

Avian and wildlife diversity in the area of bauxite mining near lamba village, Dwarka in the state of Gujarat, India

Abstract

The bauxite is the primary ore of aluminum. Almost all of the aluminum that has ever been produced has been extracted from bauxite. The area in question is rich in bauxite and lime. The mining activity increasing day by day which hinder the movement of wildlife especially birds. The area of bauxite mining is proximity to sea shore and major creek. In this study, 38 birds species (1 species protected under schedule –I as per Indian Wildlife Protection Act 1972), 10 species of reptiles, 5 species of mammals, 13 species of marine fishes were observed.

Keywords: bauxite mining, core zone, buffer zone, mining, avian–biodiversity

Volume 3 Issue 3 - 2018

Ashok K Rathoure

Ecology & Biodiversity Expert, Ecosystem Resource Management Pvt. Ltd., India

Correspondence: Ashok K Rathoure, Ecology & Biodiversity Expert, Ecosystem Resource Management Pvt. Ltd., Hardoi–241001 (UP), India, India, Tel +91 94 5050 1471, Email asokumr@gmail.com

Received: May 11, 2018 | **Published:** June 04, 2018

Introduction

The avian and wildlife biodiversity of an area depends on several factors of biotic and abiotic components. The coastal areas are rich in avian biodiversity especially sea birds. The mining activity hinders the movement of avian fauna. The bauxite mining activity increasing as demand increased of bauxite for the industrial use. The unorganized and unscientific industrial activities lead the deterioration of abiotic components which affect biotic components. Study area (Figure 1) comprises of 30% Sea, 29% cropping (dominant crop is ground nut), 9% Grassland, 7% fallow land, 5% stone (mainly bauxite), 2% Forest area, 1% human settlement and other area which is dry. The main activity in this area is mining of bauxite mineral as the area is rich in

bauxite and lime.

Methodology

The detailed method and parameters covered for the said study has been highlighted in Table 1. The study area comprises of 8 villages viz. Lamba, Maleta, Navedra, Jodhpur, Gangdi, Satapar, Chachlana, Jamdevliya (Figure 1). Secondary sources and literature was reviewed to identify the representative variety of vulnerable species, inhabitants and ecological groups listed by IUCN, WCMC, ZSI, BSI and Indian Wild life Protection Act, 1972.^{1–26} The status of individual species was assessed using the revised IUCN/SSC category system (Table 1) (Figure 1).^{27–35}

Table 1 Mode of Data collection and Parameters considered during the Survey

Data	Mode of Data Collection	Parameters Monitored	Remarks
Primary data collection	By Field Survey	<ul style="list-style-type: none"> –Reptiles, –Amphibians, –Birds, –Fresh water fishes –Mammals, –Butterflies. Rare and Endangered fauna in the study area, Endemic fauna in the study area, Wild life and their conservation importance in the study area.	Random survey, opportunistic observations, diurnal bird observation, active search for reptiles, faunal habitat assessment, active search for microhabitat, scats, foot prints, animal call, pug marks, debarking sign, Nesting, Claws, Dung, etc. and information from local villagers. ^{12–26}
Secondary data collection	Forest Division Data of Fisheries department. Literature like research papers, books published by research/ academic institutions.	Interpretation of secondary data for Ecological Sensitive Areas such as national forests, wild life sanctuaries, lakes, ravines, hills, hillocks and reserve forest, importance etc.	The status of individual species was assessed using the revised IUCN/SSC category system. ^{27–35}

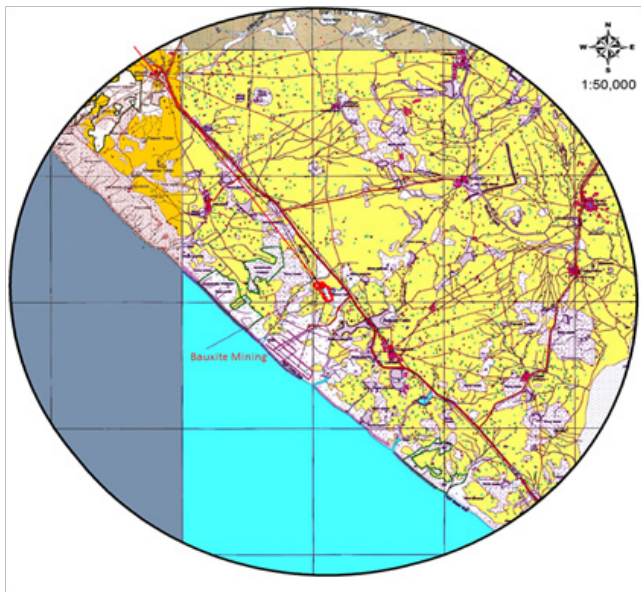


Figure 1 Study area Map.

