GREEN AUDIT REPORT

(Jan 2020)

A-13/1 South Side G.T Road, NH-9, By Pass, Industrial Area, Ghaziabad, Uttar Pradesh 201010

Audit Conducted by:

EFS Engineering Facility Services

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1. Acknowledgement

EFS Engineering Facility Services acknowledges the cooperation and support of the management and staff of **IPEM Law Academy**, in particular, the support and disposition of the Energy Audit Coordinator - Ms. Neha Garg, Environment Audit Coordinator – Mr. Neeraj Sharma & Green Audit Co-coordinator – Ms. Sonam Singh & Teaching & Supporting Staff of Academy has been invaluable to the success of this report. EFS Engineering Facility Services wishes to stress that in line with its policy, all information obtained in the course of this Audit exercise as well as those contained in this report will be accorded the strictest confidentiality.

2. Executive Summary

The rapid urbanization and economic development at local, regional and global level has led to several environmental and ecological crises. On this background it becomes essential to adopt the system of the green campus for the institute which will lead to sustainable development. Law Academy is deeply concerned and unconditionally believes that there is an urgent need to address these fundamental problems and reverse the trends. Being a premier institution of higher studies, the college has initiated 'The Green Campus' programmed few years back that actively promote the various projects for the environment protection and sustainability.

The purpose of this audit was to ensure that the practices followed in the campuses are in accordance with the green policy adopted by the institution, it works on several facets of Green Campus including water conservation, electricity conservation, tree plantation, waste management, paperless work, mapping of biodiversity. With this in mind, the specific objectives of the audit are to evaluate the adequacy of the management control framework of environment sustainability as well as the degree to which the departments are in compliance with the applicable regulations, policies and standards. It can make a tremendous impact on students' health and learning, college operational costs and the environment. The criteria, methods and recommendation used in the audit were based on the identified risks.

3. Introduction

Environmental or Green Audit is a systematic, documented, periodic and objective review by regulated entities of facility operations and practices related to meeting environmental requirements (EPA, 2003). In other words, it is a management tool comprising of systematic, documented, periodic and objective evaluation of organization, which management and equipment are performing with the aim of helping to safeguard the environment by facilitating management control of practices and assessing compliance with company policies which would include regulatory requirements and standards applicable (International Chamber of Commerce, 1989).

Environmental auditing is essentially an environmental management tool for measuring the effects of certain activities on the environment against set criteria or standards. Depending on the types of standards and the focus of the audit, there are different types of environmental audit. Organizations of all kinds now recognize the importance of environmental matters and accept that their environmental performance will be scrutinized by a wide range of interested parties. Environmental auditing is used to investigate, understand and identify.

4. Utility of Green Auditing

These are used to help improve existing human activities, with the aim of reducing the adverse effects of these activities on the environment. An environmental auditor will study an organization's environmental effects in a systematic and documented manner and will produce an environmental audit report.

5. Objectives of the Study

The main objectives of the green audit are to promote the environment management and conservation in the college campus. The purpose of the audit is to identify, quantify, describe and prioritize the framework of environment sustainability in compliance with the applicable regulations, policies and standards. The main objectives of carrying out green audit are -

- To introduce and make aware students to real concerns of environment and its sustainability.
- To secure the environment and cut down the threats posed to human health by analyzing the pattern and extent of resource use on the campus.
- To establish a baseline data to assess future sustainability by avoiding the interruptions in environment that are more difficult to handle and their corrections requires high cost.
- To bring out a present status report on environmental compliance.

6. Methodology

In order to perform green audit the methodology included different techniques such as physical inspection of the campus, observation and review of the documentation, interviewing key persons and data analysis, measurements and recommendations. The study covered the following area to summarize the present status of environment management in the campus:

- Water quality assessment, consumption and management
- Air quality assessment and management
- Electricity consumption and management
- Sound pollution monitoring
- Waste management
- Biodiversity status of thecampus

7. Water Consumption & Management

Total Number of Taps in Campus

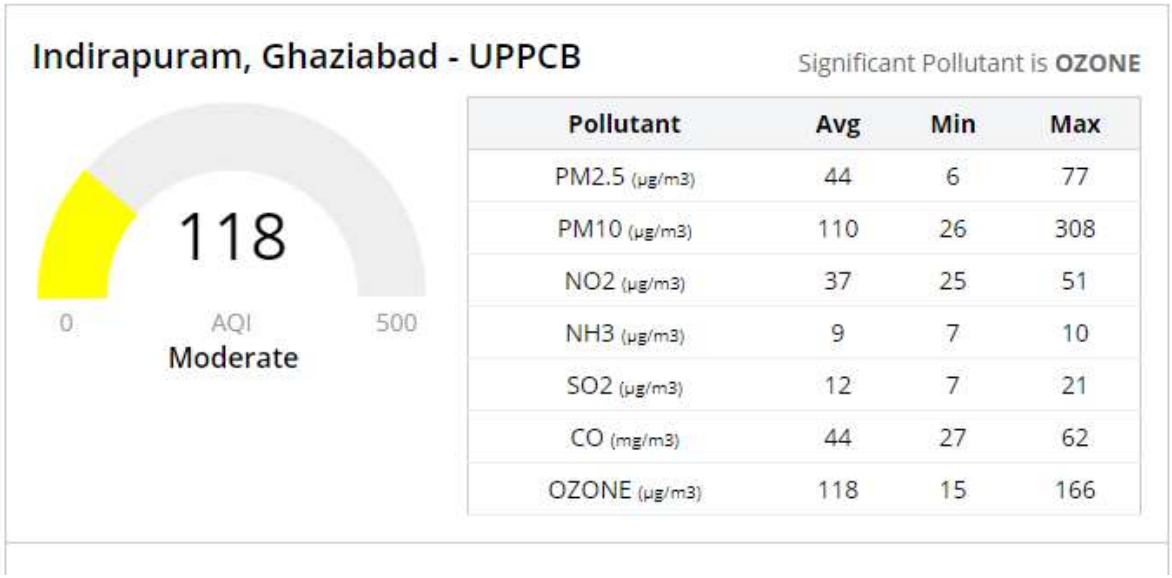
Location	UOM	Urinal Qty.	Washroom Tap	Bathroom Tap	Water Cooler	Washbasin Tap
Boys Hostel	Nos	2	5	4	1	
Girls Hostel	Nos	2	5	4	1	
Law College Common Canteen Ground Floor	Nos	4	2			4
Law College 1st Floor	Nos	2	5		1	8
Secretary Room	Nos		2			
Management College 1st Floor	Nos	5	3		1	6

Comments

Approximate per capita average consumption and usage per day is 18.6 L of water.

8. Air Quality Monitoring

Since air quality plays a vital role for good health. Air Quality monitoring instrument is used to monitor quarterly the criteria pollutants. The most important air quality parameters, which are measured, are Humidity, PM 2.5 & PM 10. The other criteria pollutants such as Ozone, Carbon Monoxide, NO2, SO2 and Lead are not measured because there are no nearby Industries located near the institute, which are emitting these pollutants. Noise equally plays a vital role in the environment, hence noise measurement are also done at the institute quarterly.



Pollutant	Avg	Min	Max
PM2.5 (µg/m3)	44	6	77
PM10 (µg/m3)	110	26	308
NO2 (µg/m3)	37	25	51
NH3 (µg/m3)	9	7	10
SO2 (µg/m3)	12	7	21
CO (mg/m3)	44	27	62
OZONE (µg/m3)	118	15	166

9. Electricity Consumption (in Units) and Management

Dec-19	7815
Nov-19	7269
Oct-19	12410
Sep-19	22222
Aug-19	19162
Jul-19	15916
Jun-19	11398
May-19	23674
Apr-19	20461
Mar-19	10468
Feb-19	9414
Jan-19	10726

10. Total electricity consumption per year

Yearly Electrical Consumption (Pashchimanchal Bijli Bitran Nigam Limited): 42153 KWH & solar power generation for same period is 170935 KWH

Comments

Approximate per capita average consumption per month is 150.3 units (Including solar power generation and Pashchimanchal Bijli Bitran Nigam Limited).

