Pioneering shorebird research in Sri Lanka: launch of the National Bird Ringing Programme

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We report on the first steps of a new project to establish a network of sites for shorebird research and conservation in Sri Lanka. These include the first training course conducted in April 2005 in the Bundala National Park in which 16 members of staff of the Department of Wildlife and Conservation learnt shorebird study skills including mist-netting, recording biometrics and ageing, under the National Bird Ringing Programme. We describe the methods we developed for ageing Curlew Sandpipers, Little Stints and Redshanks.

INTRODUCTION

The position of Sri Lanka in the Indian Ocean at the southernmost tip of the Indian subcontinent is of great importance for long distance migrant shorebirds. Every year, large numbers arrive from their breeding quarters to spend the winter in Sri Lanka. Although most species are fairly well known in terms of their general ecology, only limited information is available on the migration routes and breeding location of the birds that over-winter (De Silva & Jakobsson 1995). To date, few studies have investigated the role played by Sri Lankan wetlands as wintering quarters for migrant shorebirds, the seasonal composition of migratory waves, differential migration of sexes and/or age classes, body weight variation and fat deposition, moulting strategies, and general patterns of shorebird migration.

Several ringing projects have been conducted in Sri Lanka since the early 1970s, but most have targeted forest birds (De Silva 1980, Partridge & Ashcroft 1976, Field Ornithological Group of Sri Lanka pers. comm.).

Given the apparent but un-evaluated importance of Sri Lanka for migratory shorebirds, as long ago as 1976 it was decided that they should be the subject of focused research. This started with collaboration between the Field Ornithological Group of Sri Lanka and the Department of Wildlife Conservation. However, this was not formalized until 2005 when the National Bird Ringing Programme (NBRP) was launched. As part of this initiative, training in ringing techniques was provided to several staff members of three National Parks in southern Sri Lanka (Bundala, Yala and Kumana). The main aim of the training was to build capacity within National Park staff and managers that will facilitate the establishment of a network of sites where shorebird research will be carried out on a regular basis.

In this paper we introduce the NBRP, summarise some of the criteria and methods used during the field research, and outline the questions that will form the basis for future investigations over the next few years of this and related projects. The outcomes of this project will contribute to the recently signed Asia Central Flyway agreement.

STUDY AREA

Bundala National Park is 270 km from Colombo in the Hambantota district on the south coast of Sri lanka (6°08' to 6°14'N, 81°08'to 81°18'E) (Fig. 1). The park falls within the South-eastern Arid Zone of Sri Lanka, with a climate classified as hot and dry. Mean annual temperature is 27.1°C, average annual precipitation 1,074 mm, with the highest rainfall occurring in November.

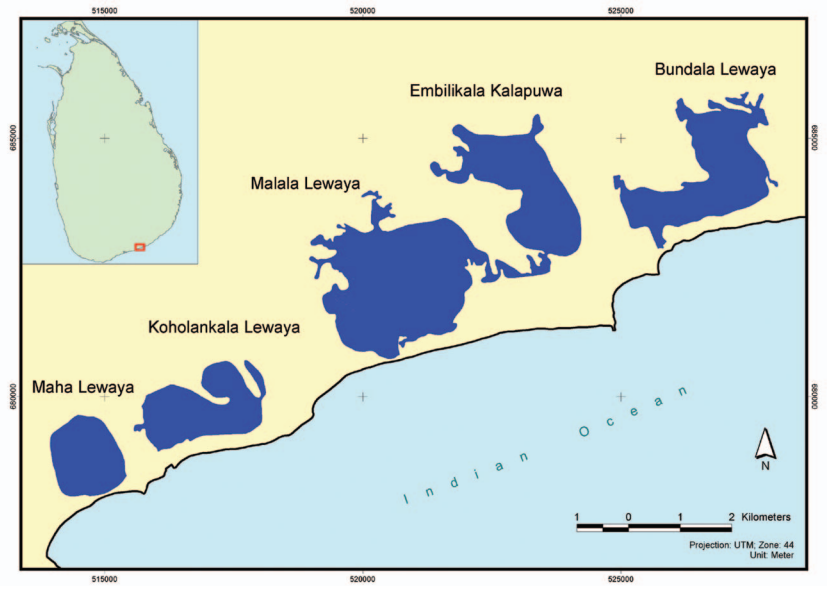

Fig. 1. Bundala National Park, Hambantota district, SE Sri Lanka.