Results and discussion

As per the map prepared by National Bureau of Soil Survey & Land Use Planning (NBSS&LUP), the study area fall under Central Malwa Highlands, Gujarat Plains and Kathiawar Peninsula which represents hot semi-arid eco-region with medium and deep black soils favorable for millets, wheat, pulses. In this area the agro-biodiversity should be promoted. As per the personal observation recorded (Figure 2), the area has scarcity of drinking water, the vegetation in the area is sparsely distributed, road side plantation and natural creek (mangrove) making the area green for avian wildlife.



Figure 2 Glimpses of Local information and Confirmation from villagers.

Status of the forest

The forest areas of Gujarat are unevenly distributed. The major concentration of forests is found all along the eastern border of the state and the hilly portion of Saurashtra. The wide variations in Geophysical and Eco-climatic conditions ranging from hot saline

deserts to humid hilly tracts and from coast to high hills have resulted in to formation of various types of forest. No forest land is involved within the mine lease area; however it is present in the study area. On the basis of forest classification by Champion and Seth 1968, tropical dry deciduous forest exists in the study area. In this type of forest vegetation developed due to they have long dry seasons which last several months and vary with geographic location. The common trees are the teak and a variety of acacia. However, vegetation in core area of mine is very sparsely distributed. As per revenue record and toposheet (SOI), there is a reserved forest (open scrub) for stony waste area. This can be classified under open scrub. This is open and having no vegetation currently, reserved for bauxite mineral.

Avian biodiversity

The 38 avian species were encountered during the survey. The most commonly spotted bird species of this area were *Accipiter badius* (Gmelin, 1788), *Acridotheres ginginianus* (Latham 1790), *Bubulcus ibis* (Linnaeus, 1758), *Dicrurus macrocercus* (Vieillot, 1817), *Merops leschenaulti* (Vieillot, 1817), *Phalacrocorax fuscicollis* (Stephens, 1826), *Psittacula krameri* (Scopoli, 1769), *Vanellus indicus* (Boddaert, 1783), *Muscicapa striata* (Pallas, 1764). Water birds are very common as creek and sea shore line is the major part falls under study area. The Indian Peafowl was observed which is listed as schedule –I as per IWPA, 1972 and others listed as schedule IV as per IWPA, 1972. Total 38 avian species encountered during the study listed in Table 2.

R–Resident, M– Migratory, RM – Resident & Migratory

Wildlife: In amphibian group, the toads were sighted during the study period. In the reptile group, *Calotes versicolor* (Cuvier, 1817), *Hemidactylus flaviviridis* (Ruppell, 1835), *Sitana ponticeriana* (Cuvier, 1817), *Bungarus caeruleus* (Schneider, 1801) etc. were observed in the region is given in the Table 3. In the mammals; *Funambulus pennantii* (Wroughton, 1905), *Pteropus giganteus* (Brünnich, 1782), *Lepus nigricollis* (F. Cuvier, 1823), *Boselaphus tragocamelus* (Pallas, 1766) and *Herpestes javanicus* (Geoffroy Saint-Hilaire, 1818) were observed in the study area are listed in the Table 4. The marine fishes *Pampus chinensis* (Bonaparte, 1834), *Penaeus indicus* (Milne-Edwards, 1837), *Mugil cephalus* (Linnaeus, 1758), *Mugil dussumieri* (Linnaeus, 1758), *Harpodon neherius* (Hamilton, 1822), *Polynemus indicus* (Linnaeus, 1758), *Tenulosa ilisha* (Hamilton, 1822) etc. are encountered in the coastal area (Figure 3) listed in Table 5.