11. Sound Pollution Monitoring

The human ear is constantly being assailed by man-made sounds from all sides, and there remain few places in populous areas where relative quiet prevails. There are two basic properties of sound, (1) loudness and (2) frequency. Loudness is the strength of sensation of sound perceived by the individual. It is measured in terms of Decibels. Just audible sound is about 10 dB, a whisper about 20 dB, library place 30 dB, normal conversation about 35-60 dB, heavy street traffic 60-0 dB, boiler factories 120 dB, jet planes during take-off is about 150 dB, rocket engine about 180 dB . The loudest sound a person can stand without much discomfort is about 80 dB. Sounds beyond 80 dB can be safely regarded as Pollutant as it harms hearing system. The WHO has fixed 45 dB as the safe noise level for a city. For international standards a noise level up to 65 dB is considered tolerate. Loudness is also expels. One some equals the loudness of 40 dB sound pressure at 1000 Hz. Frequency is defined as the number of vibration per second. It is denoted as Hertz (Hz). Sound pollution is another important parameter that is taken into account for green auditing of the College Campus. Different sites were chosen for the monitoring purpose.

Noise Meter

Measured value of sound db is as under details:

S NO	Location Name	Sound
1	G Floor Director room	52
2	Office	55
3	Girls Common Room	58
4	Faculty Room	53
5	Principal Room/General Office	50
6	Class Room -2106	53
7	Class Room -2107	52

S NO	Location Name	Sound (db)
8	Class Room -2108	55
9	Low Canteen	54
10	Low Staff Canteen	52
11	1St Floor Class Room -2201	54
12	1St Floor Class Room -2202	52
13	1St Floor Class Room -2203	50
14	1St Floor Class Room -2204	53
15	1St Floor Class Room -2205	55
16	1St Floor Class Room -2206	54
17	1St Floor Class Room -2207	55
18	1St Floor Class Room -2208	52
19	Moot Room	55
20	Faculty Room	58
21	2nd Floor Library	53
22	2nd Floor Class Room -2301	50
23	2nd Floor Class Room -2302	53
24	2nd Floor Class Room -2303	54
25	2nd Floor Class Room -2304	55
26	2nd Floor Class Room -2305	53
27	2nd Floor Class Room -2306	52
28	2nd Floor Class Room -2307	55
29	2nd Floor Class Room -2308	50
30	Faculty Room	54

12. Waste Disposal

Waste disposal include the activities and actions required to manage waste from its inception to its final disposal. This includes the collection, transport, treatment and disposal of waste, together with monitoring and regulation of the waste management process.

Waste can be solid, liquid, or gas and each type have different methods of disposal and management. Waste management deals with all types of waste, including industrial, biological and household. In some cases, waste can pose a threat to human health. Waste is produced by human activity, for example, the extraction and processing of raw materials. Waste management is intended to reduce adverse effects of waste on human health, the environment or aesthetics.

Waste management practices are not uniform among countries (developed and developing nations) regions (urban and rural areas), and residential and industrial sectors can all take different approaches.

A large portion of waste management practices deal with municipal solid waste (MSW) which is the bulk of the waste that is created by household, industrial, and commercial activity.

For this purpose Law Academy has employed waste bins for proper segregation of solid wastes in the campus. It includes provision for plastic/glass waste, food waste and metal/e-waste in a single compact system.

Number of dust bin at college listed below:

Sr. No.	Descriptions	UOM	No. of dustbin
1	Office Dustbin	Nos	40
2	Big Dust bin	Nos	10
Total			**50**

Along with the data of no. of dustbins placed in the campus, the data of the total solid waste generated and managed by the institution is also provided which is mentioned as follows-

Wet waste generation: 6.5 Kg/day

Dry waste generation: 6.5 Kg/day

13. STATUS OF FLORA AND FAUNA IN THE STUDY AREA

Total 287 trees are planted in IPEM Law Academy campus.

INTRODUCTION

The ecology is the scientific analysis and study of interactions among organisms and their environment. It is an interdisciplinary field that includes biology and Earth science. The biodiversity and conservation discipline explore natural landscapes, species and ecosystems and acquires theories and practical methods in preserving environments and organisms. Biodiversity refers not only to endangered species but also to every organism, including microbes and fungi. Biodiversity and conservation program increase awareness.

FLORA

Flora of the Core Zone

During survey herbs and shrubs observed in and around the Ghaziabad area are *Calotropis procera, Tridax procumbens, Argemone mexicana, Laptodenia, Tephrosea, zyziphus, Tribulus terrestris, Parthenium hysterophorus, Sida acuta, Cassia tora, Datura stramonium* etc.

Flora of the Buffer zone

The major land use of the study area is built up land in association with water, vegetation and vacant lands, Land with or without scrub, Fallow land, Dense Evergreen vegetation and Water bodies. The vegetation of the buffer zone of the study area can be classified into fairly dense vegetation at some patches dominated by tree species like *Azadirachta indica*, *Dalbergia sissoo, Mangifera indica, Bombax Ceiba, Albezia lebbek, Acacia albida, Propsopis cineraria, Holoptalia integrifolia, Acacia tonalis, Acacia nilotica, Pongamia pinnata, Prosopis juliflora, Syzygium cumini, Ziziphus mauritiana, Zizyphus xylopyra* etc.

Dominant tree species observed in the study area are Kikar or Babul (*Acacia nilotica*), *Acacia tonalis*, *Holoptalia integrifolia*, Neem (*Azadirachta indica*), Shisham (*Dalbergia sissoo*), Pipal (*Ficus religiosa*), Aam (*Mangifera indica*), Jamun (*Syzygium cumini*), Imli (*Tamarindus indica*), Banyan (*Ficus indicus*), Ber (*Zizyphus mauritiana*), Khara Jal (*Salvador persica*), Semul, Khejri (*Prosopis cineraria*), Lasura (*Cordia dichotoma*), Amla, Dhak (*Butea frondosa*), Shahtoot (*Morus alba*), eucalyptus, Amrood (*Psidium guajava*), and Papri (*Holoptalia*).

Some small tree species observed in the study area are *Careya arboreal, Holarrhena antidysenterica, Zizyphus mauritiana* etc.

Species of Shrubs species observed in the study area are *Adhatoda sp., Callicarpa macrophylla, Carissa opaca, Clerodendron viscosum, Euphorbia royleana, Ixora sp., Murraya sp., Zizyphus sr. etc.* Species of Grasses observed in the study area are *Chrysopogon sp., Cymbopogon martini, Heteropogon contortus, Saccharum spontaneum, Vetiveria zizanioides* etc.

Sr. No.	Botanical Name	Common Name	Family
Trees			
1.	*Acacia leucophloea*	Harmo	Fabaceae
2.	*Acacia nilotica*	Desibaval	Fabaceae
3.	*Acacia Senegal*	Khairi	Fabaceae
4.	*Acacia albida*	Ronjh	Fabaceae
5.	*Acacia tortalis*	Israeli Kikar	Fabaceae
6.	*Aegle marmelos*	Bel	Rutaceae
7.	*Albizia lebbeck*	Siras	Fabaceae
8.	*Alianthus excels*	Ullu Neem	
9.	*Albizia procera*	Kala Siras	Fabaceae
10.	*Anogeissus latifolia*	Dhawan	
11.	*Anogeissus Pendula*	Dhauk	
12.	*Azadirachta indica*	Limdo	Meliaceae
13.	*Bauhinia variegate*	Kachnar	Fabaceae
14.	*Belanite aegyptica*	Hingot	Zygophyuaceae
15.	*Bombax ceiba*	Simlo	Bombacaceae
16.	*Boswallia serrate*	Salai Guggal	Bursaraceae
17.	*Cassia fistula*	Garmalo	Caesalpiniaceae
18.	*Cassia siamea*	Kesia	Fabaceae
19.	*Capparis deciduas*	Karir	Capparaceae
20.	*Crateava religiosa*	Barna	Capparidaceae
21.	*Cordia dichotoma*	Gundo	Boraginaceae
22.	*Cordia mixa*	Lasura	Boraginaceae
23.	*Commifora mukul*	Guggal	B ursaraceae
24.	*Dalbergia sissoo*	Shisham	Fabaceae
25.	*Emblica officinalis*	Amla	Euphorbiaceae
26.	*Erythrina indica*	Coral Tree	Fabaceae
27.	*Ficus benghalensis*	Vad	Moraceae
28.	*Ficus racemosa*	Umro	Moraceae
29.	*Ficus religiosa*	Piplo	Moraceae