Table 1. List of species caught at Bundala Lagoon, Sri Lanka, during 1–7 April 2005.

Species	Sinhala Name	Status in Sri Lanka	Number ringed
Little Stint *Calidris minuta*	Punchi Hinna	Winter visitor	56
Curlew Sandpiper *Calidris ferruginea*	Kalika Hinna	Winter visitor	10
Redshank *Tringa totanus*	Podu Rathpa Silibilla	Winter visitor	14
Marsh Sandpiper *Tringa stagnatilis*	Waguru Silibilla	Winter visitor	1
Greater Sandplover *Charadrius leschenaultii*	Raja Weli Olewiya	Winter visitor	1
Lesser Sandplover *Charadrius mongolus*	Heen Weli Olewiya	Winter visitor	4
Kentish Plover *Charadrius alexandrinus*	Kenti Olewiya	Winter visitor/ breeding	10
Little Tern *Sterna albifrons*	Punchi Muhudu Lihiniya	Winter visitor/breeding	1
White-winged Tern *Chlidonias leucopterus*	Sudupiya Kagul Lihiniya	Winter visitor	1
Red-wattled Lapwing *Vanellus indicus*	Rath Yatimal Kirala	Resident	1
Total birds ringed			**99**

The Park covers 6,216 ha of lowland, including five shallow brackish water lagoons (Maha, Koholankala, Malala, Embilikala, and Bundala). The wetland system and the surrounding habitat of Bundala National Park are of great ecological importance and are one of the main sites for waterbirds and migratory shorebirds in Sri Lanka (Scott 1989, CEA/ Euroconsult 1993, De Silva 1999). Of the 197 bird species observed in Bundala, 58 are migratory (Bambaradeniya 2001, Bambaradeniya *et al*. 2002). The wetlands of Bundala National Park support waterbirds in numbers that are of international and national significance (Li & Mundukur 2004), and as such are listed under the Ramsar Wetland Convention (*www.ramsar.org*).

METHODS

Birds were caught in mist nets set perpendicular to the shoreline of the northern part of the Bundala Lagoon. Nets were set before sunset on 1 April and net rounds were carried out each day from 6 pm to 6 am the next day, checking the nets at one-hour intervals.

The following biometrics were recorded: wing length; bill length; head–bill length; tail length; weight and moult stage and wear status of primaries, secondaries, tertials and rectrices.

RESULTS

Ninety-nine individuals of ten species were caught, ringed, and released (Table 1).

We used the following criteria for ageing the three most common species caught:

Curlew Sandpiper: individuals that had completed wing moult and had a substantial amount of breeding plumage where identified as adults, whereas those in active primary moult and with no trace of breeding plumage were identified as first year (Fig. 2a–b).

Little Stint: a large variability was observed between the individuals of this species and determining age was challenging. According to Prater *et al.* (1997), first year birds undertake a complete moult of the primaries, making it difficult to separate juveniles from adults when all primaries are new. We therefore investigated the various other plumage characteristics described by Danny Rogers in Higgins & Davies (1996) (mantle, scapulars, nape and ear coverts, rump and uppertail coverts) and formulated the following criteria for separating adults from first year birds:

- We recorded as adults all birds that were not in active wing moult, had fresh new primaries (moult-score: 5^{10}) (Fig. 3a) and showed the characteristics of adult breeding plumage according to Higgins & Davies (1996). The feathers of the crown and nape were bright rufous with black-brown centres and white fringes at the tips. The forehead was white and the ear coverts bright reddish brown (Fig. 3b). The feathers of the mantle, back and scapulars were bright rufous brown with black centres, and the rump and uppertail coverts were also dark brown with rufous brown fringes. Sixteen individuals (29% of the total captured) had these plumage traits and were recorded as adults.
- We assumed that birds with old primaries (moult-score: 0^{10}) and not in active moult were first year. We caught five individuals like this (9% of the total captured). We also noted that the scapulars of these birds were pale brown with no bright rufous tips, and the nape and the ear coverts were grey-brown as well as the rump and tail feathers.
- On the basis of the plumage traits described above (pale grey or brown rufous) we then recorded as:
  - First year: individuals in active primary moult showing traits of juvenile plumage, such as grey ear coverts, old tertials, old tail feathers, grey scapulars with no rufous present, grey nape. We caught thirteen birds showing these characteristics (23% of the total captured) (Fig. 4);
  - Adult: individuals with almost complete primary moult (e.g. moult-score: 5^{9},4^{1}), with all the remainder of the plumage very fresh. Four individuals were recorded as adult using this criterion (7% of the total captured).

We also caught eighteen birds (32% of the total captured) with a mixture of characteristics of breeding and non breeding plumage. We recorded these as of unknown age as there appeared to be no clear criterion for deciding whether they were adults or first years.

This was the first attempt to determine the plumage traits and moult strategies of adult and first year Little Stints in Sri Lanka before their northward migration. During future ringing sessions we plan to record the plumage characteristics of this species as accurately as possible, so that as we gain experience our ability to age Little Stints will improve.

Redshank: adults were identified as birds that had completed wing moult, with fresh new primaries and secondaries, with very bright red legs and base of the bill, and a large amount of dark barring and spotting on the chest and flanks.

Fig. 2. Curlew Sandpipers caught Bundala National Park, Sri Lanka, April 2005: (a, left) adult and (b, above) juvenile.

Fig. 3. Little Stints caught Bundala National Park, Sri Lanka, April 2005: (a, above left) adult with fresh, new primaries and characteristic breeding plumage. (b, above right) the head of an adult.

Fig. 4. Little Stint caught Bundala National Park, Sri Lanka, April 2005, recorded as a first year, in primary moult. The body plumage shows no trace of characteristic breeding plumage.

Fig. 5. Wing of an adult Redshank caught Bundala National Park, Sri Lanka, April 2005: fresh new primaries and secondaries, tertials grey-brown with dark bars.

Fig. 6. Participants in the bird ringing training course at Bundala National Park, April 2005.

First years were those in active primary moult, with dull coloured legs and pale orange base of bill. The pattern of inner median coverts and tertials was used as a supporting criterion: in juveniles these feathers are edged with (usually worn away) buff spots, in adults the inner medians are white-tipped and tertials grey-brown with dark bars (Fig. 5), tertials lanceaolate in juveniles, more rounded in adults (Prater *et al.* 1977).

Kentish Plover: the subspecies *C. a. alexandrinus* and *C. a. seebohmi* both occur in Sri Lanka (Wait 1931, Whistler 1944, Phillips 1953, Kotagama & Wijayasinghe 1998). *C. a. alexandrinus* is a winter visitor and *seebohmi* is a breeding resident. The two subspecies differ in size, *seebohmi* being the smaller, and in the breeding plumage of males, *alexandrinus* having a rufous hind crown, black crown patch and black eyeline while *seebohmi* has a brownish crown and lacks a black forehead band and black loral stripe (Rasmussen & Anderton 2005).

Both subspecies occur in Bundala National Park, but their distribution and status is not well documented in South India or Sri Lanka. Moreover the northern limit of *C.a. seebohmi* in India is unknown (Rasmussen & Anderton 2005). Therefore ringing both subspecies is likely to provide important new information on their status and distribution. During April 2005, three of the Kentish Plovers caught in Bundala National Park were both colour- and metal-ringed.

