

## **Status and density of kingfishers (family: Alcedinidae, Halcyonidae and Cerylidae) in the Sundarbans mangrove forest, Bangladesh**

**A.H.M.A. Reza, M. M. Feeroz, M.A. Islam<sup>1</sup> and M.M. Kabir**

Department of Zoology, Jahangirnagar University, Savar, Dhaka 1342, Bangladesh

### **Abstract**

A study on the status and density of different kingfisher species of the Sundarbans mangrove forest was carried out between January 1999 and March 2000. Eight species of kingfisher belonging to 3 families (Alcedinidae, Halcyonidae and Cerylidae) were recorded. The status and density of the kingfisher species were calculated: common kingfisher, black-capped kingfisher, white-throated kingfisher, collared kingfisher were very common whereas pied kingfisher and ruddy kingfisher were very few. The overall occurrence of the kingfisher species in different habitats of the study area (e.g. forests, mudflats, canals, riverbanks, creeks, rivers, sea beaches and seashores) varied significantly. The density of kingfisher during the study period was calculated as 25.3 individuals/km<sup>2</sup>. Individually, the density of the common kingfisher was highest 5.69 individuals/km<sup>2</sup> whereas the density of ruddy kingfisher was lowest 0.15 individuals/km<sup>2</sup>.

**Key words:** Kingfisher, the Sundarbans, status, density, habitat

### **INTRODUCTION**

The kingfishers are the birds of wetlands and are well represented in Bangladesh. They are classified under the Order: Coraciiformes and Family: Alcedinidae, Halcyonidae and Cerylidae. It is remarkable that out of 14 kingfisher species of the oriental region, 10 used to occur in the country (Hussain, 1979). Amongst the 10 species found throughout the country, 8 were recorded from the Sundarbans mangrove forest. All these 8 species of kingfishers are resident to the Sundarbans. Bangladesh is the largest deltaic plain in the world, which is situated in the sub-tropical belt at the head of the world's largest gulf – the Bay of Bengal (Anon., 1981). Mangroves play an essential role in environmental and ecological processes in such largest deltaic country (Hussain and Karim, 1994). These mangrove forests comprise over half the remaining natural forest of Bangladesh, major portion of which is situated in the southwestern part of the country – the Sundarbans mangrove forest (Pernetta, 1993). The whole Sundarbans area is intersected by a complex network of rivers, canals and creeks, which constitutes 30% of the total forested area of the country. The natural ecological processes of this fragile habitat are degraded day by day. In order to draw global attention towards this fragile and unique ecosystem, the Sundarbans is recently declared as a World Heritage Site by the UNESCO.

The Sundarbans is unique for its diverse biodiversity as well. Very few wildlife species of this mangrove forest is well studied in Bangladesh. Among others, very few birds are extensively studied either as an individual species or as a group. So far, birds of the

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<sup>1</sup> Department of Zoology, University of Dhaka, Dhaka 1000, Bangladesh

Sundarbans were studied by various researchers, e.g. Hussain *et al.* (1983), Sarker (1985), Sarker and Sarker (1985 and 1986), Rahsid and Scott (1989), Islam *et al.* (1999) etc. Besides these, numbers of studies were also conducted on the other wildlife of the Sundarbans that also included birds of the mangrove forest, such as Khan (1986), Seidensticker and Hai (1983), Sarker (1986 and 1989) etc. But no in-depth study or survey has yet been conducted on the status and density of the kingfishers of the Sundarbans. So, an attempt was taken to study the status and density of kingfishers of the Sundarbans during the present study for their better management and conservation initiatives.

### Study area

The Sundarbans represents the largest tracts of productive mangrove forest in the world. It can be grouped into tropical moist forest because of its location at the south of the Tropic of Cancer near the line. The total area of the Bangladesh Sundarbans is about 5,770 sq. km, of which 4,016 sq. km is land and the remaining 1,761 sq. km is under water, in the form of rivers, canals and creeks (Hussain and Karim, 1994). It lies between 89°00' and 89°55' E longitude and latitude 21°30' and 22°30' N in the three southern districts (e.g. Bagerhat, Khulna and Satkhira) of the country. The plants of the Sundarbans show marked adaptation to life under saline condition and to frequent inundation by the tides. More than 334 species of plants, of which 27 are common trees, are found in the Sundarbans mangrove forest (Karim, 1994). The halophytic tree species mainly form the natural vegetation. The forest is more or less open and canopy height is commonly within 10 m from the ground.