Sr. No.	Botanical Name	Common Name	Family
30.	*Ficus glomerta*	Gular	Moraceae
31.	*Ficus infectoria*	Pilkhan	Moraceae
32.	*Holorrina anticlysentrica*	Indra jo	Apocynaceae
33.	*Holoptalia intregrifolia*	Pahari papari	Ulmaceae
34.	*Jacaranda mimosifolia*	Jacaranda	Bignoniaceae
35.	*Kigelia pinnata*	Kigelia	Bignoniaceae
36.	*Mangifera indica*	Aam	Anacardiaceae
37.	*Melia azedarach*	B akayan	Meliaceae
38.	*Moringa oleifera*	Mithosaragavo	Moringaceae
39.	*Mimosops hyzandra*	Khirni	Sapotaceae
40.	*Phoenix sylvestris*	Khajur	Arecaceae
41.	*Pithecellobium dulce*	Jungle jalebi	Fabaceae
42.	*Polyalthia longifolia*	Ashoka	Annonaceae
43.	*Pongamia pinnata*	Karanj, Kanji	Fabaceae
44.	*Prosopis cineraria*	Khijdo	Fabaceae
45.	*Prosopis juliflora*	Gando baval	Fabaceae
46.	*Syz,ygium cumini*	Jambu	Myrtaceae
47.	*Tamarindus indica*	Khati Amli	Fabaceae
48.	*Tectona grandis*	Sag	Verbenaceae
49.	*Tecomela undulata*	Rohira	Bignoniaceae
50.	*Terminalia arjuna*	Arjunsad	Combretaceae
51.	*Ziziphus mauritiana*	Bor	Rhamnaceae
52.	*Eugenia jambolana*	Jamoa	Myrtaceae
53.	*Zizyphus xylopyra*	Ghatbor	Rhamnaceae
54.	*Salvadora persica*	Jhal	Salvadoraceae
55.	*Wrightia tinctoria*	Kherni	
Shrubs			
56.	*Adhatoda vasica*	Adulsa	Acanthaceae
57.	*Annona squamosa*	Sitafal	Annonaceae

Sr. No.	Botanical Name	Common Name	Family
58.	*Argemone mexicana*	Pila Dhatura	Papaveraceae
59.	*Calotropis gigantea*	Shivark, Akdo	Apocynaceae
60.	*Calotropis procera*	Mudar	Asclepiadaceae
61.	*Crotalaria juncea*	Indian Hemp	Fabaceae
62.	*Euphorbia neriifolia*	Thor	Euphorbiaceae
63.	*Ipomoea fistulosa*	Beshram	Convolvulaceae
64.	*Lantana camara*	Lantana	Verbenaceae
65.	*Nyctanthes arbor-tristis*	Tamat, Harsingar	Oleaceae
66.	*Opuntia dillenii*	Opuntia	Cactaceae
67.	*Sida acuta*	Chikan	Malvaceae
Herbs			
68.	*Achyranthes aspera*	Unga, Keora	Amaranthaceae
69.	*Agave Americana*	Ram Baas	Agavaceae
70.	*Aloe vera*	Gwarpatha	Liliaceae
71.	*Amaranthus spinosus*	Jungli Cholai	
72.	*Cannabis sativa*	Bhang	Cannabaceae
73.	*Cassia tora*	Puwad, Panwar	Fabaceae
74.	*Cassia glauca*	Bathu	Fabaceae
75.	*Chenopodium album*	Goosfoot	Amaranthaceae
76.	*Datura stramonium*	Dhatura	Solanaceae
77.	*Parthenium hysterophorus*	Gajar Ghaas	Asteraceae
78.	*Tephrosia purpurea*	Sarpankha	Fabaceae
79.	*Tribulus terrestris*	Gokha ru	Zygophyllaceae
80.	*Tridax procumbens*	Kumru	Asteraceae
81.	*Caparis deciduas*	Kair	
82.	*Ocimum canum*	Jungli Tulsi	
83.	*Aerva pseudotomentosa*	Bui	
84.	*Withania somnifera*	Ashwagandha	
85.	*Leptoden ia pyrotechnica*	Kheep	
Climbers			

Sr. No.	Botanical Name	Common Name	Family
86.	*Asparagus racemosus*	Shatavari	Asparagaceae
87.	*Abrus precarious*	Rati	
88.	*Cuscuta reflexa*	Amarbel	Convolvulaceae
89.	*Cucumis callosus*	Kachri	
90.	*Convolvulus arvensis*	Shankh Pushpi	
91.	*Momordica charantia*	Jungli Kerala	Cucurbitaceae
92.	*Tinospora cordifolia*	Neem Giloy	Menispermaceae
Grass			
93.	*Cenchrus ciliaris*	Dhaman	
94.	*Cenchrus biflorus*	Bhurat	
95.	*Cenchrus setigerus*	Anjan	
96.	*Cynodon dactylon*	Dub	Poaceae
97.	*Desmodium bipinnata*	grass	
98.	*Dichanthium annulatum*	Karad	Poaceae
99.	*Heteropogon contortus*	Sukhala	Poaceae
100.	*Digitaria sp.*	Crabgrass	Poaceae
101.	*Lasirus cindicus*	Seven	
102.	*Cenchrus pennisetiformis*	Dhamnio	
103.	*Saccharum spontaneum*	Munja	

FAUNAL INVESTIGATION

Mammals

Faunal assessment provides a basis for determining relative abundance and rarity of each species which is important for assessing the diversity of fauna of a particular area. Since animals are capable of movements from one place to another, this makes their study entirely different. Different animals prefer different types of habitat for food and shelter.

During the mammalian survey, the species observed in the study area are Indian Hare (*Lepus nigricollis*), Indian gray mongoose (*Herpestes edwardsi*) and Five striped Palm Squirrel (*Funambulus palmarum*), Jackal, Chinkara, Monkey, Jungle cat. During public consultation and discussion with forest and wildlife department it was documented that species like Common House Rat (*Rattus rattus*), Nilgai *(Boselaphus tragocamelus*), Jackal (*Canis aureus*), Indian Hare (*Lepus nigricollis*), India Fox, Hyena, Chinkara, Indian fox, Monkeys are observed in the study area.

During the faunal investigation some of Schedule-I species & two Schedule-II also observed in the study area.

Reptiles and Amphibians

During audit, the reptilian species observed in the study area are Monitor Lizard, Cobra, Sand Boa, Rat Snake. As per discussion with local people it was noted that Rat snakes (*Ptyas mucosa*) is generally observed in and around the human habitation.

Amphibians are commonly found at the places along the margin of aquatic and terrestrial ecosystems. Due to presence of water bodies like river, nalas, etc the study area is providing shelter to many amphibian species. Some of the commonly reported species are *Bufo melanostictus* (common Indian toad), *Euphlyctis cyanophlyctis* (Indian skipper frog), *Hoplobatrachus tigerinus* (Indian bull frog) etc.

The list of fauna/ reptiles/Amphibians found in the study area is given in Table.

S. No.	Scientific Name	Common Name	Family	Status in Wildlife Protection Act-1972	Status in IUCN Category
Mammals					
1.	Boselaphus tragocamelus	Nilgai	Bovidae	Schedule II	Least Concern

S. No.	Scientific Name	Common Name	Family	Status in Wildlife Protection Act-1972	Status in IUCN Category
2.	Canis aureus	Jackal	Canidae	Schedule II	Least Concern
3.	Funambulus pennant	Five Striped Palm Squirrel	Sciuridae	Schedule IV	Least Concern
4.	Herpestes edwardsi	Mangoose	Herpestidae	Schedule II	Least Concern
5.	Lepus nigricollis	Indian Hare	Leporidae	Schedule IV	Least Concern
6.	Chinkara			Schedule I	
7.	Indian Fox			Schedule II	
8.	Jungal cat			Schedule II	
9.	Mus musculus	Gharelu Musa	Muridae	Schedule V	Least Concern
10.	Rattus rattus	Black Rat	Muridae	Schedule V	Least Concern
1 1.	Rousettus leschenaultia	Chamgadar	Pteropodidae	Schedule V	Least Concern
12.	Monkey				
Reptiles and Amphibians					
13.	Duttaphrynus melanostictus	Common Indian toad	Bufonidae	Not Enlisted	Least Concern
14.	Calotes versicolor	Garden lizard	Agamidae	Schedule IV	Not Evaluated
15.	Hemidactylus sp	House lizard	Gekkonidae	Schedule IV	Not Evaluated
16.	Hoplobatrachus tigerinus	Indian bull frog	Dicroglossidae	Schedule IV	Not Evaluated
17.	Euphlyctis cyanophlyctis	Indian	Dicroglossida	Schedule IV	**Not Evaluated**

S. No.	Scientific Name	Common Name	Family	Status in Wildlife Protection Act-1972	Status in IUCN Category
		skipper frog	e		
18.	Ptyas mucosa	Rat snakes	Colubridae	Schedule IV	**Not Evaluated**
19.	Monitor Lizard				
20.	Cobra				
21.	Sand Boa				
22.	Bufo stomaticus	Skipping frog	Bufonidae	Schedule IV	Not Evaluated

Source: Audit team in consultation with concern state forest officials and local people.

