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Habitat for wildlife is decreasing and deteriorating due to developmental activities all over the world affecting several species of animals and plants. Each and every species contributes to maintaining the ecological balance and healthy environment. Taxonomic studies and exploration of flora and fauna play a crucial role in assessing the threatened status of wild species and based on this conservation measures are undertaken. Human population is ever increasing all over the world, so the developmental activities are inevitable. India is a developing country, so it needs to augment its power production sources. The Uranium Corporation of India (UCIL) aims to produce 20,000 megawatts of power from nuclear fuel. It has identified the largest uranium deposits at a village Thummalapalle, YSR Kadapa District, Andhra Pradesh and started mining in 2011 (Chaki et al. 2011).

India harbors 10% of the world's flora and fauna on only 2.4% of the landmass of the world (Venkatraman & Wafar 2005). The Indian subcontinent has rich avian diversity; it is the habitat to 1,300 species (Grimmett et al. 2000). Ornithological surveys in the past include Ali's (1933–34) survey in Hyderabad State, followed by Abdulali (1945) and Ripley et al. (1987–88) in Visakhapatnam District. The recent works carried out on

## AVIFAUNA OF THUMMALAPALLE URANIUM MINING AREA, ANDHRA PRADESH, INDIA

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aviafauna of united Andhra Pradesh are Anand (2000), Srinivasulu (2004), Kannan et al. (2008), David et al. (2011), Narayana et al. (2013) and Prasad et al. (2014).

The present study focus on documentation of avifauna of Thummalapalle, Uranium Mining Area, Andhra Pradesh which has not been studied earlier.

**Materials and Methods:** Study area: Uranium ore is mined at Thummalapalle Village, which is in Vemula mandal of Kadapa District of Andhra Pradesh. The present study was carried out up to 30km all around the mining site of Thummalapalle and it consists of an area of 2,827km<sup>2</sup>. A portion (40%) of this study area extends to Anantapur District (Fig. 1). The study area



*Mycteria leucocephala*  
Painted Stork



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encompasses forest area, agricultural land, barren land and human settlements. Elevation ranges from 190–800 m; climate can be considered as tropical and semi-arid type, temperature is between 27°C and 47°C and the average rainfall is 550–650mm. Water is scarce, and the streams Maddileru and Sagileru are the major spring streams which are tributaries of the Papagni River. A stretch of Papagni River flows to the east of the study area. Dry deciduous and scrub type forest cover extends over 30% of the area. The soil types are black cotton and red sandy to red gravelly. Ground nut, paddy, banana, bengal gram, citrus and coriander are the major crops grown here.

The survey was conducted for two-and-half years i.e., from September 2009 to March 2012 and the line transect method (Bibby et al. 1992) was followed for the study. The area was divided into eight parts, i.e., north, north-east, east, south-east, south, south-west, west and north-west and each part extended from the mining point to 30km radius. In each part, six permanent line transects of 1km length were laid. The search for avian

fauna was done moving along the line transects and the whole study area was covered for each season (rainy season: June to October; winter: November–February; summer: March–May). The geographical coordinates of transects were noted with the help of a GPS. In addition to transects, birds observed opportunistically were also added to the list. Digital photographic records of the birds encountered were also maintained.

The birds were identified up to the species level following field guides and standard literature (Ali & Ripley 1987; Grimmett et al. 2000; Kazmierczak 2000). Common names, scientific names and classification follow Manakadan & Pittie (2001). Resident-migratory status follow ZSI (2008). Feeding guilds were classified based on our own observations and as per Ali & Ripley (1987). Bird Life International (2012) was followed for the threat category. The frequency of the birds was classified according to their occurrence in the line transects that were laid down. It is the ratio between the number of transects in which a species is encountered to the total number of transects laid in the whole study period, and it is as follows: Common (C) - recorded in more than 50% of transects, Occasional (O) - recorded in 20–50% of transects, Uncommon (UC) - recorded in 5–20 % of transect, Rare (r) - recorded in less than 5% of transects.

