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SHORT COMMUNICATION

AVIFAUNAL DIVERSITY ALONG THE RIVERINE HABITATS OF PAPIKONDA NATIONAL PARK, ANDHRA PRADESH, INDIA

Paromita Ray, Giridhar Malla, Upma Manral, J.A. Johnson & K. Sivakumar

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Avifaunal diversity along the riverine habitats of Papikonda National Park, Andhra Pradesh, India

Paromita Ray¹ , Giridhar Malla² , Upma Manral³ , J.A. Johnson⁴  & K. Sivakumar⁵ 

^{1,2,3,4,5} Wildlife Institute of India, Post Box #18, Chandrabani, Dehradun, Uttarakhand 248001, India.

^{1,2} Wildlife Conservation Society - India, 551, 7th Main Road, Rajiv Gandhi Nagar, 2nd Phase, Bengaluru, Karnataka 560097, India.

¹ paromitaray20@gmail.com (corresponding author), ² mallagiridhar@gmail.com, ³ upmamanral2@gmail.com, ⁴ jaj@wii.gov.in,

⁵ ksivakumar@wii.gov.in

Abstract: This study was carried out to record the avifaunal diversity of the riverine habitats along the Godavari River in Papikonda National Park, during a short survey conducted from 2017 to 2018. A total of 63 bird species belonging to 25 families were recorded during the survey. The study resulted in the recording of eight globally threatened avian species including the Endangered Black-bellied Tern *Sterna acuticauda*, and seven Near Threatened species, viz.: Painted Stork *Mycteria leucocephala*, Black-headed Ibis *Threskiornis melanocephalus*, Great Thick Knee *Esacus recurvirostris*, River Lapwing *Vanellus duvaucelli*, Malabar Pied Hornbill *Anthracoceros coronatus*, Grey-headed Fish Eagle *Haliaeetus ichthyaeus*, and Oriental Darter *Anhinga melanogaster*. Species including Black-bellied Tern *Sterna acuticauda*, Grey-headed Fish Eagle *Haliaeetus ichthyaeus*, Indian Eagle-owl *Bubo bengalensis*, and Black Eagle *Ictinaetus malaiensis* were recorded for the first time along the riverine habitats of Papikonda National Park. Sand mining of the riverbed and discharge of effluents into the Godavari River has already negatively impacted the associated habitats and avifaunal diversity.

Keywords: Birds, Godavari River, Polavaram Dam, protected area.

River channels and adjacent riparian zones play critical ecological roles, which include the supporting of rich biodiversity. Birds constitute an essential component of the biological community of a riverscape – an integrated landscape unit comprising streams, floodplains, and riparian zones along a river channel (Wiens 2002). Riparian zones also provide conducive dispersal pathways and sufficient cover for migrating birds, thereby often supporting a higher diversity of bird species (Sinha et al. 2019). Although several protected areas in India have major rivers flowing through their boundaries, very little or no attention is given to the health of these rivers and their biodiversity (Gupta et al. 2014). Freshwater habitats are considered to be among the most threatened (Dudgeon et al. 2006), with riverine habitats increasingly being subjected to large-scale modifications resulting in the loss of their ecosystem

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services and wider repercussions for associated biodiversity. Papikonda National Park (PNP), Andhra Pradesh, has been identified as an Important Bird and Biodiversity Area (IBA), where around 300 species of birds have been recorded (Rahmani et al. 2016). During the latest study conducted by Prashanth et al. (2014) on the bird diversity of the PNP and northern Eastern Ghats, nearly 145 species were documented with notable records of species including Jerdon’s Baza *Aviceda jerdoni* and Brook’s Flycatcher *Cyornis poliogenys*. While this study was carried out in the interior forested habitats of the national park, the main focus of the present study was to understand the bird diversity in the riparian and riverine habitats. In this context, we present the results of a short survey conducted between 2017 and 2018 on the bird diversity of riverine habitats along the Godavari River in Papikonda National Park (hereafter PNP). This survey is important considering that the species associated with the riverine and riparian habitats of PNP are vulnerable to changes brought about due to submergence by Polavaram Dam; a large dam (dams that are higher than 15m) that is currently under construction and located approximately 5km downstream of PNP near Polavaram Village.

