Nesting patterns of some terrestrial birds in Danta Forest Range, northern Gujarat, India

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The nesting of terrestrial birds in Gujarat has not been documented in detail, and information for northern Gujarat (71°39'–73°58'E & 23°26'–24°39'N) is especially scattered. The few reports that exist (Ali 1945; Abdulali 1962; Himmatshinji 1968; Parasharya 1984; Pailmes & Briggs 1986) are chiefly related to population and distribution of wetland birds in Gujarat. Barring a few observations on nesting of terrestrial birds (e.g., Soni et al. 2004 in Rajkot city), there are no reported attempts to study their nesting patterns in northern Gujarat. In fact, there is no detailed checklist of the region’s avifauna. We present in this paper a concise account of our observations on distribution and nesting patterns of the terrestrial birds in Danta Forest Range in northern Gujarat.

Study Area

The Danta Forest Range is located between 24°1’24”-24°37’30”N & 72°15’45”-73°1’30”E in Danta taluka in Banaskantha district of Gujarat (Fig. 1). The fact that the Danta FR is situated at the tail end of the Aravalli range and connects both the Jessore and Balaram Ambient wildlife sanctuaries makes it an important site for long-term conservation of the region’s wildlife. The dry deciduous and thorn forest (Sub type: 5A/C, Southern Dry Mixed Deciduous Forest of Champion & Seth 1968) is spread over 47,941ha with hilly terrain and characterized by steep slopes. Most of the rivers are annual, originating from the Aravalli hills especially the Abu mountain. Notable among them are Banas, Sirinala, Arjuni, Saraswati, and Selvani. According to the biogeographic classification of Rodgers & Panwar (1988), the forest range of Danta hills falls under the Aravalli biogeographic region of Province 4B of Gujarat Rajwara in the semi-arid zone.

The climate is typically tropical with three main seasons. Summer ranges from March to June (with mean maximum temperature of 40°C), followed by a rainy season heralded by the south-west monsoon between July and September. The cold season starts in December and may last until February, with a mean minimum temperature of 9°C. May is the hottest month and January is the coldest; relative humidity during the monsoon may range from 60% to 85%.

Methods

Fieldwork was carried out during the summer (i.e. March–June) 2006, when most land birds breed. Birds were observed using a pair of 10 x 50 binoculars, and were identified using standard field guides, e.g. The Book of Indian Birds’ (Ali 1996). Nest sites were collected using established methodologies (Soni et al. 2004). The plant species on which nests were placed were also identified and recorded.

Results and Discussion

In total, 103 terrestrial bird species belonging to 30 families were recorded during the study period (Table 1). Of these, 31 species belonging to 16 families were observed nesting in the area (Table 2, 3). In total, 101 nests were recorded during the study period (Fig. 2). The highest number of nests were made by Baya Weavers (16), followed by House Crows (14) and Green Bee-eaters (12). Thirty-seven nests were of hole-nesting birds, while the remaining were of non-hole nesters. Baya Weaver nests were observed mainly along streams and around check dams. Green Bee-eaters made their nests on roadside burrows, allowing for easy observation and recorded during fieldwork. Table 4 lists nest host plant species. Of the 13 tree species recorded, Azadirachta indica was found to be used by four bird species, while Celastrus paniculatus, Butea monosperma and Acacia nilotica were each used by three species. A preliminary analysis of host-plant characteristics showed that tree species with either thorny branches or large, dense canopies were preferred by birds for placing their nests. Among the grasses and sedges, Pennisetum typhoides and Typha angustifolia were the predominant hosts of Plain Prinia and Black-breasted Weaver, respectively. Bank Myna, which usually nest in burrows excavated in earth-cuttings, were often observed to appropriate old nests of Common Mynas placed in tree-holes.