TRAINING

Sixteen staff members of the Department of Wildlife and Conservation were trained by the personnel of Field Ornithological Group of Sri Lanka (Ms Vathsala Abeygunawardena, Mr Chandima Fernando, Mr Saman Gamage, Mr Indrika Kaggodaarachchi and Mr Chinthaka Kaluthota) during the visit to Bundala in April 2005. A series of lectures aimed at introducing the basic concepts of bird migration and bird ringing ethics were provided, as well as practical sessions on techniques for handling, ringing, collecting and recording data (Fig. 6).

DISCUSSION

Three reasons for catching and marking individuals within a population are:

i) to estimate population size
ii) to determine migration routes
iii) to estimate survival rates (Bibby *et al.* 1992).

The ringing project initiated in Bundala National Park is intended to be an intensive monitoring effort to analyze the migratory strategies of shorebirds staging in Sri Lanka during one part of their annual migration cycle.

Despite a great amount of information from other flyways on the moulting strategy of shorebirds, data on the seasonal composition of migratory waves, differential migration of sexes and/or age classes, body weight variation and fat deposition and moulting strategies are not available for Bundala National Park or other parts of Sri Lanka. Therefore the study carried out in April 2005 represents the first attempt to investigate criteria for ageing shorebirds in Sri Lanka, and to collect information on their physiology, biometry and morphology. There are many gaps in our knowledge, especially in relation to the moulting strategy of some species (e.g. Little Stint). The wetlands of Bundala National Park are of particular interest in terms of migratory phenology as they seem to host birds from both from the east and west (Kotagama unpubl. info.), and very little is known in terms of systematic relationships within different geographic populations wintering in the area, or between individuals of the same species but belonging to resident and migratory populations (e.g. Kent-

ish Plover). As these questions cannot be answered by a single study, or in the short term, three main ringing sessions have been planned for future years in order to acquire information on the moult status, and physiological condition (body mass, parasite load, etc) of shorebirds on arrival from their breeding grounds (Sept–Oct), during the wintering period (Nov–Jan) and prior their departure to the breeding grounds (Feb–April). A session in July has also been planned in order to investigate the resident populations, especially of those species like Kentish Plover that are both resident and migratory.

As bird ringing can have significant results only if efforts are coordinated, programmes such the one initiated by the Field Ornithological Group of Sri Lanka in Bundala should be extended to other parts of the country (especially to the north-west of Sri Lanka: the Mannar Peninsula and islands). Close collaboration will be necessary with other institutions and universities, in order to create a network of focal points where monitoring and research on shorebirds is carried out. Training, such as took place in April 2005 at Bundala, should be provided to different institutions in order to standardize practices and collection of data. Capacity building and education programmes are necessary at the level of local communities in order to raise awareness of the importance of shorebirds and wetlands, and to encourage participation of local communities in the NBRP.

The outcomes of such comprehensive collaborative projects will provide an important flow of information between Sri Lanka and other countries along the Central Asian Flyway. It will contribute to an enhanced knowledge about the ecology and behaviour of shorebirds and their migrations and to a better understanding of the population sizes of the different species that use the flyway. The recently published third edition of *Waterbird Population Estimates* (Wetland International 2002) highlights how our knowledge of Asian waterbird (shorebirds included) demography is still scant, with about 40% of populations lacking information about trends.

In Asia, wetlands and other habitats upon which waterbirds depend are under severe threat as they occur in areas with huge human populations. Although wetlands provide many amenities and food resources for the people, increasingly they are being exploited unsustainably. Many wetlands in Sri Lanka are subject to such pressures. Programmes of research into crucial gaps in our knowledge of the ecology of waterbirds and trends in populations are essential for assessing impacts and pressures and ensuring sustainable use of wetland resources for people as well as survival of the birds and their habitats. The importance of linking biodiversity conservation to the services provided by wetlands in support of human well-being has recently been emphasized through the Millennium Ecosystem Assessment (Finlayson & D'Cruz 2005).

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