STUDY AREA

Godavari River is the largest river of peninsular

India that originates in Triambakeshwar near Nasik, Maharashtra, traverses eastwards for a distance of around 1,470km, and empties into Bay of Bengal near Kakinada, Andhra Pradesh. The river has a large catchment area of 312,812km² (Bharati et al. 2009; Rao et al. 2015), which is fed by several tributaries along the course, including Indravathi, Sabari, Sileru, Kinnerisani, and Pranahita. Once the river enters Andhra Pradesh in the East Godavari District, it flows through the hills of Papikonda National Park (also popularly known as Papikondalu) for nearly 50km. These hills of Papikondalu form the southern edge of the northern Eastern Ghats – a largely unbroken chain of rugged hills and plateaus extending across the states of Odisha, Chhattisgarh, and Andhra Pradesh. After crossing through the Eastern Ghats, it emerges into the vast alluvium-rich plains and finally branches into two distributaries- Gouthami and Vashishta just downstream of the Dowlaiswaram Barrage near the city of Rajahmundry in Andhra Pradesh.

The Papikonda National Park (located between 8.491944–19.181389 N & 79.541111–83.233333 E), is an important protected area in this landscape. The altitude is 200–800 m and is characterized by southern tropical dry deciduous forest and southern tropical moist deciduous forest types intermingled with scrub vegetation (Champion & Seth 1968; Aditya & Ganesh 2017). Godavari River meanders through the hills of

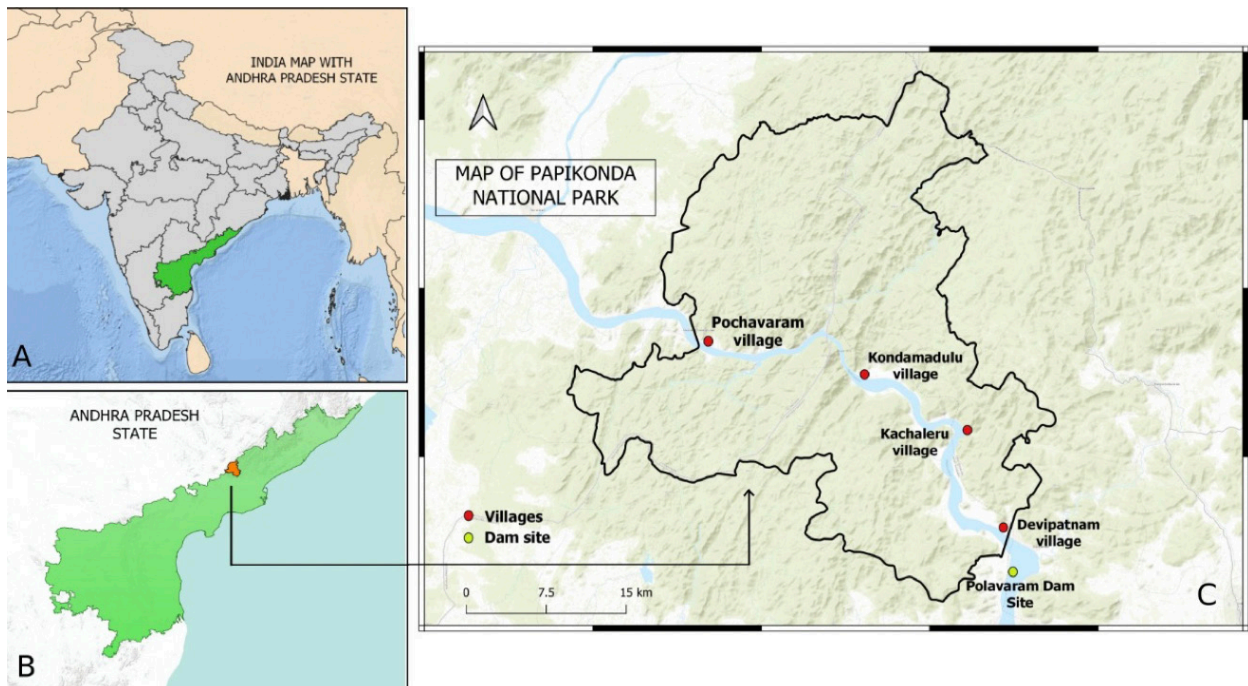


Figure 1. Location of Papikonda National Park in Andhra Pradesh: A—India map with Andhra Pradesh boundaries in green | B—showing location of Papikonda National Park in Andhra Pradesh | C—Papikonda National Park boundary, Polavaram Dam site and the main villages along the riparian habitats of Godavari River.

PNP, leading to the formation of sand bars and natural levees that provide essential habitats for riverine and riparian birds. At specific points along the stretches in PNP, the river is also lined by hills and rocky boulders.