**Results:** A total of 99 species of birds, belonging to 43 families were recorded from the study area. The present study reveals that 47 species are common, 13 are occasional, 17 are uncommon and 22 are rare. The significant birds encountered during the study are presented in Images 1–40. The family Muscicapidae was the largest among all the others with 14 species and followed by Cuculidae with six species and Ardeidae, Accipitridae, Columbidae, and Estrildidae represented by five species each. Most of the species were resident (92 species), and only three species, namely, *Actitis hypoleucos* and *Circus aeruginosus* were winter migrants, while five species, namely, *Ardea cinerea*, *Himantopus himantopus*, *Mycteria leucocephala*, *Pterocles exustus* and *Threskiornis melanocephalus* were local migrants (Table 1). Feeding guilds of seven types were observed; omnivores were abundant with 29 species and followed by insectivores (28), carnivores (24), granivores (11), frugivores (3), nectarivores (3) and herbivores (1). A good number of wetland birds (22 species) were observed, of which 12 species were commonly seen in the study area. *Mycertia leucocephala* is assessed as Near Threatened and most of the other species belong to the Least Concern and a few species belong to the Not Evaluated category of IUCN (BirdLife International 2012).

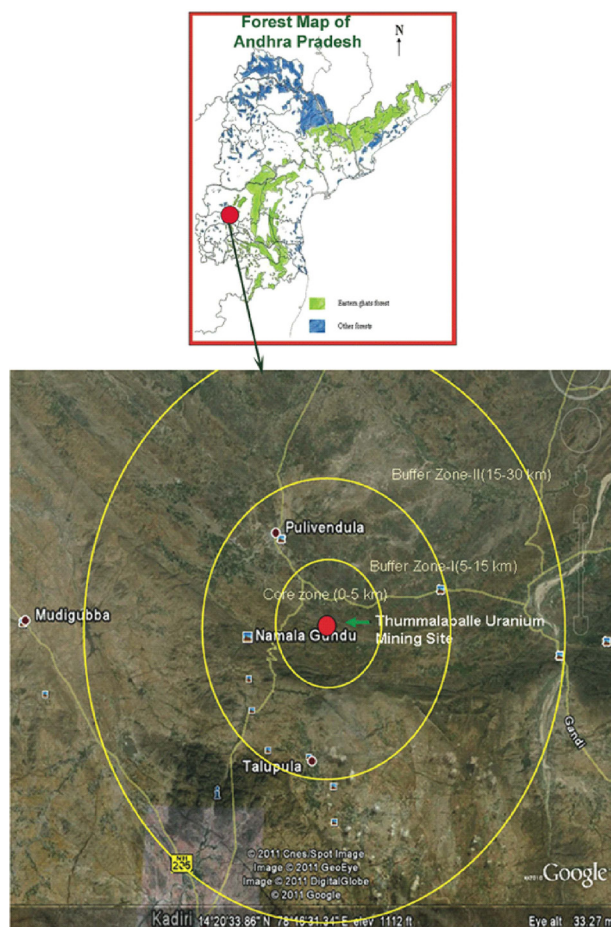


Figure 1. Study area.

**Discussion and Conclusions:** In Thummalapalle Uranium Mining area, the forest cover is only 30% and the remaining is occupied by agricultural lands and human settlements. Only two reserve forest areas, namely, Kalasamudram and Nigidi have dense and diverse vegetation compared to the remaining forest areas. In most of the forest area vegetation is made up of stunted trees and herbaceous species. In the present study only 99 species of birds were reported. The study area is not of specific type to offer a particular group of birds, so 20 families are represented by a single species each. Majority of the birds are omnivores, insectivores and granivores, only a few are frugivores and nectarivores. It implies that most of the study area is covered with herbaceous species and doesn't have thick and dense vegetation. In the reported list, there were 22 wetland species, of which 12 were commonly seen in the study area. Many streams, ponds and ditches are full of water during the monsoon and dry up during summer, but wetland birds rely on these sources such as a few irrigation tanks, check dams with degraded level of water including rice fields during summer. Most of the species reported are common and usually seen in other similar areas of the country. The Painted Stork *Mycertia leucocephala* belongs to the Near Threatened category of IUCN Red List. It was recorded only in a few line transects and included in the rare category of frequency in study area.