Avifauna

Diversity of avifauna is one of the most important ecological indicators to evaluate the quality of habitats. Now-a-days, avifaunal diversity has been decreasing due to the destruction of natural habitats and human disturbances. Both plant and bird diversity have an important role in maintaining the ecological balance and these are the indicator of health of the ecosystem. Bird diversity has a direct relationship with plant diversity. Plant diversity provides a space to birds for nesting, feeding and breeding.

Different land use in the study area was identified to get maximum bird diversity. In the study area, a good number of birds are totally dependent on plants for food and shelter. The bushy vegetation around the lease area provides good shelter for bird species.

The species observed in the study area are Rose Ringed Parakeet (*Psittacula krameri*), Small Blue Kingfisher (*Alcedo atthis*), Cattle Egret (*Bubulcus ibis*), Little Egret (*Egretta garzetta*), Common Myna (*Acridotheres tristis*), Indian Roller (*Coracias benghalensis*), Blue Rock Pigeon (*Columba livia*), Magpie Robin (Copsychus saularis), Koel (Eudynamys scolopaceus), Common Babbler (Turdoides caudate), Jungle Babbler (*Turdoides striata*), Small Green Bee Eater (*Merops orientalis*), House Crow (*Corvus splendens*), Purple Sunbird (*Cinnyris asiaticus*), Red Vented Bulbul (*Pycnonotus cafer*), Indian Robin (*Saxicoloides fulicatus*), House Sparrow (*Passer domesticus*), White Wagtail (*Motacilla alba*), Golden Oriole (*Oriolus oriolus*). List of birds observed in the study area are presented in below-

Sr. No.	Scientific Name	Common Name	Family	Status in Wildlife Protection Act-1972	Status in IUCN Category
1.	*Accipiter badius*	Shikara	Accipitridae	Schedule IV	Least Concern
2.	*Acridotheres tristis*	Common Myna	Sturnidae	Schedule IV	Least Concern
3.	*Alcedo atthis*	Small Blue Kingfisher	Alcedinidae	Schedule IV	Least Concern
4.	*Anlaurornis phoenicurus*	White Breasted Waterhen	Rallidae	Schedule IV	Least Concern
5.	*Anas poecilorhyncha*	Spot-billed Duck	Anatidae	Schedule IV	Least Concern
6.	*Ardeola grayii*	Indian Pond Heron	Ardeidae	Schedule IV	Least Concern
7.	*Bubulcus ibis*	Cattle Egret	Ardeidae	Schedule IV	Least Concern
8.	*Butastur teesa*	White eyed buzzard	Accipitridae	Schedule IV	Least Concern
9.	*Cinnyris asiaticus*	Purple Sunbird	Nectariniidae	Schedule IV	Least Concern
10.	*Columba livia*	Blue Rock Pigeon	Columbidae	Not Enlisted	Least Concern
11.	*Copsychus saularis*	Magpie Robin	Muscicapidae	Schedule IV	Least Concern
12.	*Coracias benghalensis*	Indian Roller	Coraciidae	Schedule IV	Least Concern
13.	*Corvus macrorhynchos*	Jungle Crow	Corvidae	Not Enlisted	Least Concern

Sr. No.	Scientific Name	Common Name	Family	Status in Wildlife Protection Act-1972	Status in IUCN Category
14.	*Corvus splendens*	House Crow	Corvidae	Schedule V	Least Concern
15.	*Dendrocitta vagabunda*	Rufous Treepie	Corvidae	Schedule IV	Least Concern
16.	*Dicrurus adsimilis*	Fork-tailed Drongo	Dicruridae	Schedule IV	Least Concern
17.	*Egretta garzetta*	Little Egret	Ardeidae	Schedule IV	Least Concern
18.	*Eudynamys scolopaceus*	Koel	Cuculidae	Schedule IV	Least Concern
19.	*Francolinus pondicerianus*	Grey Partridge	Phasianidae	Schedule IV	Least Concern
20.	*Halcyon smyrnensis*	White Breasted Kingfisher	Halcyonidae	Schedule IV	Least Concern
21.	*Lanius excubitor*	Grey Shrike	Laniidae	Not Enlisted	Least Concern
22.	*Lonchura malabarica*	White Throated Munia	Estrildidae	Schedule IV	Least Concern
23.	*Merops orientalis*	Small Green Bee Eater	Meropidae	Not Enlisted	Least Concern
24.	*Motacilla alba*	White Wagtail	Motacillidae	Schedule IV	Least Concern
25.	*Motacilla capsica*	Grey Wagtail	Motacillidae	Schedule IV	Least Concern
26.	*Motacilla flava*	Yellow Wagtail	Motacillidae	Schedule IV	Least Concern
27.	*Oriolus oriolus*	Golden Oriole	Oriolidae	Schedule IV	Least Concern

Sr. No.	Scientific Name	Common Name	Family	Status in Wildlife Protection Act-1972	Status in IUCN Category
28.	*Passer domesticus*	House Sparrow	Passeridae	Not Enlisted	Least Concern
29.	*Pavo cristatus*	Common Peafowl	Phasianidae	Schedule I	Least Concern
30.	*Phalacrocorax niger*	Little Cormorant	Phalacrocoracidae	Schedule IV	Least Concern
31.	*Ploceus philippinus*	Baya Weaver	Ploceidae	Schedule IV	Least Concern
32.	*Psittacula krameri*	Rose Ringed Parakeet	Psittaculidae	Schedule IV	Least Concern
33.	*Pycnonotus cafer*	Red Vented Bulbul	Pycnonotidae	Schedule IV	Least Concern
34.	*Saxicoloidesfulicatus*	Indian Robin	Muscicapidae	Schedule IV	Least Concern
35.	*Streptopelia chinensis*	Spotted Dove	Columbidae	Schedule IV	Least Concern
36.	*Sturnus pagodarum*	Brahminy myna	Sturnidae	Schedule IV	Least Concern
37.	*Turdoides caudate*	Common Babbler	Timaliidae	Schedule IV	Least Concern
38.	*Turdoides striata*	Jungle Babbler	Timaliidae	Schedule IV	Least Concern
39.	*Upupa epops*	Hoopoe	Upupidae	Not Enlisted	Least Concern

CONSERVATION PLAN FOR FAUNA

BACKGROUND

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. These criteria are relevant to all species and all regions of the world. With its strong scientific base, the IUCN Red List is recognized as the most authoritative guide to the status of biological diversity. IUCN, (2008) has evaluated 1976 animal species from India, among them 313 have been recognized as threatened species. Among them one species is considered as extinct, while 44 species are in critically endangered (CR) category, 88 is in endangered category (EN), while 181 is considered as vulnerable (VU). Wild Life (Protection) Act, 1972, amended on 17thJanuary 2003, is an Act to provide for the protection of wild animals, birds and plants and for matters connected therewith or ancillary or incidental thereto with a view to ensuring the ecological and environmental security of the country. Some of the sighted fauna was given protection by the Indian Wild Life (Protection) Act, 1972 by including them in different schedules. Among the birds in the study area, Pea fowl (Pavocristatus) is included in schedule I of Wild life protection Act (1972), while many other birds are included in schedule IV. Among the reptiles, Indian Cobra (Najanaja) were provided protection as per Schedule-II of Wild Life Protection Act, (1972). Among mammals; there is no any species found under schedule-I while Common Mongoose (Herpestesed wardsi), Jackal (Canisaureus (Linnaeus) are a schedule –II animals. Nilgai (*Bos elaphustragocamelus*) is protected as Schedule-III animal and hares and five stripped squirrels are included in schedule IV of Wild Life Protection act 1972.