METHOD

As part of a Conservation Leadership Programme (CLP) supported project in the northern Eastern Ghats, we had an opportunity to record opportunistic sightings of avifaunal diversity along the riverine habitats of the Godavari River inside Papikonda National Park and surrounding areas (Fig. 1). Most of the sightings were made during December 2017 to August 2018 using a locally available artisanal boat with the survey restricted only to the riverine habitats. Data were collected mostly during the morning time at 05.30–09.00 h and in the evening from 17.00–19.00 h. At a few random locations, we waited for about 10 min to watch for any activity of birds foraging on the riverine habitats and took photographs using a Canon SX50 camera to aid with further identification. We followed Ali & Ripley (1983) and Grimett et al. 2013 to identify the species. The taxonomic order and nomenclature follows Howard & Moore (Dickinson & Remsen 2013; Dickinson & Christidis 2014).

RESULTS

A total of 63 bird species belonging to 25 families were recorded along the riverine habitats of PNP (Table 1). For the first time, the Black-bellied Tern *Sterna acuticauda*, Grey-headed Fish Eagle *Haliaeetus ichthyaetus*, Indian Eagle-owl *Bubo bengalensis*, and Black Eagle *Ictinaetus malaiensis* were recorded along the riverine habitats of Papikonda National Park especially from the submergence zone of Polavaram dam. We also recorded several nests of River Lapwing *Vanellus duvaucelli* along the sandbars of Godavari River. Of the 63 species, eight are globally threatened species including the Endangered Black-bellied Tern *Sterna acuticauda*, and seven Near Threatened species, viz.: Painted Stork *Mycteria leucocephala*, Black-headed Ibis *Threskiornis melanocephalus*, Great Thick Knee *Esacus recurvirostris*, River Lapwing *Vanellus duvaucelli*, Malabar Pied Hornbill *Anthracoceros coronatus*, Grey-headed Fish Eagle *Haliaeetus ichthyaetus* and Oriental Darter *Anhinga melanogaster*.

One individual of Black Eagle *Ictinaetus malaiensis* was sighted near Kachaleru Village (Image 1) inside PNP, soaring over the hills for nearly 30 minutes before taking rest. Several nesting colonies (25–30) of the Blue-tailed Bee-eater *Merops philippinus* (Image 2) were found along

the entire stretch on either side of the riverbanks from Devipatnam to Pochavaram Village. During our study period, higher nesting activity of Blue-tailed Bee-eaters was observed between April and June than the other survey months. Distribution of nesting colonies at a site varied from two to 30 nests potentially depending upon the availability of certain bank types, riverine vegetation, and biotic disturbances. In the same river stretch, multiple nestings of River Lapwing *Vanellus duvaucelli* on the sandbars of Godavari River were observed (Image 3). Black-bellied Terns *Sterna acuticauda*, were observed near the Devipatnam Village, but we could not notice any nesting activity during our survey. Two individuals of Indian Eagle-owl *Bubo bengalensis* were recorded near the village of Kondamadulu in PNP that were seen perching on rocks and crevices present along the river (Image 4). A few individuals of the Bar-headed Geese *Anser indicus* (Image 5), Ruddy Shelduck *Tadorna ferruginea*, Lesser Whistling Duck *Dendrocygna javanica*, and Northern Pintail *Anas acuta*, were also seen during the winter from December 2017 till March 2018 in PNP. The small Pratincole *Glareola lactea* (Image 6) was the most frequently recorded species across all the sampling sites along the river followed by River Lapwing. The Open-billed Stork, Painted Stork, and Blue-tailed Bee-eater were also seen mostly during winters and summers, but were visibly uncommon during the rainy season. During the summer months, we saw nearly ten individuals of Black Ibis *Pseudibis papillosa* engaged in courtship display and mating adjacent to the river near Pochavaram Village located just outside PNP (Image 7).

DISCUSSION

This survey has led to quite a few fascinating discoveries of birds that occur in the riverine and riparian habitats of Eastern Ghats, especially inside Papikonda National Park. In addition to the species reported in this survey, we also recorded a population of Indian Skimmers *Rynchops albicollis* at a site nearly 80 km downstream of PNP. In 2015, 15 individuals of Indian Skimmers were recorded from this site (Malla et al. 2015), while in 2016, 150 individuals of Indian Skimmers were recorded from the same site (Image 8). Since then, the birds have been recorded from the same site in every consecutive year that suggests that the Godavari Delta is a critical site for the conservation of this threatened species, although breeding or nesting sites of the species could not be recorded from the river delta during this study period. Sand mining in the riverbed and discharge of effluents into Godavari River are presently the major sources of disturbance with potential negative impacts

Table 1. A checklist of bird species recorded from riverine habitats of the Papikonda National Park and the submergence zone of Polavaram Dam.