Deforestation, hunting, forest fires, encroachments of forest area were observed and these are the main reasons for the deterioration of the existing forests in the study area. All these threats must be prevented to sustain wildlife of this area. The present study is only a baseline survey, and further studies on the impact of uranium mining ore on avifauna and other wildlife must be carried out.

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Table 1. List of birds observed in the Thummalapalle Uranium mining area, Andhra Pradesh

	Common Name	Scientific Name	Status
<b>Podicipedidae</b>			
1	Little Grebe	<i>Tachybaptus ruficollis</i> (Pallas, 1764)	R, C
<b>Phalacrocoracidae</b>			
2	Little Cormorant	<i>Phalacrocorax niger</i> (Vieillot, 1817)	R, C
<b>Ardeidae</b>			
3	Little Egret	<i>Egretta garzetta</i> (Linnaeus, 1766)	R, O
4	Grey Heron	<i>Ardea cinerea</i> Linnaeus, 1758	LM, UC
5	Large Egret	<i>Casmerodius albus</i> (Linnaeus, 1758)	R, UC
6	Cattle Egret	<i>Bubulcus ibis</i> (Linnaeus, 1758)	R, C
7	Indian Pond-Heron	<i>Ardeola grayii</i> (Sykes, 1832)	R, C
<b>Ciconiidae</b>			
8	Painted Stork	<i>Mycteria leucocephala</i> (Pennant, 1769)	LM, r
<b>Threskiornithidae</b>			
9	Oriental White Ibis	<i>Threskiornis melanocephalus</i> (Latham, 1790)	LM, r
10	Black Ibis	<i>Pseudibis papillosa</i> (Temminck, 1824)	R, r
<b>Anatidae</b>			
11	Spot-billed Duck	<i>Anas poecilorhycha</i> J.R. Forster, 1781	R, C
<b>Accipitridae</b>			
12	Oriental Honey-Buzzard	<i>Pernis ptilorhynchus</i> (Temminck, 1821)	R, O
13	Black shouldered Kite	<i>Elanus caeruleus</i> (Desfontaines, 1789)	R, C
14	Black Kite	<i>Milvus migrans</i> (Boddaert, 1783)	R, C
15	Western Marsh Harrier	<i>Circus aeruginosus</i> (Linnaeus, 1758)	WM, r
16	Shikra	<i>Accipiter badius</i> (Gmelin, 1788)	R, C
<b>Phasianidae</b>			
17	Grey Francolin	<i>Francolinus pondicerianus</i> (Gmelin, 1789)	R, C
18	Jungle Bush-Quail	<i>Perdica asiatica</i> (Latham, 1790)	R, C
19	Indian Peafowl	<i>Pavo cristatus</i> Linnaeus, 1758	R, C
<b>Turnicidae</b>			
20	Barred Button – Quail	<i>Turnix suscitator</i> (Gmelin, 1789)	R, C
<b>Rallidae</b>			
21	White-breasted Waterhen	<i>Amaurornis phoenicurus</i> (Pennant, 1769)	R, C
22	Common Moorhen	<i>Gallinula chloropus</i> (Linnaeus, 1758)	R, r
23	Common Coot	<i>Fulica atra</i> Linnaeus, 1758	R, C
<b>Charadriidae</b>			
24	Red-wattled Lapwing	<i>Vanellus indicus</i> (Boddaert, 1783)	R, C