With respect to nest location, 18 bird species were found nesting near human habitation and 13 species near water sources, while seven species were observed nesting near the road (Fig. 3). It was also found that 16 species placed their nests on trees and five were using tree-holes; in addition, five species were nesting in earth-burrows and two species built mud-nests either on rock crevices or on the wall just under the eaves of buildings. Rose-ringed Parakeet were observed nesting in both natural tree holes and crevices on walls of buildings. Nests of Blue Rock Pigeon and Rose-ringed Parakeet were generally found in human settlements, showing their association with humans. In general, the nesting behaviour of
Table 1. Checklist of birds recorded in the Danta Forest Range with their residential status

| Bird Species          | Scientific Name                  | Residential Status |
|-----------------------|----------------------------------|--------------------|
| **Accipitridae**      |                                  |                    |
| 1 Black-shouldered Kite | Elanus caeruleus                | RB                 |
| 2 Brahminy Kite       | Haliastur indus                 | RB                 |
| 3 Honey Buzzard       | Pernis ptilorhyncus             | RB                 |
| 4 Shikra              | Accipiter badius               | RB                 |
| 5 Tawny Eagle         | Aquila rapax                   | RB                 |
| 6 White-backed Vulture | Gyps bengalensis              | RB                 |
| **Phasianidae**       |                                  |                    |
| 7 Common Quail        | Coturnix coturnix              | R,M                |
| 8 Grey Francolin      | Francolinus pondicinianus       | RB                 |
| 9 Indian Peafowl      | Pavo cristatus                 | RB                 |
| 10 Painted Francolin  | Francolinus pictus             | RB                 |
| 11 Rain Quail         | Coturnix coromandela           | R                  |
| 12 Jungle Bush Quail  | Perdicula asiatica             | R                  |
| **Charadriidae**      |                                  |                    |
| 13 Red-wattled Lapwing | Vanellus indicus               | RB                 |
| 14 Yellow-wattled Lapwing | Vanellus malabaricus       | RB                 |
| **Columbidae**        |                                  |                    |
| 15 Blue Rock Pigeon   | Columba livia                  | RB                 |
| 16 Green Pigeon       | Treron phoenicoptrera          | RB                 |
| 17 Little Brown Dove  | Streptopelia senegalensis       | RB                 |
| 18 Red turtle dove    | Streptopelia tranquebarica     | RB                 |
| 19 Ring Dove          | Streptopelia decoacto          | RB                 |
| **Psittacidae**       |                                  |                    |
| 20 Rose-ringed Parakeet | Psittacula krameri            | RB                 |
| **Cuculidae**         |                                  |                    |
| 21 Pied Cuckoo        | Clamator jacobinus             | BSV               |
| 22 Common Hawk Cuckoo | Cuculus varius                 | RB                 |
| 23 Greater Coucal     | Centropus sinensis             | RB                 |
| 24 Koel               | Eudynamys scolopaceus          | RB                 |
| **Strigidae**         |                                  |                    |
| 25 Spotted Owlet      | Athene brama                   | RB                 |
| **Campephagidae**     |                                  |                    |
| 26 Common Woodshrike  | Taphродromis pondicinianus     | RB                 |
| 27 Small Minivet      | Pericrocotus cinnamomeus       | RB                 |
| 28 Indian Nightjar    | Caprimulgus indicus            | RB                 |
| 29 Asian Palm Swift   | Cypsius balasiensis            | RB                 |
| 30 House Swift        | Apus affinis                   | RB                 |
| **Alcedinidae**       |                                  |                    |
| 31 Common Kingfisher  | Alcedo atthis                  | RB                 |
| 32 Pied Kingfisher    | Ceryle rudis                   | RB                 |
| 33 White-breasted Kingfisher | Halcyon smyrnensis       | RB                 |
| 34 Blue-tailed Bee-eater | Merops philippinus         | BSV               |
| 35 Blue-cheeked Bee-eater | Merops superciliosus         | BSV               |
| 36 Green Bee-eater    | Merops orientalis              | RB                 |
| **Coraciidae**        |                                  |                    |
| 37 European Roller    | Coracias garulus              | RM                 |
| 38 Indian Roller      | Coracias benghalensis         | RB                 |
| **Upupidae**          |                                  |                    |
| 39 Common Hoopoe      | Upupa epops                    | RB,M               |
| **Bucerotidae**       |                                  |                    |
| 40 Indian Grey Hornbill | Ocyperos birostris          | RB                 |
| **Capitonidae**       |                                  |                    |
| 41 Cooper's Barbet    | Megalaima haemacephala         | RB                 |
| 42 Brown-headed Barbet | Megalaima zeylanica           | RB                 |
| **Picidae**           |                                  |                    |
| 43 Black-rumped Flameback | Dinopium benghalense        | RB                 |
| 44 Yellow-fronted Pied | Dendrocopos mahrattensis      | RB                 |
| 45 White-naped Woodpecker | Chrysocolaptes festivus    | RB                 |
| **Pittidae**          |                                  |                    |