Order: Anseriformes	26. Great Thick-knee <i>Esacus recurvirostris</i>
Family: Anatidae	Family: Charadriidae
1. Ruddy Shelduck <i>Tadorna ferruginea</i>	27. River Lapwing <i>Vanellus duvaucelli</i>
2. Lesser Whistling Duck <i>Dendrocygna javanica</i>	28. Red-wattled Lapwing <i>Vanellus indicus</i>
3. Bar-headed Goose <i>Anser indicus</i>	29. Little Ringed Plover <i>Charadrius dubius</i>
4. Northern Pintail <i>Anas acuta</i>	Family: Scolopacidae
Order: Galliformes	30. Common Greenshank <i>Tringa nebularia</i>
Family: Phasianidae	31. Green Sandpiper <i>Tringa ochropus</i>
5. Red Junglefowl <i>Gallus gallus</i>	32. Marsh Sandpiper <i>Tringa stagnatilis</i>
Order: Columbiformes	33. Common Redshank <i>Tringa totanus</i>
Family: Columbidae	34. Common Sandpiper <i>Actitis hypoleucos</i>
6. Oriental Turtle Dove <i>Streptopelia orientalis</i>	Family: Glareolidae
7. Laughing Dove <i>Streptopelia senegalensis</i>	35. Little Pratincole <i>Glareola lactea</i>
8. Spotted Dove <i>Streptopelia chinensis</i>	Family: Laridae
Order: Caprimulgiformes	36. Black-bellied Tern <i>Sterna acuticauda</i>
Family: Caprimulgidae	37. River Tern <i>Sterna aurantia</i>
9. Jerdon's Nightjar <i>Caprimulgus atripennis</i>	Order: Accipitriformes
10. Indian Nightjar <i>Caprimulgus asiaticus</i>	Family: Pandionidae
Family: Apodidae	38. Osprey <i>Pandion haliaetus</i>
11. Asian Palm Swift <i>Cypsiurus balasiensis</i>	Family: Accipitridae
Order: Gruiformes	39. Grey-headed Fish Eagle <i>Ichthyophaga ichthyaetus</i>
Family: Rallidae	40. Black Kite <i>Milvus migrans</i>
12. White-breasted Waterhen <i>Amaurornis phoenicurus</i>	41. Black Eagle <i>Ictinaetus malaiensis</i>
Order: Pelecaniformes	42. Brahminy Kite <i>Haliastur indus</i>
Family: Ciconiidae	43. Crested Serpent Eagle <i>Spilornis cheela</i>
13. Painted Stork <i>Mycteria leucocephala</i>	44. Oriental Honey Buzzard <i>Pernis ptilorhynchus</i>
14. Asian Openbill <i>Anastomus oscitans</i>	Order: Strigiformes
Family: Ardeidae	Family: Strigidae
15. Little Egret <i>Egretta garzetta</i>	45. Rock Eagle Owl <i>Bubo bengalensis</i>
16. Indian Pond Heron <i>Ardeola grayii</i>	Order: Bucerotiformes
17. Cattle Egret <i>Bubulcus ibis</i>	Family: Bucerotidae
18. Grey Heron <i>Ardea cinerea</i>	46. Malabar Pied Hornbill <i>Anthracoeros coronatus</i>
19. Yellow Bittern <i>Ixobrychus sinensis</i>	Order: Piciformes
20. Black-crowned Night Heron <i>Nycticorax nycticorax</i>	Family: Megalaimidae
Family: Threskiornithidae	47. Brown-headed Barbet <i>Psilopogon zeylanicus</i>
21. Black-headed Ibis <i>Threskiornis melanocephalus</i>	48. Coppersmith Barbet <i>Psilopogon haemacephalus</i>
22. Indian Black Ibis <i>Pseudibis papillosa</i>	Order: Coraciiformes
Family: Phalacrocoracidae	Family: Meropidae
23. Little Cormorant <i>Microcarbo niger</i>	49. Blue-tailed Bee-eater <i>Merops philippinus</i>
24. Great Cormorant <i>Phalacrocorax carbo</i>	Family: Coraciidae
Family: Anhingidae	50. Indian Roller <i>Coracias benghalensis</i>
25. Oriental Darter <i>Anhinga melanogaster</i>	Family: Alcedinidae
Order: Charadriiformes	51. Pied kingfisher <i>Ceryle rudis</i>
Family: Burhinidae	52. White-throated Kingfisher <i>Halcyon smyrnensis</i>