	Common Name	Scientific Name	Status
<b>Scolopacidae</b>			
25	Common Sandpiper	<i>Actitis hypoleucos</i> Linnaeus, 1758	WM, UC
<b>Recurvirostridae</b>			
26	Black winged Stilt	<i>Himantopus himantopus</i> (Linnaeus, 1758)	LM, R
<b>Pteroclididae</b>			
27	Chestnut-bellied Sandgrouse	<i>Pterocles exustus</i> Temminck, 1825	LM, r
<b>Columbidae</b>			
28	Blue Rock Pigeon	<i>Columba livia</i> Gmelin, 1789	R, C
29	Little Brown Dove	<i>Streptopelia senegalensis</i> (Linnaeus, 1766)	R, C
30	Spotted Dove	<i>Streptopelia chinensis</i> (Scopoli, 1786)	R, O
31	Eurasian Collared-Dove	<i>Streptopelia decaocto</i> (Frisvaldszky, 1838)	R, C
32	Yellow-legged Green-Pigeon	<i>Treron phoenicoptera</i> (Latham, 1790)	R, r
<b>Psittacidae</b>			
33	Rose-ringed Parakeet	<i>Psittacula krameri</i> (Scopoli, 1769)	R, C
34	Plum-headed Parakeet	<i>Psittacula cyanocephala</i> (Linnaeus, 1766)	R, UC
<b>Cuculidae</b>			
35	Pied Crested Cuckoo	<i>Clamator jacobinus</i> (Boddaert, 1783)	R, O
36	Drongo-Cuckoo	<i>Surniculus lugubris</i> (Horsfield, 1821)	R, r
37	Asian Koel	<i>Eudynamis scolopacea</i> (Linnaeus, 1758)	R, C
38	Small Green-billed Malkoha	<i>Phaenicophaeus viridirostris</i> (Jerdon, 1840)	R, UC
39	Sirkeer Malkoha	<i>Phaenicophaeus leschenaultii</i> (Lesson, 1830)	R, UC
40	Greater Coucal	<i>Centropus sinensis</i> (Stephens, 1815)	R, C
<b>Strigidae</b>			
41	Spotted Owlet	<i>Athene brama</i> (Temminck, 1821)	R, O
<b>Caprimulgidae</b>			
42	Common Indian Nightjar	<i>Caprimulgus asiaticus</i> Latham, 1790	R, C
<b>Apodidae</b>			
43	House Swift	<i>Apus affinis</i> (J.E. Gray, 1830)	R, UC
<b>Hemiprocnidae</b>			
44	Crested Tree-Swift	<i>Hemiprocne coronata</i> (Tickell, 1833)	R, UC
<b>Alcedinidae</b>			
45	Small Blue Kingfisher	<i>Alcedo atthis</i> (Linnaeus, 1758)	R, UC
46	White-breasted Kingfisher	<i>Halcyon smyrnensis</i> (Linnaeus, 1758)	R, C
47	Lesser Pied Kingfisher	<i>Ceryle rudis</i> (Linnaeus, 1758)	R, O
<b>Meropidae</b>			
48	Small Bee-eater	<i>Merops orientalis</i> Latham, 1801	R, C