Domestic animals: Camel, Bull, Buffalo, Sheep, Cow, Goat, etc.

Insects: like Wasps, Honeybees and Signature spider was also recorded (Figure 2) (Figure 3).

RET species: The IUCN Red List is the world's most comprehensive inventory of the global conservation status of plant and animal species. It uses a set of criteria to evaluate the extinction risk of thousands of species and subspecies. Among the birds in the study area, Pea fowl (*Pavo cristatus*) is included in schedule I of Wild life protection Act (1972), while many other birds are included in schedule IV. Among the reptiles *Xenochrophis piscator* (Schneider, 1799), *Naja naja* (Linnaeus, 1758), *Bungarus caeruleus* (Schneider, 1801) and *Daboia russelli* (Shaw & Nodder, 1797) provided protection as per Schedule-II of Indian Wild life Protection Act, (1972). In the mammal group, *Herpestes javanicus* (Geoffroy Saint-Hilaire, 1818) is protected under schedule-II while others are not covered under schedule-I or II as per Indian Wild life Protection Act, (1972).

Table 2 Avian Biodiversity in the area

SNO	Family	Common Name	Scientific Name	Schedule/IUCN	Status
		Shikra	<i>Accipiter badius</i> (Gmelin, 1788)	Schedule IV	R
1	Accipitridae	Imperial Eagle	<i>Aquila heliaca</i> (Saigny, 1809)	Vulnerable	R
		Black-winged Kite	<i>Elanus caeruleus</i> (Desfontaines, 1789)	Schedule IV	R
2	Alaudidae	Oriental Sky Lark	<i>Alauda gulgula</i> (Franklin, 1831)	Schedule IV	M
3	Alcedinidae	White-throated Kingfisher	<i>Halcyon smyrnensis</i> (Linnaeus, 1758)	Schedule IV	R
		Indian pond heron	<i>Ardeola grayii</i> (Sykes, 1832)	Schedule IV	R
4	Ardeidae	Cattle Egret	<i>Bubulcus ibis</i> (Linnaeus, 1758)	Schedule IV	RM
		Little Egret	<i>Egretta garzetta</i> (Linnaeus, 1766)	Schedule IV	R
5	Charadriidae	Lapwing	<i>Vanellus indicus</i> (Boddaert, 1783)	Schedule IV	R
6	Ciconiidae	Painted Stork	<i>Mycteria leucocephala</i> (Pennant, 1769)	Schedule IV	RM
		Eurasian Collared-Dove	<i>Streptopelia decaocto</i> (Frisvoldszky, 1838)	Schedule IV	R
7	Columbidae	Rufous Turtle Dove	<i>Streptopelia orientalis</i> (Latham, 1790)	Schedule IV	RM
8	Coraciidae	Indian Roller	<i>Coracias benghalensis</i> (Linnaeus, 1758)	LC	R
		Crow-Pheasant	<i>Centropus sinensis</i> (Stephens, 1815)	LC	R
9	Cuculidae	Blue Rock Pigeon	<i>Columba livia</i> (Gmelin, 1789)	LC	R
10	Dicruridae	Black drongo	<i>Dicrurus macrocercus</i> (Vieillot, 1817)	LC	R
11	Laniidae	Great Grey Shrike	<i>Lanius excubitor</i> (Linnaeus, 1758)	Schedule IV	RM
12	Laridae	Little Tern	<i>Sternula albifrons</i> (Pallas, 1764)	LC	R
13	Leiotrichidae	Common Babbler	<i>Turdoides caudatus</i> (Dumont, 1823)	Schedule IV	R
14	Meropidae	Chestnut-headed Bee-eater	<i>Merops leschenaulti</i> (Vieillot, 1817)	LC	R
15	Motacillidae	Yellow Wagtail	<i>Motacilla flava</i> (Linnaeus, 1758)	Schedule IV	RM
16	Muscicapidae	Spotted Flycatcher	<i>Muscicapa striata</i> (Pallas, 1764)	Schedule IV	R
17	Nectariniidae	Purple Sunbird	<i>Nectarinia asiatica</i> (Latham, 1790)	Schedule IV	R
18	Passeridae	House sparrow	<i>Passer domesticus</i> (Linnaeus, 1758)	LC	R
		Cormorant	<i>Phalacrocorax fuscicollis</i> (Stephens, 1826)	Schedule IV	R
19	Phalacrocoracidae	Little Cormorant	<i>Phalacrocorax niger</i> (Vieillot, 1817)	Schedule IV	RM
20	Phasianidae	Indian Peafowl	<i>Pavo cristatus</i> (Linnaeus, 1758)	Schedule I	R
21	Phoenicopteridae	Lesser Flamingo	<i>Phoenicopterus minor</i> (Geoffroy Saint-Hilaire, 1798)	Schedule IV	RM
22	Ploceidae	Baya weaver	<i>Ploceus philippinus</i> (Linnaeus, 1766)	Schedule IV	R
23	Podicipedidae	Little Grebe	<i>Tachybaptus ruficollis</i> (Pallas, 1764)	Schedule IV	R
24	Psittacidae	Rose-ringed Parakeet	<i>Psittacula krameri</i> (Scopoli, 1769)	Schedule IV	R
		White-breasted Water hen	<i>Amaurornis phoenicurus</i> (Pennant, 1769)	Schedule IV	R
25	Rallidae	Coot	<i>Fulica atra</i> (Linnaeus, 1758)	Schedule IV	R
26	Scolopacidae	Ruff	<i>Philomachus pugnax</i> (Linnaeus, 1758)	LC	R
27	Sturnidae	Bank Myna	<i>Acridotheres ginginianus</i> (Latham 1790)	Schedule IV	R
		Eurasian Spoonbill	<i>Platalea leucorodia</i> (Linnaeus, 1758)	Schedule IV	P
28	Threskiornithidae	Red-naped ibis	<i>Pseudibis papillosa</i> (Temminck, 1824)	Schedule IV	R
		Black headed ibis	<i>Throskiornis melanocephalus</i> (Latham, 1790)	Schedule IV	M