Order: Falconiformes
Family: Falconidae
53. Peregrine Falcon <i>Falco peregrinus</i>
Order: Passeriformes
Family: Artamidae
54. Ashy Woodswallow <i>Artamus fuscus</i>
Family: Estrildidae
55. Black-headed Munia <i>Lonchura malacca</i>
Family: Motacillidae
56. White Wagtail <i>Motacilla alba</i>
57. White-browed Wagtail <i>Motacilla maderaspatensis</i>
58. Yellow Wagtail <i>Motacilla flava</i>
59. Grey Wagtail <i>Motacilla cinerea</i>
Family: Alaudidae
60. Ashy-crowned Sparrow Lark <i>Eremopterix griseus</i>
Family: Sturnidae
61. Asian Pied Starling <i>Gracupica contra</i>
62. Bank Myna <i>Acridotheres ginginianus</i>
63. Jungle Myna <i>Acridotheres fuscus</i>

on the associated habitats and biodiversity (Koehnken et al. 2019). The construction of Polavaram Dam would further lead to modification and destruction of the river's unique habitats (Dynesius & Nilsson 1994; Rosenberg et al. 1997; Nilsson & Berggren 2000; Sivakumar et al. 2014). Within Papikonda National Park, the valleys and sandbars adjoining the river will be submerged, which would lead to the loss of nesting and feeding habitats for several riverine birds, including the Near Threatened species River Lapwing and Black-headed Ibis. Regulation of the river flow and creation of reservoirs can also lead to changes in the avian community, particularly leading to negative impacts on riverine species (Kingsford 2000). The dam will act as a physical barrier to the movement of fishes, which would have a profound impact on the avifaunal communities that depend on it (Sivakumar et al. 2014).

A review on linkages between biodiversity and ecosystem services of the Godavari delta including the estuary and associated mangrove forests, and the flow of Godavari River has been carried out wherein some mitigative measures have been suggested (Sivakumar et al. 2014; Johnson et al. 2017), which include the conservation of riverine birds. This short-term study shows the importance of the riverine and riparian habitats of the Godavari River in supporting a vibrant avian community and in providing critical habitats for threatened riverine species. We further suggest

additional studies as well as long-term monitoring of these riverine and riparian habitats along the submergence zone of the Polavaram Dam and the downstream stretches of Godavari River to identify and address the negative impacts on the associated avian community.

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Image 1. A Black Eagle is seen in the riparian habitats of Godavari River.



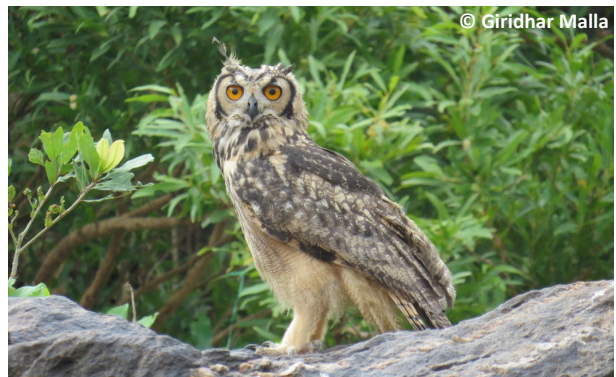
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Image 2. Blue-tailed Bee-eater near its nest entrance and colony seen along the mudbanks of the Godavari River.



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Image 3. River Lapwing near the Godavari River.



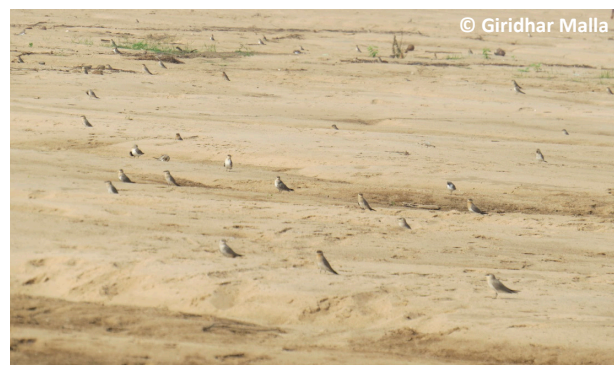
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Image 4. Indian Eagle-owl on the rock-filled banks of the Godavari River.



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Image 5. Bar-headed Goose near the sandbars in the Godavari River.



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Image 6. Small Pratincoles on the sandbars in the Godavari River.



Image 7. Black Ibis feeding near the sandbars in the Godavari River near Kunavaram Village.



Image 8. Indian Skimmers seen on the banks of Gowthami Godavari River, near Neelapalli Village, Yanam that is located nearly 90km downstream of PNP.

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Article

Elevational pattern and seasonality of avian diversity in Kaligandaki River Basin, central Himalaya

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