DECLINE OF WILDLIFE

Biological evolution on earth is associated with extinction of older species and descent of new species but the disappearance of species from the surface of the earth has speeded up 1000 to 10,000 times as compared to the natural disappearance, due to destructive activities of man. Important reasons for decline of wildlife are:

- Fragmentation, degradation and loss of habitat
- Hunting and poaching
- Man-animal conflict
- Pollution

OBJECTIVES OF CONSERVATION PLAN

- To prepare the list of flora and fauna of core and buffer zone falling within ten kilometre radius area from the project site and classification as per schedules of Wildlife Protection Act, 1972.
- To evaluate the ecological sensitivity of the area.
- To explore whether the area forms a corridor for any scheduled wildlife.

- To locate the Sanctuary, National Park, Bio-sphere reserve, Tiger/ Elephant reserve or notified Eco- sensitive zones falling in 10-kilometer radius area from the proposed site.
- To evaluate the possible threat of wildlife in the area and possible impact of mining on flora and fauna.
- To prepare a comprehensive Conservation Plan for the animal.

ANIMALS AND BIRDS OF THE CORE & BUFFER ZONE (Belonging to schedule I and II of Wildlife (Protection) Act, 1972.)

List of Schedule I and II species

S. No.	Common Name	Scientific name	Wildlife Schedule
Mammals:			
1.	Chinkara	*Gazella gazelle*	I
2.	Jackal	*Canis aureus L.*	II
3.	Jungle Cat	*Felis chaus*	II
4.	Indian Fox	*Vulpes bengalensis*	II
5.	Mongoose	*Herpestes edwardsii*	II
Avian flora (Birds):			
6.	Peacock	*Pavo cristatus*	I
Reptiles & Amphibians			
7.	Rat snakes	*Ptyas mucosa L.*	II
8.	Monitor Lizard	*Varanus bengalensis Daudin*	I
9.	Indian Cobra	*Naja naja*	

CONSERVATION PLAN FOR AVIAN FAUNA

Pea Fowl (Pavo cristatus)

Introduction

Zoological name– ***Pavo cristatus***

The **peafowl** include three species of birds in the genera *Pavo* and *Afropavo* of the Phasianidae family, the pheasants and their allies. There are two Asiatic species (the blue or Indian peafowl originally of

India and Sri Lanka and the green peafowl of Myanmar, Indochina, and Java) and one African species (the Congo peafowl native only to the Congo Basin). Male peafowl are known for their piercing call and their extravagant plumage. The latter is especially prominent in the Asiatic species, who have an eye- spotted "tail" or "train" of covert feathers which they display as part of a courtship ritual. The term **peacock** is properly reserved for the male; the female is known as a **peahen**, and the immature offspring are sometimes called **peachicks.**

An Indian peafowl or Peacock or Mor (*Pav ocristatus*) is a large pheasant justifiably declared as the National Bird of India in 1963 due to its flag ship value founded on its glorious position in mythology and its widespread distribution and grandeur. In India, it is given the utmost protection by inclusion in Schedule I of Indian Wildlife (Protection) Act, 1972. Being a wide spread species, apart from the various urban habitats, it is also found in agriculture fields, along streams with vegetation and close to human habitations in a semi-feral condition (Johnsgard1986). The species (*Pavo cristatus*) was observed in buffer zone of the mine lease area during the site visit and the potential habitat of the species was also recorded.

Classification

Kingdom: Animalia

Phylum: Chordata

Class: Aves

Order: Galliformes

Family:Phasianidae

Genus: *Pavo*

Species: *cristatus*

Vernacular name: MororPeacock

Geographical Distribution: India, Pakistan and Sri Lanka. Many feral populations exist throughout the world.

Appearance

The Indian peacock has iridescent blue and green plumage. The peacock "tail", known as a "train", consists not of tail quill feathers, but highly elongated upper tail coverts. These feathers are marked with eyespots, best seen when a peacock fans his tail. Both sexes of all species have a crest atop the head. The Indian peahen has a mixture of dull grey, brown, and green in her plumage. The female also displays her plumage to ward off female competition or signal danger to her young.

Male peacock has a spectacular glossy green long tail feathers that may be more than 60 percent of the bird's total body length. These feathers have blue, golden green and copper colored ocelli (eyes). The long tail feathers are used for making rituals like court ship displays. The feathers are arched in to a magnificent fan shaped for macros the back of the bird and almost touching the found on both sides. Females do not have these graceful tail feathers. They have the fan like crest with whitish face and throat, chest nut brown crown and hind neck, metallic green upper breast and mantle, white belly and brown back rump and tail. Their primaries are dark brown.

Geographical Distribution

The Indian sub-continent is the natural habitat of the Indian Peafowl. It is found in good numbers in Indian Territory ranging from Outer Himalayas through vast stretch of the country including the Peninsula. It is also found in Pakistan, Nepal and Sri Lanka. The arid deserts of Rajasthan, the riverbanks of Gujarat and Madhya Pradesh, the foothills of the Himalayas in Uttar Pradesh and the forests of Haryana – these are considered to be the major and commonly-known habitats of peacocks in India.

Habitat and Behavior

The scrub jungles and forest edges are the natural habitat of this bird; has affinity towards moist & dry deciduous and semiarid biomes. It is also found along streams with good vegetation and in agricultural fields and in close proximity with the human settlements. Habitat mosaic of scrub and open areas with ample sites for "dust bathing" and "lekking". Dust bathing is critical as this bird has to condition its feathers and remove feather-degrading bacteria and other external parasites. The peafowl are forest birds that nest on the ground. The peafowl are terrestrial feeders but roost in trees. It has got a loud scream that can scary many enemies. The life expectancy is about 10-15 years.

Food and Feeding Habits

Peafowls are omnivores, eating plant parts, flower petals, seed heads, insects and other arthropods, reptiles and amphibians. In the study area at some places, dense tree canopy cover supports good insect diversity which is very common food for peafowls.

Threats in the Study Area

No perceptible threats were identified in the villages surveyed. Village residents are against hunting or poaching of the peafowl, due to culture and mythology reasons. Adult peafowl can usually escape ground predators by flying into trees.

a) For aging in groups provides some safety as there are more eyes to look out for predators.

b) Habitat loss, specially the shortage of tall trees in and around the villages for roosting and for providing shade during hot summer months.

c) Shortage of drinking water for the birds during the hot summer days.

d) Casualties caused by eating chemically treated agricultural cropseeds.

e) Illegal hunting by some communities.

CONSERVATION PLAN FOR MAMMALS

CHINKARA

(Gazellagazella)

Introduction

The mountain gazelle (*Gazell agazella)* is a species of gazelle widely but unevenly distributed in Israel, Lebanon, the Golan Heights, Iran and Turkey. It inhabits mountains, foothills and coastal plains. Its range coincides closely with that of the acacia trees that grow in these areas. It is mainly a grazing species, though this varies with food availability. It is less well adapted to hot, dry conditions than the Dorcas late Holocene in a period of climatic warming.

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Mammalia	Cetardiodactyla	Bovidae

Geographical Distribution:

Native: Israel; Oman; Saudi Arabia; United Arab Emirates; Yemen

Possibly extinct: Jordan

Regionally extinct: Egypt; Syrian Arab Republic

Appearance

Male mountain gazelles weigh between 17 and 29.5 kg, whereas the smaller females weigh 16-25 kg. They are sexually dimorphic with the males being larger and having larger horns. Tooth rows of mountain gazelles are nearly straight.

Gazelles have a slender build with proportionally long necks and legs. The hind legs of mountain gazelles are articularly long.

Mountain gazelles are a dark brown with white underparts, flanks, and light brown limbs. The face is marked with an off-white stripe with black lower margins. There is also a narrow, dark flank-band that separates the dark dorsal tones from the white underparts. The base of the hairs from the underside are buff colored. The black tail is short and bushy. The ears are also relatively short. The white line down the thigh stops at the hock. Pelage is short and sleek, and reflects the sun's radiation in the summer months,

and is much longer, thicker and rainproof during the winter to protect the animal from the heavy winter rains.

Both sexes have horns. The relatively short horns of the males (220-294 mm) vary greatly depending on habitat. Female mountain gazelles have horns that are less than 70% the length of males' horns in the same population (84-153 mm). Males' horns are thick and have prominent rings whereas the females' horns are un-ringed. The horns are elliptical in a cross-section and the gap at the base is about 25 mm.