| 46 Indian Pitta       | Pitta brachyura               | M                  |
| **Alaudidae**         |                                  |                    |
| 47 Ashy-crowned Finch Lark | Eremopterix grisea          | RB                 |
| 48 Hoopoe Lark        | Alaemon alaebipes              | R                  |
| 49 Red-winged Bush Lark | Mirafra erythrorheta        | RB                 |
| 50 Singing Bush Lark  | Mirafra cantillans             | R                  |
| 51 Syke's Crested Lark | Galerida deva                 | RB                 |
| **Phalacrocoracidae** |                                  |                    |
| 52 Crested Lark       | Galerida cristata              | RB                 |
| **Hirundinidae**      |                                  |                    |
| 53 Dusky Crag Martin  | Hirundo concolor               | RB                 |
| 54 Red-rumped Swallow | Hirundo daurica                | BSV               |
| 55 Streak-throated Swallow | Hirundo fluvicola         | RB                 |
| 56 Wire-tailed Swallow | Hirundo smithii               | RB                 |
| **Lanidae**           |                                  |                    |
| 57 Southern Grey Shrike | Lanius meridionalis        | RB                 |
| 58 Bay-backed Shrike  | Lanius vittatus                | RB                 |
| 59 Long-tailed Shrike | Lanius schach                 | M                  |
| **Dicruridae**        |                                  |                    |
| 60 Black Drongo       | Dicrurus macrocercus           | RB                 |
| 61 Ashy Drongo        | Dicrurus leucophaeus           | M                  |
| **Oriolidae**         |                                  |                    |
| 62 Black-headed Oriole | Oriolus xanthonurus           | RB                 |
| 63 Golden Oriole      | Oriolus oriolus               | RB,M               |
| **Corvidae**          |                                  |                    |
| 64 House Crow         | Corvus splendens               | RB                 |
| 65 Jungle Crow        | Corvus macrorhynchos           | RB                 |
| 66 Rufous Treepie     | Dendrocitta vagabunda          | R                  |
| **Sturnidae**         |                                  |                    |
| 67 Barik Myna         | Acridotheres ginpiniannus      | RB                 |
| 68 Common Myna        | Acridotheres tristis           | RB                 |
| 69 Brahminy Starling  | Stumus pagodarum               | RB                 |
| **Irenidae**          |                                  |                    |
| 70 Blue-winged Leafbird | Chloropsis cochin cineina     | RB                 |
| 71 Common Iora        | Aegithalos tiphia              | RB                 |
| **Pycnonotidae**      |                                  |                    |
| 72 Red-vented Bulbul  | Pycnonotus cafer               | RB                 |
| 73 Red-whiskered Bulbul | Pycnonotus jocosus            | RB                 |
| 74 White-cheeked Bulbul | Pycnonotus leucogenys         | RB                 |
| **Paridae**           |                                  |                    |
| 75 Great Tit          | Parus major                    | R                  |
| 76 White-naped Tit    | Parus nuchalis                 | R                  |
| **Musciicapidae**     |                                  |                    |
| 77 Common Babbler     | Turdoides caudata              | RB                 |
| 78 Yellow-eyed Babbler | Chrysomma sinense             | RB                 |
| 79 Large Grey Babbler | Turdoides malcolmi             | RB                 |
| 80 Jungle Babbler     | Turdoides striata              | RB                 |
| 81 Brown Rock Chat    | Cercomela fusca                | RB,M               |
| 82 Indian Robin       | Saxicoloides fulicata          | RB                 |
| 83 Magpie Robin       | Copsychus saularis             | RB                 |
| 84 Ashy Prinia        | Prinia socialis                | RB                 |
| 85 Plain Prinia       | Prinia inornata                | RB                 |
| 86 Rufous-fronted Prinia | Prinia buchanani            | RB                 |
| 87 Common Tailorbird  | Orthotomus sutorius            | RB                 |
| 88 Asian Paradise-flycatcher | Terpsiphone paradisi    | BSV               |
| 89 White-browed Fantail | Rhinopipra aureola        | RB                 |
| **Zosteropidae**      |                                  |                    |
| 90 Oriental White-eye | Zosterops palpebrocous        | R                  |
| **Nectariniidae**     |                                  |                    |
| 91 Crimson Sunbird    | Aethopyga siparaja             | R                  |
| 92 Purple Sunbird     | Nectarinia asiatica            | RB                 |
| **Passeridae**        |                                  |                    |
| 93 House Sparrow      | Passer domesticus              | RB                 |
| 94 Baya Weaver        | Ploceus philippinus            | RB                 |
| 95 Black-breasted Weaver | Ploceus benghalensis         | RB                 |
| 96 White-throated Munia | Lonchura malabarica          | RB                 |
| 97 Red Munia          | Amandava amandava              | RB                 |
| **Motacillidae**      |                                  |                    |
| 98 Indian Tree Pipit  | Anthus hodgsoni                | M                  |
| 99 Yellow Wagtail     | Motacilla flava                | M                  |
| **Emberizidae**       |                                  |                    |
| 100 Crested Bunting   | Meloposph laithami             | RB                 |
| 101 Red-headed Bunting | Emberiza bruniceps            | M                  |