Table 3 List of Reptiles in the Study Area

SNO	Family	Common Name	Scientific Name	Schedule as per 1972
1	Agamidae	Common Garden Lizard	<i>Calotes versicolor</i> (Cuvier, 1817)	Not listed
		Fan-Throated Lizard	<i>Sitana ponticeriana</i> (Cuvier, 1817)	Not listed
2	Agamidae	Roux's Forest Lizard	<i>Calotes rouxii</i> (Dumeril and Bibron, 1837)	Not listed
3	Chamaeleonidae	Indian Chameleon	<i>Chameleon zeylanicus</i> (Rafinesque, 1815)	Not listed
4	Colubridae	Checked Keelback	<i>Xenochrophis piscator</i> (Schneider, 1799)	Schedule II
5	Elapidae	Indian Cobra	<i>Naja naja</i> (Linnaeus, 1758)	Schedule II
		Common Indian Krait	<i>Bungarus caeruleus</i> (Schneider, 1801)	Schedule II
6	Gekkonidae	House Gecko	<i>Hemidactylus flaviviridis</i> (Ruppell, 1835)	Not listed
7	Viperidae	Indian Saw Scaled Viper	<i>Echis carinatus</i> (Schneider, 1801)	Not listed
8		Russell's Viper	<i>Daboia russelli</i> (Shaw & Nodder, 1797)	Schedule II

Table 4 Mammals in Study Area

SNO	Family	Common Name	Scientific Name	Status as per IWPA 1972/IUCN
1	Antilopinae	Blue Bull	<i>Boselaphus tragocamelus</i> (Pallas, 1766)	Schedule III
2	Herpestidae	Small Asian mongoose	<i>Herpestes javanicus</i> (Geoffroy Saint-Hilaire, 1818)	Schedule II
3	Leporidae	Indian Hare	<i>Lepus nigricollis</i> (F. Cuvier, 1823)	Schedule IV
4	Pteropodidae	Indian flying fox/Fruit bat	<i>Pteropus giganteus</i> (Brünnich, 1782)	LC
5	Sciuridae	Five striped Palm Squirrel	<i>Funambulus pennantii</i> (Wroughton, 1905)	Schedule IV