Male horns bow out from the base with the tips almost always pointing in. The females' horns are curved slightly forward. Horn shape may vary greatly within populations, but in most cases the horns resemble an S-shape. Horns also have broad grooves that run up the anterior part of the core, a groove along the posterior boarder, and a less prominent groove that runs medial to the aspect of the core (Groves and Lay, 1985; Mendelsohn et al., 1995).

Geographical Distribution

Gazella gazella, or mountain gazelle, is one of several closely related species found in the Middle East. Its distribution includes the Arabian Peninsula, Egypt, Iran, Israel, Jordan, Lebanon, Oman, Saudi Arabia, Syrian Arab Republic, Yemen, and the United Arab Emirates (Mendelsohn et al., 1995; IUCN Species Survival Commission, 2000).

Habitat & Behavior

Mountain gazelles live in mountainous and hilly habitats consisting of light forests, fields, or desert plateaus. They usually spend the days in the hills bedded down and descend at night or in the early morning to forage.

Mountain gazelles live in areas with an average annual temperature of 21-23 degrees Celsius and an average winter temperature of about 14 degrees Celsius. The areas occupied by G. gazella are dry, usually with an annual precipitation of 300-400 mm (Mendelsohn et al., 1995; Massicot, 2001).

Food & Feeding Habits

This diurnal species is highly territorial. The social organization of the G. gazella consists of maternity herds, bachelor male herds, and territorial solitary males. Incidents of fighting escalate as the males mature, however, fights between territorial males are ritualized and less violent than those between adult bachelor males. The immature bachelor males have more frequent horn contact during fights than do adult or territorial males. Males maintain a territory of about 0.6 km year round, while non-territorial males have a home range of about 6.7 km . Female groups have overlapping ranges of about 1 km and neighboring groups avoid overlap.

Mountain gazelles are excellent runners for several hundred meters, and can reach speeds of 80 kilometers per hour. This species has excellent vision as well as good smell and hearing. Vision is the sense mainly used for predator detection, whereas smell is used to find food (Grau and Walther, 1976; Mendelsohn et al., 1995; Duhnam, 1998; Geffen et al., 1999).

Threats in the Study Area

The major threats are illegal hunting for meat and live capture for pets and private collections. Habitat

loss through agricultural development, fencing pasture for cattle, construction of roads and settlement is also a major threat.

Hunting (killed for meat) and live trapping for sale as pets.

JACKAL (Canis aures)

Introduction

Jackals are medium-sized omnivorous mammals of the genus Canis, which also includes wolves and the domestic dog. While the word "jackal" has historically been used for many small canids, in modern use it most commonly refers to three species: the closely related black-backed jackal and side-striped jackal of sub-Saharan Africa, and the golden jackal of south-central Eurasia, which is more closely related to other members of the genus Canis.

Jackals and coyotes (sometimes called the "American Jackal") are opportunistic omnivores, predators of small- to medium sized animals and proficient scavengers. Their long legs and curved canine teeth are adapted for hunting small mammals, birds, reptiles and their large feet and fused leg bones give them a physique well-suited for long distance running, capable of maintaining speeds of 16 km/h (9.9 mph) for extended periods of time. Jackals are crepuscular, most active at dawn and dusk.

Their most common social unit is a monogamous pair, which defends its territory from other pairs by vigorously chasing intruding rivals and marking landmarks around the territory with their parents until they establish their own territories. Jackals may occasionally assemble in small packs, for example, to scavenge a carcass, but they normally hunt either alone or in pairs.

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Mammalia	Carnivora	Canidae

Geographical Distribution:

Native:

Afghanistan; Albania; Algeria; Bahrain; Bhutan; Bosnia and Herzegovina; Bulgaria; Central African Republic; Croatia; Djibouti; Egypt; Eritrea; Ethiopia; Greece; India; Iran, Islamic Republic of; Iraq; Israel; Jordan; Kenya; Kuwait; Lebanon; Libya; Mali; Mauritania; Morocco; Myanmar; Nepal; Niger; Nigeria; Oman; Pakistan; Qatar; Saudi Arabia; Senegal; Somalia; South Sudan; Sri Lanka; Sudan; Syrian Arab Republic; Tanzania, United Republic of; Thailand; Tunisia; Turkey; Turkmenistan; United Arab Emirates; Viet Nam; Western Sahara; Yemen

Vagrant: Austria; Italy; Slovakia; Slovenia

Appearance

The body length of the golden jackal is 70 to 85 cm, with a tail length of about 25 cm. Its standing height is approximately 40 cm. The fur is generally coarse and not very long. Its coat is usually yellow to pale gold and brown-tipped, but the color can vary with season and region. On the Serengeti Plain in Northern Tanzania, golden jackals are brown-tipped yellow in the rainy season (December-January), changing to pale gold in the dry season (September-October).

Geographical Distribution

The golden jackal occurs in North and East Africa, Southeastern Europe and South Asia to Burma.

Habitat & Behavior

The golden jackal is the most northerly of jackal species, and also the most widely distributed. It overlaps biotopes only with the black-backed jackal in East African savannas. Golden jackals prefer dry open country, arid short grasslands and steppe landscapes.

The basic social unit of the golden jackal is a mated pair or a mated pair and its young. Golden jackal pairs forage and rest together. All of their behavior is highly synchronized. Cooperative hunting is important to the jackals. Pairs are three times more likely to be successful than individuals in hunting. Members of the same family also cooperate in sharing larger food items and transport food in their stomachs for later regurgitation to pups or to a lactating mother. Hunting families hold territories of two to three square kilometers throughout the year, portions of which are marked with urine, either by the male or the female jackal, to ward off intruders.

Though the golden jackal is a capable hunter, it normally does not attack larger animals. When the gazelles in the Serengeti give birth, every day several newborns are grabbed by the jackals and are taken to the dens to be eaten. Jackals also take part in the kills of larger animals, such as those of the lion. They howl when a lion makes a kill, which usually lures other jackals to the scene. If a sated lion leaves an unfinished carcass, the jackals rush in to devour the remains. Should other animals arrive at the scene, the jackals bury their pieces of meat. Using their forepaws, they dig a trench, lay the bits of quarry into it, and then close the trench using the ridge of the nose.

Both male and female members of a golden jackal pair have important roles in maintaining their territory and in raising the young. When one parent dies, it is unlikely that the rest of the family will survive. However, most jackal families have helpers. These helper associations are probably responsible for reports of large packs hunting together. Within the family, helpers are subordinate to parents.

Helpers strengthen the family in several ways. The presence of a single adult at the den provides considerable protection: adults both "rumble growl" and "predators bark" to warn the pups to take refuge, and a single adult can successfully drive off large predators. Helpers also bring food to a lactating mother and improve the provisioning of the pups indirectly by allowing the parents to spend more time foraging alone or hunting as a pair. Families with helpers may be able to defend and exploit a carcass more successfully than an individual would be able to. Pup survival improves in the presence of helpers, though not as markedly in golden jackals as in other jackal species.

The female golden jackal initiates all den changes. Though the males are predominantly monogamous, females reserve their aggression for female intruders, preventing the sharing of the male and his paternal investment.

Golden jackals are strictly nocturnal in areas inhabited by humans but may be partly diurnal elsewhere. They dig caverns for shelter, or use crevices in rocks, or caverns that were dug by other animals. Golden jackals live in pairs and are friendly to one another, scratching their partners all over their bodies. However, if strange jackals meet each other, most of the behavior expresses subordination, superiority, or eagerness to attack.

They behave in a manner similar to domesticated dogs and wolves. Males raise a hind leg when spraying their urine, and female squat at the site they wish to spray. Males and females alike mark their territory by spraying, primarily during the mating season.

Each jackal species communicates through its own repertoire of calls. Golden jackals use a wide inventory of howls to locate one another. By howling together, a pair shows that there is a bond between them, and thus the choral howling can be considered a kind of betrothal.

Food & Feeding Habits

Golden jackals consume 54% animal food and 46% plant food. They are opportunistic foragers with a very varied diet, which consists of young gazelles, rodents, (especially during winter), hares, ground birds and their eggs, reptiles, frogs, fish, insects and fruit. They take carrion on occasion.

Threats in the Study Area

Over its entire range, except in protected areas like National Parks and Sanctuaries, the jackal population is steadily declining. Traditional land use practices, like livestock rearing and dry farming that were conducive to the survival of jackals and other wildlife, are being steadily replaced by industrialization and intensive agriculture; wilderness areas and rural landscapes are being rapidly urbanized. Jackal populations adapt to some extent to this change and may persist for a while, but eventually disappear from such areas like other wildlife.