The entire Bangladesh Sundarbans forest is divided into four forest ranges and three saline zones (Curtis, 1933). The slightly saline zone consists of Chandpai-Sarankhola range (21°50'-22°25' N latitudes and 89°45'-89°25' E longitudes), moderately saline zone consists of Khulna range (21°20'-22°30' N latitudes and 89°40'-89°20' E longitudes) and strongly saline zone consists of Burigoalini range (22°20'-21°40' N latitudes and 89°30'-89°25' E longitudes). The present study site is situated at the southeastern tip of the Sundarbans: Katka-Kochikhali. The area lies between 21°51' and 21°55' N latitudes and 89°41' and 89°51' E longitudes in the district of Bagerhat. The whole area form an island of 20 km<sup>2</sup>, as it is surrounded by the Bay of Bengal in the south, Kochikhali and Jamtala *khal* (canal) in the north, Supoti river in the east and Katka river in the west. This is an ideal island that covers diverse habitat types. The forest covers about 50% of the total area of the island of which meadows cover 30% and rest 20% are forest edge, sea beach, riverbank and human residents (forest offices). Some isolated adjacent islands nearby Katka-Kochikhali were also visited during the present study, e.g. Dimer *char* (island), Dublar *char*, Maran *char*, Hironpoint, Tiar *char*, Volardia *char* etc.

### MATERIALS AND METHODS

The study was conducted between January 1999 and March 2000. Total 10 trips were made to carry out the fieldwork in the Sundarbans during 15 months study period. A total

of 81 days and 744 hours was spent in the field for data collection. Fieldwork was carried out mainly on foot and from a country-made wooden boat between 0530 hrs and 1730 hrs. Several 7×50 and 20×50 binoculars, auto and manual cameras with 70-300 mm zoom lens, spotlight and other relevant materials were used in the field.

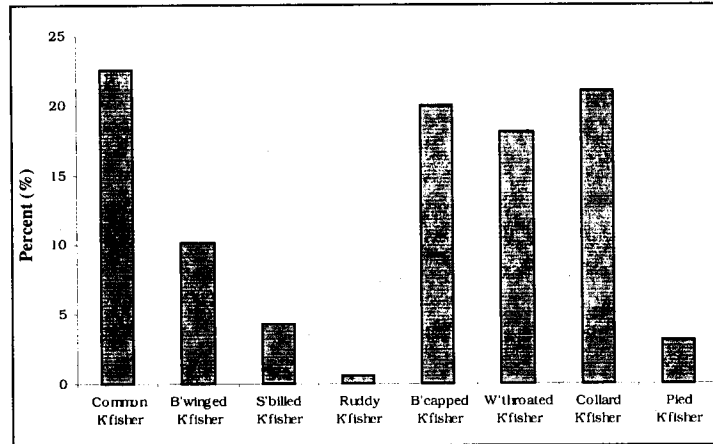
Ali and Ripley (1983) has been followed for the identification of the bird species. The status such as very common (Vc), common (C), fairly common (Fc) and few (F) is based on the standard practices (Khan, 1982). National status, distribution and arrangement of the kingfisher species have been followed from IUCN Bangladesh (2000). Line transect survey method (Johnsingh, 1983) was followed for the density estimation of the kingfisher species during the present study. This method is the increasingly preferred for formal population estimation method based on visual detection of animals (Burnham *et al.* 1980). For the density estimation of the kingfishers species in a difficult terrain of the Sundarbans, the traditional line transect method was slightly modified during the present study.

During this study, two permanent transects (each of which was 7 km long) were placed in Katka-Kochikhali, one was along the sea beach and another one was along the riverbanks, forests and forest edges. The transect survey was covered on foot at a uniform pace of about 1.5 km/hour. Sometimes it was difficult to walk inside the forest because of the presence of pneumatophores and submerged ground due to high tide or heavy rain. A soundless country-made wooden boat was also used to explore the unfavoured portion of the transect for walking. The narrow creeks of the study area were also explored by the water vehicle at a speed of 5-7 km/hour. Some nearby islands of Katka-Kochikhali were also surveyed during the present study to gather maximum quantity of data on the study species. All these data were accumulated and analyzed following standard methods through various computer models.