Table 5 List of Marine Fish

SNO	Family	Common Name	Scientific Name
1	Clupeidae	Hilsa shad	<i>Tenulosa ilisha</i> (Hamilton, 1822)
2	Mugilidae	Blue Spot Grey Mullet	<i>Valamugil seheli</i> * (Forsskal, 1775)
3		Grey Mullet	<i>Mugil cephalus</i> (Linnaeus, 1758)
4		Mullet	<i>Mugil dussumieri</i> (Linnaeus, 1758)
5	Penaeidae	Indian Prawn	<i>Penaeus indicus</i> (Milne-Edwards, 1837)
6	Polynemidae	Thread Fin	<i>Polynemus indicus</i> (Linnaeus, 1758)
7	Stromateidae	Pomfret	<i>Pampus chinensis</i> (Bonaparte, 1834)
8	Synodontidae	Bombay Duck (Bumla)	<i>Harpodon neherius</i> (Hamilton, 1822)
9	Sciaenidae	Jewfish	<i>Pseudosciaena amblyceps</i> (Bleeker, 1863)
10			<i>Argyrosomus japonicus</i> (Temminck & Schlegel, 1844)
11			<i>Protonibea diacanthus</i> (Lacepede, 1802)

*not seen directly



Figure 3 Marine view at Sea Shore near the Lamba Village.

Conclusion

Study area has 30% sea shore and 70% terrestrial. No any major forest observed in the study area, the wild life distribution is meager. The wildlife can sustain when human influence will be minimized and agro-forestry will be encouraged. An urgent need to protect agro-biodiversity of the area by using good practice in bauxite mining such as controlled wet blasting, 5m high boundary on periphery of mining area; regular water sprinkling and manual mining instead of mechanized mining, plantation over benches, grooves development, rainwater harvesting and its use in irrigation and restoration of mine pits. The effective plantation should be done in 3 tier green belt development to protect the avian biodiversity of the area.

Acknowledgements

None.

Conflict of interest

Author declared that he has no conflict of interest.