	Common Name	Scientific Name	Status
<b>Coraciidae</b>			
49	Indian Roller	<i>Coracias benghalensis</i> (Linnaeus, 1758)	R, O
<b>Upupidae</b>			
50	Common Hoopoe	<i>Upupa epops</i> Linnaeus, 1758	R, C
<b>Bucerotidae</b>			
51	Indian Grey Hornbill	<i>Ocyrceros birostris</i> (Scopoli, 1786)	R, O
<b>Capitonidae</b>			
52	Coppersmith Barbet	<i>Megalaima haemacephala</i> (P.L.S. Muller, 1776)	R, UC
<b>Picidae</b>			
53	Yellow-fronted Pied Woodpecker	<i>Dendrocopos maharattensis</i> (Latham, 1801)	R, UC
54	Lesser Golden-backed Woodpecker	<i>Dinopium benghalense</i> (Linnaeus, 1758)	R, UC
<b>Alaudidae</b>			
55	Ashy-crowned Sparrow-Lark	<i>Eremopterix grisea</i> (Scopoli, 1786)	R, C
56	Rufous-tailed Finch-Lark	<i>Ammomanes phoenicurus</i> (Franklin, 1831)	R, C
<b>Hirundinidae</b>			
57	Red-rumped Swallow	<i>Hirundo daurica</i> Linnaeus, 1771	R, C
<b>Motacillidae</b>			
58	Large Pied Wagtail	<i>Motacilla maderaspatensis</i> Gmelin, 1789	R, C
59	Paddyfield Pipit	<i>Anthus rufulus</i> Vieillot, 1818	R, C
<b>Campephagidae</b>			
60	Black-headed Cuckoo-shrike	<i>Coraciana melanoptera</i> (Rupell, 1839)	R, r
61	Small Minivet	<i>Pericrocotus cinnamomeus</i> (Linnaeus, 1766)	R, r
<b>Pycnonotidae</b>			
62	Red-vented Bulbul	<i>Pycnonotus cafer</i> (Linnaeus, 1766)	R, C
<b>Irenidae</b>			
63	Common Iora	<i>Aegithina tiphia</i> (Linnaeus, 1758)	R, r
64	Jerdon's Chloropsis	<i>Chloropsis cochinchinensis</i> (Gmelin, 1788)	R, r
<b>Laniidae</b>			
65	Bay-backed Shrike	<i>Lanius vittatus</i> Valenciennes, 1826	R, C
66	Long-tailed Shrike	<i>Lanius schach</i> Linnaeus, 1758	R, C
<b>Muscicapidae</b>			
67	Oriental Magpie-Robin	<i>Copsychus saularis</i> (Linnaeus, 1758)	R, UC
68	Indian Robin	<i>Saxicoloides fulicata</i> (Linnaeus, 1776)	R, C
69	Pied Bushchat	<i>Saxicola caprata</i> (Linnaeus, 1766)	R, UC
70	Yellow-eyed Babbler	<i>Chrysomma sinense</i> (Gmelin, 1789)	R, O
71	Common Babbler	<i>Turdoides caudatus</i> (Dumont, 1823)	R, UC

	Common Name	Scientific Name	Status
72	Large Grey Babbler	<i>Turdoides malcolmi</i> (Sykes, 1832)	R, C
73	Pale-capped Babbler	<i>Turdoides affinis</i> (Jerdon, 1847)	R, C
74	Franklin's Prinia	<i>Prinia hodgsonii</i> Blyth, 1844	R, r
75	Jungle Prinia	<i>Prinia sylvatica</i> Jerdon, 1840	R, O
76	Ashy Prinia	<i>Prinia socialis</i> Sykes, 1832	R, C
77	Plain Prinia	<i>Prinia inornata</i> Sykes, 1832	R, C
78	Common Tailorbird	<i>Orthotomus sutorius</i> (Pennant, 1769)	R, r
79	Asian Brown Flycatcher	<i>Muscicapa dauurica</i> Pallas, 1811	R, UC
80	Asian Paradise-Flycatcher	<i>Terpsiphone paradisi</i> (Linnaeus, 1758)	R, r
<b>Nectariniidae</b>			
81	Purple-rumped Sunbird	<i>Nectarinia zeylonica</i> (Linnaeus, 1766)	R, C
82	Purple Sunbird	<i>Nectarinia asiatica</i> (Latham, 1790)	R, C
<b>Estrilidae</b>			
83	Red Munia	<i>Amandava amandava</i> (Linnaeus, 1758)	R, r
84	White-throated Munia	<i>Lonchura malabarica</i> (Linnaeus, 1758)	R, O
85	White-rumped Munia	<i>Lonchura striata</i> (Linnaeus, 1766)	R, r
86	Spotted Munia	<i>Lonchura punctulata</i> (Linnaeus, 1758)	R, C
87	Black-headed Munia	<i>Lonchura malacca</i> (Linnaeus, 1766)	R, r
<b>Passeridae</b>			
88	House Sparrow	<i>Passer domesticus</i> (Linnaeus, 1758)	R, C
89	Yellow-throated Sparrow	<i>Petronia xanthocolis</i> (Burton, 1838)	R, r
90	Baya Weaver	<i>Ploceus philippinus</i> (Linnaeus, 1766)	R, C
<b>Sturnidae</b>			
91	Brahminy Starling	<i>Sturnus pagodarum</i> (Gmelin, 1789)	R, O
92	Common Myna	<i>Acridotheres tristis</i> (Linnaeus, 1766)	R, C
<b>Oriolidae</b>			
93	Eurasian Golden Oriole	<i>Oriolus oriolus</i> (Linnaeus, 1758)	R, UC
94	Black-headed Oriole	<i>Oriolus xanthornus</i> (Linnaeus, 1758)	R, r
<b>Dicruridae</b>			
95	Black Drongo	<i>Dicrurus macrocercus</i> Vieillot, 1817	R, C
96	White-bellied drongo	<i>Dicrurus caeruleus</i> (Linnaeus, 1758)	R, O
<b>Corvidae</b>			
97	Indian Treepie	<i>Dendrocitta vagabunda</i> (Latham, 1790)	R, C
98	House Crow	<i>Corvus splendens</i> Vieillot, 1817	R, C
99	Jungle Crow	<i>Corvus macrorhynchos</i> Wagler, 1827	R, C