## RESULTS AND DISCUSSION

During the present study, a total 8 species of kingfishers belonging to 3 families (Alcedinidae, Halcyonidae and Cerylidae) was recorded (Table 1). A total of 1341 individual kingfishers were recorded during January 1999-March 2000. Amongst the total number of kingfishers, the common kingfisher, *Alcedo atthis* was highest (23%), whereas the ruddy kingfisher, *Halcyon coromandra* was lowest (0.6%) (Figure 1). The overall occurrence of the kingfisher species in different habitats of the study area (e.g. forests, mudflats, canals, riverbanks, creeks, rivers, sea beaches, seashores) varied significantly ( $\chi^2 = 56$ ,  $df = 49$ ). Common kingfisher, black-capped kingfisher, *Halcyon pileata*, white-throated kingfisher, *Halcyon smyrnensis*, collared kingfisher, *Halcyon chloris* were very common (Vc) during the present study, whereas brown-winged kingfisher, *Pelargopsis amauroptera* was common (C). The stork-billed kingfisher, *Pelargopsis capensis* was fairly common (Fc) and the pied kingfisher and ruddy kingfisher, *Halcyon coromandra* were very few (F).

For density calculation of the kingfisher species in the Sundarbans, a total of 530 km walking distance was covered during the study period. Hence, due to the high eyesight capability in the sea beaches, riverbanks and in the creeks, the effective strip width for the transects was considered as 100 metres. So, the total surveyed area of the study was 53 km<sup>2</sup>, from where a total of 1341 individual kingfishers was recorded. The overall density of the kingfishers was 25.3 kingfishers/km<sup>2</sup>. The density of common kingfisher was highest 5.69 individuals/km<sup>2</sup>, followed by collared kingfisher 5.32 individuals/km<sup>2</sup>. The least density was calculated as pied and ruddy kingfisher, 0.81 and 0.15 individuals/km<sup>2</sup> respectively (Table 1).



**Fig. 1. Percentage (%) of different kingfisher species in the Bangladesh Sundarbans**

Knowledge on the status and density of wildlife population is vital pre-requisite of the effective management of an individual species or a group of species. Such information is essential to monitor changes in the population size over time or to compare among habitats, or to evaluate the success of wildlife management programme (Boyce, 1995). In the Sundarbans, kingfishers are seen mostly everywhere, e.g. forests, mudflats, canals, riverbanks, creeks, rivers, sea beaches and seashores. Their distribution among these different habitats of the Sundarbans mangrove forest varied significantly. Significant variation is also observed in their habitat preferences, food habit and preferences of the food items in the Sundarbans.

Generally, the kingfishers have some common physical features. Body compact; neck short; bill massive, long, straight and pointed. Legs short, feet syndactyl. Wings short and rounded, but flight direct and swift. Sexes generally alike. The kingfishers are non-social birds, most of the time seen alone sitting on an over-hanging branch of tree and scan the water time to time for their desired prey. The collared, black-capped and brown-winged kingfishers are largely maritime and found more frequently in the sea facing areas, whereas the others are chiefly adapted for inland waters and found mostly in the forested areas. Ruddy kingfisher is nationally categorized as 'Vulnerable' (IUCN Bangladesh

2000) and a viable population only exists in the Sundarbans. Most of the kingfisher species of the Sundarbans chiefly feed on various species of fishes obtained by diving headlong into the water. They also depend on large insects and small vertebrate animals as their food items. In the Sundarbans, kingfishers construct burrowing nest in riverbanks/mudflats or hole nests in trees. Now a day, these birds are facing various kinds of threats of extinction. For the better management and conservation purposes of this bird group, special attention should be given on their undisturbed habitats, especially for their nesting and breeding grounds.

**Table 1. Status, distribution and density of the kingfisher species in the Sundarbans**

Family and English name of kingfisher	Scientific name	Distribution & Status (National)		Status in the SB	Density in the SB (individual/km <sup>2</sup> )
		Distribution	Status		
<i>Family: ALCEDINIDAE</i>					
Common Kingfisher	<i>Alcedo atthis</i>	W	NO	Vc	5.69
Brown-winged Kingfisher	<i>Pelargopsis amauroptera</i>	SB	NO	C	2.58
Stork-billed Kingfisher	<i>Pelargopsis capensis</i>	W	NO	Fc	1.09
Ruddy Kingfisher	<i>Halcyon coromandra</i>	SB	VU	F	0.15
Black-capped Kingfisher	<i>Halcyon pileata</i>	Coasts, St M	NO	Vc	5.06
White-throated Kingfisher	<i>Halcyon smyrnensis</i>	W	NO	Vc	4.58
<i>Family: HALCYONIDAE</i>					
Collard Kingfisher	<i>Halcyon chloris</i>	Coasts, StM	NO	Vc	5.32
<i>Family: CERYLIDAE</i>					
Pied Kingfisher	<i>Ceryle rudis</i>	Forests	NO	Fc	0.81

*Note: W-wide, SB-Sundarbans, St M-St. Martins Island, NO-Not threatened, VU-Vulnerable, Vc-Very common, C-Common, Fc-Fairly common, F-Few*

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