R - Residents; RB - Resident Breeding (Breeding recorded in Gujarat); M - Migratory; BSV - Breeding summer visitor
Table 2. Number of bird species recorded per family

| Family               | # Species Recorded |
|----------------------|--------------------|
| 1 Accipitridae       | 6                  |
| 2 Phasianidae        | 7                  |
| 3 Charadriidae       | 2                  |
| 4 Columbidae         | 5                  |
| 5 Psittacidae        | 1                  |
| 6 Cuuculidae         | 4                  |
| 7 Strigidae          | 1                  |
| 8 Campephagidae      | 5                  |
| 9 Alcedinidae        | 6                  |
| 10 Coraciidae        | 2                  |
| 11 Upupidae          | 1                  |
| 12 Bucorvidae        | 1                  |
| 13 Capitonidae       | 2                  |
| 14 Picidae           | 3                  |
| 15 Pittidae          | 1                  |
| 16 Alaudidae         | 6                  |
| 17 Hirundinidae      | 4                  |
| 18 Laniidae          | 3                  |
| 19 Dicruridae        | 2                  |
| 20 Oriolidae         | 2                  |
| 21 Corvidae          | 3                  |
| 22 Sturnidae         | 3                  |
| 23 Pycnonotidae      | 3                  |
| 24 Pycnonotidae      | 3                  |
| 25 Paridae           | 2                  |
| 26 Muscicapidae      | 13                 |
| 27 Zosteropidae      | 1                  |
| 28 Nectarinidae      | 2                  |
| 29 Passeridae        | 5                  |
| 30 Motacillidae      | 2                  |
| 31 Emberizidae       | 2                  |