C - Common; LM - Local Migrant; O - Occasional; R - Resident; r - Rare, UC - Uncommon; WM - Winter Migrant.



Image 1. *Anas poecilorhyncha* Spot-billed Duck



Image 2. *Ardea cinerea* Grey Heron



Image 3. *Ardeola grayii* Indian Pond-heron



Image 4. *Athene brama* Spotted Owlet



Image 5. *Caprimulgus asiaticus* Common Indian Nightjar



Image 6. *Circus aeruginosus* Western Marsh Harrier



Image 7. *Clamator jacobinus* Pied Crested Cuckoo



Image 8. *Coracias benghalensis* Indian Roller





Image 9. *Corvus macrorhynchos* Jungle Crow



Image 10. *Dendrocitta vagabunda* Indian Treepie



Image 11. *Dicrurus macrocercus* Black Drongo



Image 12. *Egretta garzetta* Little Egret



Image 13. *Fulica atra* Common Coot



Image 14. *Halcyon smyrnensis* White-breasted Kingfisher



Image 15. *Hemiprocne coronata* Crested Tree-swift



Image 16. *Himantopus himantopus* Black-winged Stilt





Image 17. *Lanius schach* Long-tailed Shrike



Image 18. *Lonchura punctulata* Spotted Munia



Image 19. *Lonchura striata* White-rumped Munia



Image 20. *Merops orientalis* Small Bee-eater



Image 21. *Milvus migrans* Black Kite



Image 22. *Mycteria leucocephala* Painted Stork



Image 23. *Nectarinia zeylonica* Purple-rumped Sunbird



Image 24. *Ocyrceros birostris* Indian Grey Hornbill





Image 25. *Oriolus oriolus* Eurasian Golden Oriole



Image 26. *Perdicula asiatica* Jungle Bush-Quail



Image 27. *Taccocua leschenaultii* Sirkeer Malkoha



Image 28. *Phaenicophaeus viridirostris* Small Green-billed Malkoha



Image 29. *Phalacrocorax niger* Little Cormorant



Image 30. *Ploceus philippinus* Baya Weaver



Image 31. *Prinia socialis* Ashy Prinia



Image 32. *Psittacula krameri* Rose-ringed Parakeet





Image 33. *Pterocles exustus* Chestnut-bellied Sandgrouse



Image 34. *Pycnonotus cafer* Red-vented Bulbul



Image 35. *Saxicoloides fulicata* Indian Robin



Image 36. *Streptopelia chinensis* Spotted Dove



Image 37. *Streptopelia decaocto* Eurasian Collared-Dove



Image 38. *Terpsiphone paradisi* Asian Paradise-Flycatcher



Image 39. *Turdoides malcolmi* Large Grey Babbler



Image 40. *Vanellus indicus* Red-wattled Lapwing