There is no significant trade in jackal products, although skins and tails are occasionally sold.

INDIAN FOX

(Vulpes bengalenesis)

Introduction

The Bengal Fox *(Vulpes bengalensis),* also known as the Indian fox, is a fox endemic to the Indian subcontinent and is found from the Himalayan foothills and Terai of Nepal through southern India and from southern and eastern Pakistan to eastern India and southeastern Bangladesh.

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Mammalia	Carnivora	Canidae

Geographical Distribution:

Native: Bangladesh; India; Nepal; Pakistan

Appearance

Bengal foxes are medium sized foxes. They have elongated muzzles and small patches of black hair on the upper portion of the muzzle. The most prominent feature of Bengal foxes is a large bushy tail accounting for up to 60% of their body length and possessing a distinct black tip. During normal

movement, the tail is left trailing. When running the tail is carried horizontally. It is held vertical when these foxes make sudden turns. Dorsal pelage varies seasonally and within populations but is generally hoary gray on the dorsum and paler ventrally. Pelage on the ears is dark brown with a black margin. Their ears are large for their size and are possible an adaptation to thermoregulation in their hot, arid abitats.

Geographical Distribution

Vulpes bengalensis is native to the Indian subcontinent, including India, Nepal and Pakistan and is widespread throughout its range. These foxes are found in the Himalayan foothills to the tip of the Indian peninsula. (Johnsingh and Jhala, 2004)

Habitat & Behavior

Bengal foxes generally prefer foothills and non-forested regions such as open grassland, thorny scrub, semi- desert and arid environments. They can also be found in agricultural fields, as they are not generally fearful of humans. Bengal foxes inhabit burrows built approximately two to three feet below ground surface. These burrows have several openings converging towards the center burrow area. Many of these openings are blind while others lead towards a large, central breeding space. (Johnsingh, 1978).

Bengal foxes are tame and generally not fearful of humans, making them vulnerable to hunting. In response to human presence, Bengal fox populations alter their active periods from daytime to crepuscular and nocturnal habits. In mild temperatures and cloudy weather, daytime hunting also occurs. Hunting is a solitary behavior in these foxes. The basic social unit is one breeding pair but larger aggregations may occur when grown pups remain in their natal area. Female Bengal foxes have been witnessed sharing dens during lactation and four adult foxes have been seen emerging from the same den. (Johnsingh, 1978; Manakadan and Rahmani, 2000)

Food & Feeding Habits

Vulpes bengalensis is an omnivorous, opportunistic species that feeds mainly on insects, birds and their eggs, small rodents, reptiles, and fruits. While the primary diet of adults is insects, the fecal matter of pupsis is composed primarily of rodent hair. Common prey includes orthopterans, termites, ants, beetle grubs, spiders, soft-furred rats (*Millar diameltada*), little Indian field mice (*Musbooduga*), Indian gerbils (*Tatera indica*), Indian mynahs (*Acridotheres tristis*), Grey Partridge (*Francolinu sponticerianus*), and ashy-crowned finch larks (*Eremopterix griseus*). Less common prey items include ground lizards, rat snakes (Ptyas mucuosus), hedgehogs (*Parantechinus nudiventris*), and Indian hares (*Lepus nigricollis*). They feed on fruits of ber (*Ziziphus*), neem (*Azadirachta indica*), mango (*Mangifera indica*), jambu (*Syizigium cumini*), and banyan (*Ficus bengalensis*). (Johnsingh, 1978; Manakadan and Rahmani, 2000).

Threats in the Study Area

Although the Indian Fox is widespread, it occurs generally at low densities throughout its range, and populations can undergo major fluctuations due to prey availability and disease (rabies and canine distemper virus have been recorded to cause local population declines in western India). They can tolerate some human disturbance, although with expanding human populations and continued development of grasslands for agricultural and industrial uses, the habitat of the Indian Fox is continuously being depleted. The combination of above factors along with disease and/or natural mortality could potentially cause localized extirpations. In certain states like Gujarat, Maharashtra, and Rajasthan, Indian Fox habitat is widespread with minimal threats, while in other states like Karnataka and Tamil Nadu the habitats of the Indian Fox are under threat (Johnsingh and Jhala 2004).

JUNGLE CAT (*Felis chaus*)

Introduction

The jungle cat (*Felis Chaus),* also called the reed cat or swamp cat, is a medium-sized cat native to the Middle East, South and Southeast Asia and southern China. It is a member of the genus *Felis.* Ten sub-species are recognized at present.

The jungle cat is a habitat generalist; it inhabits places with adequate water and dense vegetation, such as swamps, wetlands and riparian areas. Despite its name, the jungle cat shuns rain forests and woodlands.

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Mammalia	Carnivora	Felidae

Geographical

Distribution: Native:

Afghanistan; Armenia (Armenia); Azerbaijan; Bangladesh; Bhutan; Cambodia; China; Egypt; Georgia; India; Iran, Islamic Republic of; Iraq; Israel; Jordan; Kazakhstan; Lao People's Democratic Republic; Lebanon; Myanmar; Nepal; Pakistan; Russian Federation; Sri Lanka; Syrian Arab Republic; Tajikistan; Thailand; Turkey; Turkmenistan; Uzbekistan; Vietnam

Appearance

Jungle cats range in size from 70 to 120 cm long and 35 to 38 cm tall. They weigh from 4 to 16 kg. Adult males are larger and heavier than adult females. Throughout their range, significant variation in mass occurs. For example, in west Israel, they weigh 43% more than those in east India. This is likely due to increased competition between different cat species in the east. Jungle cats have long, slim faces with white lines above and below their bright yellow eyes with a dark spot just below each eye near the nose. They have long rounded ears, with a distinctive tuft of hair at the tips. Jungle cats have relatively short tails, about 1/3 of their total body length, which have several dark rings along its length and a black tip. Their coat color varies from a reddish or sandy brown to tawny grey. Black jungle cats are regularly seen in southeastern Pakistan and India. Kittens may be striped and spotted; however, these markings typically fade with age and are only retained on the fore and hind limbs. The muzzle, throat, and belly of the jungle cat are a pale cream color, and their winter coat is darker and denser than their summer coat. ("International Society for Endangered Cats", 2001; Mukherjee and Groves, 2007; Nowell and Jackson, 1996; Sunquist and Sunquist, 2002)

Geographical Distribution

Jungle cats have a wide-ranging distribution that extends from Egypt, Israel, Jordan, northern Saudi Arabia, Syria, Iraq, Iran, to the shores of the Caspian Sea and the Volga River delta, east through Turkmenistan, Uzbekistan, Tadzhikistan, Kazakhstan and to western Xingjian, Afghanistan, Pakistan, Nepal, India, Sri Lanka, Myanmar, Laos, Thailand, Cambodia, Vietnam, and southwestern China. (Sunquist and Sunquist, 2002).

Habitat & Behavior

Jungle cats prefer habitats near water with dense vegetative cover but can be found in a variety of habitats including deserts (where they are found near oases or along riverbeds), grasslands, shrubby woodlands and dry deciduous forests, as well as cleared areas in moist forests. They are commonly found in tall grass, thick brush, riverside swamps, and reed beds. They also adapt well to cultivated land and can be found in many different types of agriculture and forest plantations. Jungle cats are known to occur at elevations of up to 2500 m but are more common in lowlands. ("International Society for Endangered Cats", 2001; Nowell and Jackson, 1996; Ogurlu, et al., 2010; Sunquist and Sunquist, 2002)

Except for breeding season, jungle cats live solitary lives. They are most active at night, but are not strictly nocturnal. They are more often seen at dusk and travel approximately 5 to 6 km per night. They typically rest in dense cover during the day but often sunbathe on cold winter days. Unlike most cat species, jungle cats have an affinity for water and are proficient swimmers that will dive into water to catch fish with their mouths. (Mukherjee, 2008; Sunquist and Sunquist, 2002; Taber, et al., 1967)

Food & Feeding Habits

Jungle cats primarily prey on animals that weigh less than 1 kg and commonly consume rodents, lizards, snakes, frogs, birds, hare, fish, insects, livestock, and even fruit during the winter. Rodents are its primary prey item, however, which provides up to 70% of its daily energy intake. Although they specialize on small prey, jungle cats have been known to kill wild pigs (Susscrofa) and chital fawns (Axis axis). (Baker, et al., 2003; Duckworth, et al., 2008; Mukherjee, et al., 2004; Mukherjee, 2008)

Threats in the Study Area

The biggest threat to Jungle Cat is habitat loss particularly industrialization and urbanization of low intensity agricultural areas and scrubland in the Indian subcontinent.

