One prominent hypothesis to explain how species respond to habitat disturbance is that organisms with broad environmental tolerance (generalists) are less sensitive to human disturbance than those with a narrower tolerance (specialists), and thus generalists predominate in disturbed areas (Glazier, 1986). Our study species support this hypothesis

because both house crow and jungle crow has wide ecological plasticity and they can survive in different environmental condition easily.

Early studies reviewed by Klausnitzer (1989) suggested many specific characteristics of urban species. For example, some of these studies suggested that urbanisation favours residency over migration (Bezzel, 1985), urbanization favours nesting in holes and trees, whereas ground-nesters may suffer from urbanization and urbanisation favours omnivores or species with broad environmental tolerance (Møller, 2009). Others have suggested that humans feeding birds during winter may promote urbanization, especially at northern latitudes with harsh conditions during winter (Jokimäki and Suhonen, 1998; Møller, 2009). By our observation, the above-mentioned characteristics are somewhat similar to that of our study species which allows them to adapt in urban Bangladesh. For species, able to exploit them, urban environments have the attributes of abundant habitat and consistent resources (Withey and Marzluff, 2009; Marzluff et al., 2001; Belant, 1997) which supports our findings also. The behaviour of species that have colonised urban environments has often been observed to change from that of their ‘natural’ behavior (Howell, 1982; van der Ree, 2006; McKinney, 2002). Though we didn’t carry out research regarding the characteristics and activity patterns of crow species living in the natural forest habitat but our field experience suggests that the crow species living in the forest are more sensitive in behavior than that of urban species. As for example urban species rarely afraid of human presence and others disturbance but species living in natural habitat are so sensitive regarding these issues.

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КНИГИ ПО ВРАНОВЫМ В БРИТАНСКОЙ СЕРИИ «ПОЙЗЕР» И «КРИСТОФЕР ХЕЛЬМ»

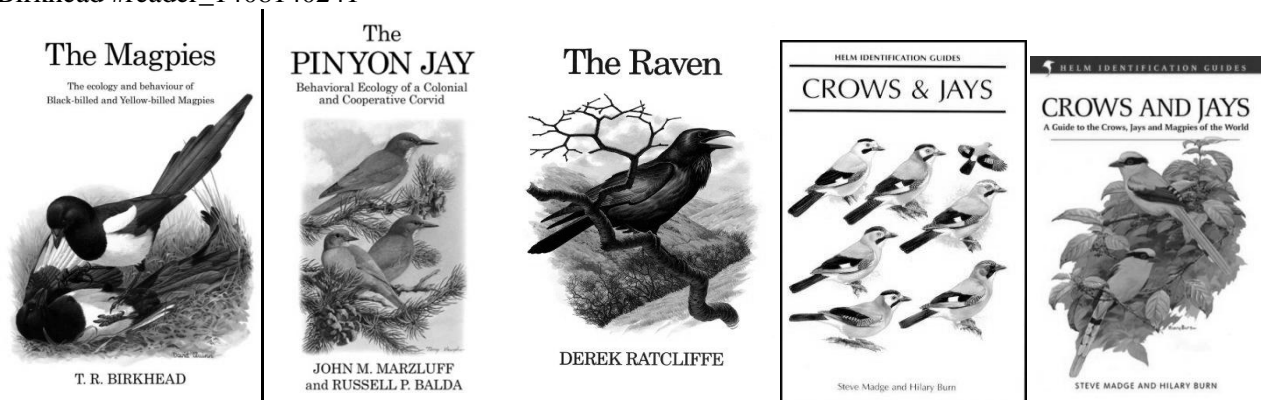
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В известном и часто цитируемом британском издательстве «Пойзер/Poyser» до настоящего времени вышло 3 монографии по врановым: по сороке Тима Биркхеда в 1991 году, по западноамериканской сойке Джона Марцлупфа и Рассела Балда в 1992 году и по ворону Дерек Ратклиффа в 1997 году.

Монография по сорокам “The Magpies” известного британского орнитолога профессора Ноттингемского университета Тима Биркхеда имеет подзаголовок «Экология и поведения обыкновенной (черноклювой) и желтоклювой сорок». Биография Тима Биркхеда изложена в отдельной статье (Шергалин 2010). Монография состоит из 270 страниц и содержит 46 фотографий, 96 прекрасных рисунков, выполненных известным анималистом Дэвидом Квинном (David Quinn), 35 таблиц, 9 приложений. Интересен подход автора – он сравнивает по всем аспектам жизнь евразийского вида сороки (*Pica pica*), имеющей очень широкое распространение в Старом Свете с узкоареальным видом Нового Света – желтоклювой сорокой (*Pica nuttalli*), ареал которой ограничен исключительно Калифорнией. Автору самому посчастливилось изучать птиц обоих видов в природе на обоих континентах. Монография раскрывает результаты 10-летнего изучения автором экологии и поведения сороки в северной Англии. Библиография включает 271 печатных работ на английском, испанском, немецком, русском, французском языках и др. В силу того, что материалы первых десяти конференций по врановым Северной Евразии, к сожалению, публиковались исключительно на русском языке, ссылки ограничены лишь следующими работами: Dementiev G.P. & Gladkov, N.A. et al. 1970; Eigelis Y.K., 1964; Eigelis Y.K. & Nekrasov V.V. 1967; Kekilova A.F., 1978. Частично с этой книгой можно ознакомиться в британском amazone по ссылке: [https://www.amazon.co.uk/d/Books/Magpies-Ecology-Behaviour-billed-Yellow-Poyser Monographs /1408140241/ref=sr_1_1?ie=UTF8&qid=1483689801&sr=8-1&keywords=Magpies+Birkhead#reader_1408140241](https://www.amazon.co.uk/d/Books/Magpies-Ecology-Behaviour-billed-Yellow-Poyser-Monographs /1408140241/ref=sr_1_1?ie=UTF8&qid=1483689801&sr=8-1&keywords=Magpies+Birkhead#reader_1408140241)



Монография по ворону “The Raven” принадлежит перу знаменитого британского орнитолога и деятеля охраны природы Дерек Ратклиффа (1929-2005), жизнь которого трагически оборвалась в одну из его поездок с супругой в Лапландию. Он вошел в историю первым, кто установил связь между применением фермерами ДДТ и прочих пестицидов и сокращением численности хищных птиц, в первую очередь у сокола-сапсана. В этой же