

# Diurnal time-activity budgets in wintering Ferruginous Pochard *Aythya nyroca* in Tanguar Haor, Bangladesh

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Diurnal time-activity budgets were quantified for Ferruginous Pochard *Aythya nyroca* wintering in Tanguar Haor, Bangladesh. Individuals spent most time resting (60%), with less time spent feeding (17%), preening (14%) and swimming (9%). The time spent feeding was generally lower than for other *Aythya* species in winter, perhaps because Ferruginous Pochard feed preferentially at night. Human disturbance during the day may be a significant factor driving this.

## INTRODUCTION

The Ferruginous Pochard *Aythya nyroca* is widely distributed in Europe, Asia and Africa, but it has undergone declines in its populations and changes in distribution over the past few decades (Ali and Ripley 1978, Perennou *et al.* 1994, Callaghan 1997, Lopez and Mundkur 1997, Grimmett *et al.* 1999, Islam 2003, Robinson and Hughes 2003a,b). The primary reasons for its decline are habitat degradation and loss and hunting for local consumption (Callaghan 1997, Robinson and Hughes 2003a). The species is a winter visitor to the Indian subcontinent, where pressures on its population are particularly intense (Khan 1987, Grimmett *et al.* 1999, Muzaffar 2003, Islam 2003). In Bangladesh, the species had undergone a steady decline by the 1990s (Lopez and Mundkur 1997), although very large numbers have been observed since 2002 (Robinson and Hughes 2003b, Muzaffar 2003). The species is considered Near Threatened (BirdLife International 2004), and both European and international Species Action Plans have now been formulated (Callaghan 1997, Robinson and Hughes 2003c).

The Ferruginous Pochard generally feeds on a range of aquatic and terrestrial vegetable matter as well as aquatic invertebrates, frogs and small fish (Ali and Ripley 1978, Kiss *et al.* 1984, Poynt 1994, Petkov 1998). The species seeks refuge in reedy areas within wetland complexes, dispersing over water bodies and paddy fields to feed during the night (Ali and Ripley 1978, Grimmett *et al.* 1999). Although some aspects of the species's feeding ecology have been characterised at breeding sites (e.g. Petkov 1998, 2000, Saporetti 2000, Zogaris and Handrinos 2003), little is known about feeding and time-activity budgets in the wintering grounds.

Time-activity budgets reflect of a combination of factors including individual physical condition, social structure and environmental conditions (Paulus 1988). The amount of time allocated to various behaviours is therefore critical in understanding a species's ecological needs and the pressures acting upon individuals. The objective of this study was to quantify time-activity budgets in wintering Ferruginous Pochard.

## STUDY AREA

The Haor basin is located in the north-eastern region of Bangladesh. It contains the floodplains of the Meghna river tributaries and it is characterised by numerous shallow water bodies known locally as *beels*, which coalesce in the wet season to form larger water bodies (Rashid 1977, NERP 1993, Geisen *et al.* 2000).

Tanguar Haor is one of the most important wetland areas located near the northern reaches of the Haor basin (NERP 1993, Geisen *et al.* 2000). With a total area of 9,527 ha it is among the least disturbed of water bodies in the area (NCSIP-1 2001a). It contains extensive stands of open water and emergent marsh vegetation. The open water areas support *Hydrilla verticillata*, plus *Trapa* spp., *Nymphoides* spp. and *Potamogeton* spp. The emergent vegetation is dominated by *Persicaria chinensis* and *P. orientalis*. The most abundant reed vegetation consists of *Phragmites karka*, with other reed types occurring in scattered aggregations. The wetland supports a diverse assemblage of aquatic invertebrates and fish. When water levels fall, the Haor breaks down into as many as 40 beels, exposing levees in between. This habitat is ideal for wintering waterfowl (Khan 1997, NCSIP-1 2001b), and large flocks start to arrive from as early as October (Muzaffar 2003). Annual counts of 30,000–60,000 waterbirds have resulted in the designation of the area as a Ramsar site (Geisen *et al.* 2000), but obligations associated with this status have yet to be fulfilled (NCSIP-1 1999, Muzaffar 2003). Waterbird counts in 2002–2003 exceeded 200,000 birds (Muzaffar 2003). In this study, data were obtained from birds in Raoua beel, one of the eight beels within the site that are most important for waterbirds (NCSIP-1 2001b). Tanguar Haor is populated by c.30,000 people (Geisen *et al.* 2000), and the area is continuously traversed by motorised boats, people and their livestock (Geisen *et al.* 2000, Muzaffar 2003).

## METHODS

Time-activity budgets were quantified using a modified scan sample approach (Baldassarre *et al.* 1988). Data were collected during 44 hours of observations from 14 to 20 December 2002, during good weather conditions (sunny, with occasional light winds

and a mean temperature of 24°C). Observations were made using a Vitacom 20–60x60 spotting scope. Behaviour was classified into five categories: preening (including scratching and splash-bathing), feeding (including dabbling, up-ending and diving), resting (inactive with eyes open or sleeping), alert (head raised), and swimming. Groups of 5–43 individuals (totalling 231 individuals over the whole study) were scanned at 5-minute intervals over 30-minute periods. The behaviour of each individual in the group was recorded during each scan. A new group of birds was selected after each 30-minute period in order to maximise statistical independence. For analysis, data were pooled into two-hour blocks beginning at 07h00, 09h00, 11h00, 13h00, 15h00 and 17h00 (note however that no observations were made after dusk at 18h00).