References

1. Bentham G, Hooker JD. *Genera plantarum*. London: L Reeve and Co; 1862.
2. Welsh BHH. Monitoring herpetofauna in woodlands of north western California and south west Oregon: a comparative strategy. *AGRIS*. 1987.
3. Hartwell H Welsh, Amy J Lind. The structure of the herpetofaunal assemblage in the Douglas-fir/hardwood forests of northwestern California and south western Oregon. *USDA*; 1991.
4. Wilson DE, Reeder DM. *Mammal Species of the World a Taxonomic and Geographic reference*. 2nd ed. Washington: Smithsonian Institution Press; 1993.
5. Wilson DE, Reeder DM. *Mammal Species of the World. A Taxonomic and Geographic Reference*. 3rd ed. Baltimore: Johns Hopkins University Press; 2005.
6. Thommpson FID, Davidson IJ, O Donnell S, et al. Use of track transects to measure the relative occurrence of some arboreal mammals in uncut forest and regeneration stands. *Canadian Journal of Zoology*. 1989;(67):1816–1823.
7. Vijaya Sankar R, Ravikumar R, Ganesh Babu NM. On the collection of a Peninsular Endemic, *Barleria stocksii* (Acanthaceae), after a century. *Zoo's Print*. 2005;(20):1820.
8. Rathoure Ashok K. Ecological status around Victor Port, Rajula Taluka, District Amreli in the State of Gujarat. *Oct Jour Env Res*. 2017;5(2):82–105.
9. Rathoure Ashok K. Terrestrial and Marine ecological status around Pindara jetty in Devbhoomi Dwarka, Gujarat. *Oct Jour Env Res*. 2018;6(1):6–30.
10. Ashok K Rathoure. Ecological status around Sanghipuram, Abdasa Taluka, District Kutch Bhuj in the State of Gujarat. *Oct Jour Env Res*. 2017;5(3):182–205.
11. Rathoure Ashok K. Fern Biodiversity at Nagaon District of Assam. *Oct Jour Env Res*. 2017;5(4):251–257.
12. Batten SD, Clarke R, Flinkman J. CPR sampling: the technical background, material and methods, consistency and comparability. *Progress in Oceanography*. 2003;58:193–215.
13. The Birdlife checklist of the birds of the world, with conservation status and taxonomic sources. UK: Birdlife International; 2004.
14. *State of the World's Birds 2004—Indicators for our changing world*. UK: Birdlife International; 2004.
15. *Threatened Birds of the World 2004. CD-ROM*. UK: Birdlife International; 2004.
16. *Threatened Birds of the World*. UK: Lynx Edicions and Birdlife International, Barcelona and Cambridge; 2000.
17. IUCN. *Guidelines for Using the IUCN Red List Categories and Criteria*. Standards and Petitions Subcommittee of the IUCN Species Survival Commission; 2010.
18. *Red List of Threatened Species*. IUCN; 2008.
19. IUCN. *Guidelines for Application of IUCN Red List Criteria at Regional Levels*. UK: IUCN Species Survival Commission; 2003.
20. IUCN. *IUCN Red List Categories and Criteria: Version 3.1*. UK: IUCN Species Survival Commission. IUCN, Gland; 2001.
21. IUCN. *IUCN Red List Categories, prepared by the IUCN Species Survival Commission*. IUCN; 1994.
22. Kumar Ashok, Aggarwal Savita Goyal. Ecology and Biodiversity status of Sachin gidc and its surroundings with Special reference to Conservation measures for Indian Peafowl (*Pavo cristatus*) schedule –I Bird species. *Oct Jour Env Res*. 2013;2(1):82–100.
23. Kumar Ashok, Aggarwal Savita Goyal. Study of Common Property Resources (Cpr) With Special Reference To Water And Biological Resources At Projected Area Near Village Ninat, Bardoli, District–Surat. *Oct. Jour. Env. Res*. 2013;1(4): 319–331.
24. Kumar Ashok, Eledath Manoj. Baseline status for Flora and Fauna with aquatic biodiversity in Dahej area, district Bharuch Gujarat. *Oct Jour Env Res*. 2015;3(1):80–93.
25. Kumar Ashok, Srivastava Meena. Diversity of medicinal Plants in Uttarakhand and their conservation Strategy with special reference to Orchids. *Proceeding of National Conference on Environmentla Health: Challaneges and Management*. Lucknow: Pt Deendayal Upadhyay Govt, PG College Rajajipuram; 2012. p. 139–142.
26. Kumar Ashok, Srivastava Meena, Goyal Savita. The Biodiversity at Sandi Bird Sanctuary, Hardoi with Special Reference to Migratory Birds. *Oct Jour Env Res*. 2013;1(3): 173–181.
27. Kumar Ashok. Butterfly (Lepidoptera: Insecta) Diversity from Different Sites of Jhagadia, Ankleshwar, District–Bharuch, Gujarat. *Oct Jour Env Res*. 2013;1(1):9–18.
28. Kumar Ashok. Cumulative baseline status for Flora and Fauna with Ecological Impact Assessment for Sand Mining projects at Yamuna River in Sonapat and Baghpat Area. *Oct Jour Env Res*. 2015;3(2):167–184.
29. Kumar Ashok. Environmental Management Plan for Chemical Industries Especially Resin Manufacturing Unit. *Oct Jour Env Res*. 2014;2(3):262–273.
30. Kumar Ashok. Wild life conservation plan with special reference to Indian Elephant and Dhole (Wild Dog) around 5 mining sites in Behat, Saharanpur (UP). *Oct Jour En Res*. 2015;3(3):244–258.
31. Misra R. *Ecology Workbook*. Scientific Publishers; 2013.
32. Rathoure AK. Ecological status for Ratapani wild life sanctuary, Raisen (MP) India. *BIJ*. 2018;2(2):179–196.
33. Rathoure, Ashok K. Conservation Measures for Monkey (*Macaca mulatta*) and Languor (*Presbytis entellus*). *Oct Jour Env Res*. 2016;3(4):308–316.
34. World Conservation Monitoring Centre. *The Conservation of Biological Diversity*. UK: WCMC; 1988.
35. Groombridge B, Jenkins. *Global Biodiversity: Earth's living resources in the 21st Century*. UK: World Conservation Press; 2000.