Table 3. List of nesting bird species, number of nests and nest type observed

| Bird Species                      | Scientific Name         | # Nest | Non-Hole Nest | Hole Nest |
|-----------------------------------|-------------------------|--------|---------------|----------|
| Charadriidae                      | Vanelius indicus        | 1      | +             |          |
| Columbidae                        | Columba livia           | 3      | +             |          |
| Psittacidae                       | Psittacula krameri      | 2      | +             |          |
| Strigidae                         | Athene brama            | 1      | +             |          |
| Alcedinidae                       | Pericrocotus cinnamomeus| 1      | +             |          |
| Accipitridae                      | Halcyon smyrnensis      | 4      | +             |          |
| Alcedinidae                       | Merops superciliosus    | 8      | +             |          |
| Pycnonotidae                      | Merops orientalis       | 12     | +             |          |
| Picidae                           | Dinopium benghalense    | 1      | +             |          |
| Hirundinidae                      | Hirundo daurica         | 3      | +             |          |
| Laniidae                          | Hirundo smithii         | 2      | +             |          |
| Dicruridae                        | Lanius vittatus         | 1      | +             |          |
| Oriolidae                         | Dicurus amsimilis       | 1      | +             |          |
| Corvidae                          | Oriolus oriolus         | 1      | +             |          |
| Sturnidae                         | Corvus splendens        | 14     | +             |          |
| Pycnonotidae                      | Acridotheres gingenianus| 2      | +             |          |
| Muscicapidae                      | Acridotheres tristis    | 1      | +             |          |
| Pycnonotidae                      | Sturnus pagodarum       | 3      | +             |          |
| Muscicapidae                      | Turdoides caudata       | 2      | +             |          |
| Muscicapidae                      | Turdoides malcolmi      | 1      | +             |          |
| Asian Paradise-flycatcher         | Tersiphone paradisi     | 1      | +             |          |
| Indian Robin                      | Saxicoloides fulicata   | 2      | +             |          |
| Magpie Robin                      | Copsychus saularis      | 1      | +             |          |
| Plain Prinia                      | Prinia inornata         | 1      | +             |          |
| Common Tailorbird                 | Orthothomus sutorius    | 3      | +             |          |
| Nectarinidae                      | Nectarinia asiatica     | 4      | +             |          |
| Passeridae                        | Ploceus philipinus      | 16     | +             |          |
| Black-breasted Weaver             | Ploceus benghalensis    | 5      | +             |          |
| White-throated Munia              | Lonchura malabarica     | 3      | +             |          |
| Total                             | 101                     | + = 20 | + = 11        |          |

+ - Present
Table 4. Nesting of different bird species observed on various trees

| Tree species                  | # bird species | Bird species nesting                                                                 |
|-------------------------------|----------------|--------------------------------------------------------------------------------------|
| 1 Azadirachta indica (Limdo)  | 4              | Common Myna, Blue Rock Pigeon, White-throated Munia, Small Minivet                     |
| 2 Derris indica (Karanj)      | 1              | Golden Oriole                                                                        |
| 3 Ficus benghalensis (Vadalo) | 2              | Ring Dove, Large Grey Babbler                                                        |
| 4 Syzygium cumini (Jambu)     | 1              | Common Babbler                                                                        |
| 5 Adhatoda vasica (Araduso)   | 2              | House Crow, Rose-ringed Parakeet                                                     |
| 6 Terminalia catappa (Badam)  | 1              | Common Tailorbird                                                                    |
| 7 Celastrus paniculatus (Kanaji) | 3          | Brahminy Myna, Spotted Owlet                                                       |
| 8 Butea monosperma (Khakharo)| 3              | Bay-backed Shrike, Black-rumped Flameback, Black Drongo                                |
| 9 Acacia farnesiana (Talbaval) | 2            | Purple Sunbird, Common Babbler                                                      |
| 10 Acacia nilotica (Rambaval) | 3              | Red-vented Bulbul, Paradise Flycatcher, White-throated Munia                         |
| 11 Prosopis juliflora (Gandobaval) | 1        | Baya Weaver                                                                          |
| 12 Pennisetum typhoides (Bajaro) | 1            | Plain Prinia                                                                        |
| 13 Typha angustifolia         | 1              | Black-breasted Weaver                                                                |

Figure 1. Study area: Danta Taluka of Banaskantha district, Gujarat

Figure 2. Family-wise number of species nesting in the Danta Forest Range, Gujarat

the birds in the Danta FR indicates that most of the terrestrial birds prefer either large canopy trees or thorny bushes for nesting, probably to avoid predation.

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