## RESULTS

Overall, Ferruginous Pochard spent most of the day resting (59.9%), with significantly less time spent feeding (16.7%), preening (14.3%), swimming (8.9%) and alert (0.3%); see Fig. 1. Feeding mostly comprised dabbling and diving, rather than up-ending, although this was not quantified. Most feeding was observed in the morning prior to 11h00, when it comprised 30–35% of the time-activity budget. Resting behavior peaked from 11h00 to 15h00, when birds were inactive for over 80% of the time. After 17h00, birds spent about 25% of their time preening.

## DISCUSSION

The feeding behaviour of ducks during the non-breeding season is known to differ considerably within and among species, depending on timing and location (Paulus 1988). Inland diving ducks of the genus *Aythya* usually spend less than 30% of diurnal hours feeding (Nilsson 1970), e.g. 21% for Tufted Duck *Aythya fuligula* in Switzerland (Pedroli 1982), and 23% for Ferruginous Pochard in Bulgaria (Petkov 2003). In the present study, Ferruginous Pochard spent only 17% of the time feeding. In Hungary, 78% of the diet of this species in winter consists of animal matter (Poyni

1994). Although this has a higher calorific value than plant material (Driver *et al.* 1974), implying that individuals might need to spend less time feeding than herbivorous species (Paulus 1988), Ferruginous Pochards obtain this food at greater depths compared to other ducks (Green 1998), requiring more time foraging. If most food was obtained at depth whilst diving rather than when up-ending or dabbling, the proportion of time spent feeding most productively will therefore have been even lower than the 17% recorded during the study (see Paulus 1988).

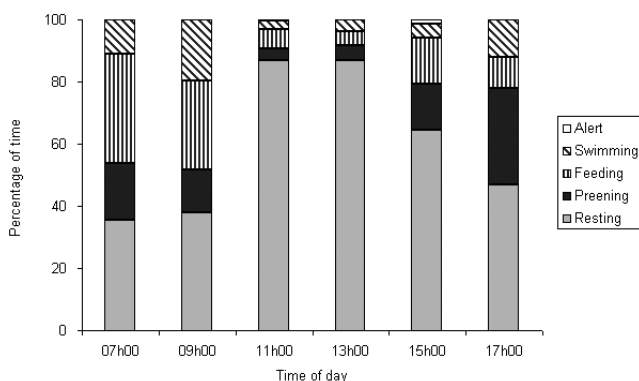
Although hunting levels have declined (Khan 1997, Geisen *et al.* 2000), there was considerable human activity, and people living in the area move freely around the beels. Each day, about ten large, motorised boats (each capable of carrying up to 100 people) travelled through areas adjacent to or within Raoua beel. In addition, small, hand-paddled or motorised boats passed through at a rate of c.3 per hour. When boats approached closer than 30 m, Ferruginous Pochard typically abandoned the site. Boats often passed through large flocks, causing them to panic and disperse.

Disturbance was also caused by collection of molluscs for feeding domestic ducks, and this activity may affect food availability for Ferruginous Pochard (Geisen *et al.* 2000). Rearing domestic ducks is a common practice in the area, with 10,000–20,000 birds in total (Geisen *et al.* 2000). Domestic ducks intermingle with wild birds in feeding areas, but the presence of herders close to them often causes wild ducks to leave (Muzaffar 2003). Cattle herding on the shorelines also caused wildfowl to increase vigilance and to move away from the shallow littoral zones. The existing fishing practices at Tanguar Haor have been identified as the most important threat to its wildlife and habitats (NCSIP-1 1999, Geisen *et al.* 2000, Muzaffar 2003). The level of disturbance to waterbirds is very high since the peak fishing season coincides with peak numbers of migratory waterbirds in the area.

Although there was insufficient data to test the hypothesis, human disturbance may have reduced levels of diurnal foraging by Ferruginous Pochard in favour of nocturnal foraging, when there is less human activity. Nocturnal feeding activity was not quantified during this study, but large flocks were seen to return to the beel from surrounding areas at dawn. The species is known to disperse around wetlands, often feeding on crops at night (Ali and Ripley 1978).

In addition to the disturbance to wildfowl, local people collect fuelwood from the area by uprooting trees, cutting down branches and collecting twigs (Geisen *et al.* 2000, Muzaffar 2003). This has resulted in the gradual destruction of swamp forests in Tanguar Haor (NERP 1993, Geisen *et al.* 2000). Replanting of *Pongamia pinnata* trees has had some benefit, but fuelwood collection continues, preventing the regeneration of swamp forests (Muzaffar 2003). Furthermore, grazing may have a severe impact on the already degraded swamp forest (NCSIP-1 1999).

Management plans formulated in 1997 and 2000 have not yet been implemented (Geisen and Rashid 1997, Geisen *et al.* 2000), but this is urgently needed. With careful selection of areas within Tanguar Haor as protected zones (NCSIP-1 2001b, Muzaffar 2003), the



**Figure 1.** Time-activity budgets of Ferruginous Pochard at Tanguar Haor, Bangladesh, in December 2002.

wetland could continue to be used by local people and wildlife in a sustainable manner.

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