Habitat destruction for agricultural purposes and infrastructure development (Ogurlu *et al.* 2010, Sanei *et al.* 2016).

Additionally, environmental pollution and illegal hunting are threatening the

Jungle Cat Illegal killing of Jungle Cats by shooting or trapping is a threat (Sanei

et al. 2016).

Jungle cats can do well in cultivated landscapes (especially those that lead to increased numbers of rodents).

Unselective trapping, snaring and poisoning around agricultural and settled areas have caused population declines in many areas throughout its range (Abu-Baker *et al.* 2003, Duckworth *et al.* 2005).

India formerly exported large numbers of Jungle Cat skins before the species came under legal protection (over 300,000 were declared as being held by traders there when export was banned in 1979), and some illegal trade (and killing) continues there (Sunquist and Sunquist 2002, Choudhury 2010.

COMMON MONGOOSE

(Herpestes edwardsi)

Introduction

Zoological name- *Herpestes edwardsi*

The Indian grey mongoose or common grey mongoose (*Herpestes edwardsi*) is a mongoose species mainly found in West Asia and on the Indian subcontinent. The grey mongoose is commonly found in open forests, scrublands and cultivated fields, often close to human habitation. It lives in burrows, hedgerows and thickets, among groves of trees, and takes shelter under rocks or bushes and even in drains. It is very bold and inquisitive but wary, seldom venturing far from cover. It climbs very well. Usually found singly or in pairs. It preys on rodents, snakes, birds' eggs and hatchlings, lizards and variety of invertebrates. It breeds throughout the year.

Geographical Distribution

Afghanistan; Bahrain; Bangladesh; Bhutan; India; Iran, Islamic Republic of; Kuwait; Nepal; Pakistan; Saudi Arabia; Sri Lanka; Turkey (Turkey-in-Asia); United Arab Emirates.

Appearance

Herpestides have long bodies, short legs and highly developed and scent glands. Their coats are thick and coarse in texture. Herpestes edwardsi is identified by its silver- grey, salt and pepper speckled fur and white tipped tail. (Santiapillai, et al., 2000). They have five toes on fore and hind feet. The hind foot is naked to the heel, but the forefoot has hair to its sharp, curved claws. (Ewer, 1973; Walker. 1975). The Indian grey mongoose has tawny grey or iron grey fur,
which is more grizzled and stiffer and coarser than that of other mongooses. The ruddiness of the coat varies in different subspecies, but it is described as appearing more grey than other mongooses. The grizzled appearance comes from the individual hairs being ringed by creamy-white and black. The legs are brown and darker than the body. The hair around the muzzle and eyes is also brown but with a stronger rusty red colouring. The tail is bushy, whilst the tip of the tail, if coloured, is pale yellow or white. Males are significantly larger than the females.

Geographical Distribution

Indian Grey Mongoose occurs from Turkey and the Arabian Peninsula east to India, Bhutan and Bangladesh (Veron *et al*. 2006, Tempa *et al*. 2013).

Habitat & Behavior

Indian mongoose has been observed in areas of thickets, in cultivated fields, bushy vegetation. (Bridges, 1948). They also occupied open areas, grasslands and scrub. Habitat regions are temperate, tropical, and terrestrial. They are terrestrial solitary hunters. This species is known for its behavior in combating snakes.

Food & Feeding Habits

Mongooses are omnivores, which means they eat both meat and vegetation. They prefer to eat small animals such as birds, reptiles, fish, snakes, crabs, rodents, frogs, insects and worms. They will also supplement their diet with eggs, nuts, fruits, roots, berries and seeds. They have been known to prey in grasslands in search of snakes and small mammals. ("Rajaji National Park", 2000; Postanowicz, 2002; Santiapilai, et al., 2000; Whitefield, 1978).

Threats in the Study Area

Indian Grey Mongoose has no range-wide threats sufficient to drive significant population declines. It is likely that in some areas the levels of harvest are sufficient to reduce local densities. Over recent centuries the species has probably benefited from conversion of closed evergreen forest (at most only rarely occupied) to open habitats.

COMMON MONKEY

(Macca mulatta)

Introduction

Zoological Name - *Macca mulatta*

The rhesus macaque (*Macaca mulatta*), is one of the best-known species of Old World monkeys. Divided according to country of origin, rhesus macaques are referred to as Chinese-and Indian-derived. Chinese- derived rhesus macaques include subspecies *M. m. vestita*, *M. m. lasiota*, *M. m. sanctijohannis*, and *M. m. brevicauda*.

Classification

Kingdom:

Animalia

Phylum:

Chordata Class:

Mammalia Order:

Primates

Family:

Cercopithecidae

Genus: *Macaca*

Species: *M. mulatta*

Vernacular name: Bandar, Monkey

Geographical Distribution: From Afghanistan to India and Thailand to southern China

Native:

Afghanistan; Bangladesh; Bhutan; China; India; Lao People's Democratic Republic; Myanmar; Nepal; Pakistan; Thailand; Vietnam

Introduced:

Hong Kong; United States (Florida)

Appearance

Rhesus macaques, both Chinese- and Indian-derived, range in color from dusty brown to auburn with little to no fur found on their reddish-pink faces. Its tail is of medium length and averages between 20.7 and 22.9 cm (8.1 and
9.0 in). Adult males measure approximately 53 cm (21 in) on average and weigh about 7.7 kg (17 lb). Females are smaller, averaging 47 cm (19 in) in length and 5.3 kg (12 lb) in weight. Males and females are sexually dimorphic. The rhesus macaque has 32 teeth with a dental formula of 2.1.2.3/2.1.2.3 and bilophodont molars. The upper molars have four cusps: paracone, metacone, protocone and hypocone. The lower molars also have four cusps: metaconid, protoconid, hypoconid and entoconid.

Geographical Distribution

The species as a whole is found throughout most of southern Asia, in eastern Afghanistan, Bangladesh, Bhutan, central and southern China (Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Shaanxi, Sichuan, Tibet, and Yunnan, as well as the island of Hainan), northern and central India (in the states of Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chattisgarh, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir, Jharkand, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Orissa, Punjab, Rajasthan, Sikkim, Tripura, Uttaranchal, Uttar Pradesh and West Bengal), Lao PDR, Myanmar, Nepal, northern Pakistan, northern Thailand, and Viet Nam.

In India, *Rhesus macaques* are found in flat, cultivated areas, where agricultural fields dominate the landscape and, in the plains, foothills and mountainous regions where habitat includes cultivated fields, tropical forests and dry, deciduous forests. Average annual rainfall ranges between 420 and 2150 mm (1.38 and 7.05 ft), depending on elevation, and annual range in temperature is between -4° C (25° F) and 48° C (118° F) (Seth & Seth 1986). During the hottest parts of the year, groups in the Himalayan region of India migrate to higher elevations where cooler temperatures persist throughout the summer months (Seth et al. 2001). In urban areas of India, they are found on roadsides, canal banks, in railway stations, villages, towns, and temples (Richard et al. 1989). It is estimated that 48.5% of rhesus macaques in northern India live in villages, towns, cities, temples and railway stations where they are in close and frequent contact with people at all times. About 37.1% of the population lives with some human contact on roadsides and canal banks and only 14.4% of the rhesus macaques in the northern part of the country live in isolation from humans and do not rely on them at all for food (Southwick & Siddiqi 1994). It occurs to the north of the Krishna River in central and eastern India and to the north of the lower Tapti River in western India.

Habitat and Behavior

It resides in a range of habitats, including temperate coniferous, moist and dry deciduous, bamboo, and mixed forests, mangroves, scrub, rainforest, and around human habitations and developments, including cultivated areas, temples, and roadsides (Choudhury 2001; Srivastava and Mohnot 2001). In Pakistan this monkey remains in mountainous regions with forest cover; it is typically associated with Himalayan moist temperate forest (Roberts 1997). It is found at elevations up to 4,000m (Molur *et al*. 2003). Due to hunting in Lao PDR and Viet Nam the species does not occur in commensal situations there, and is restricted to forest areas where it is generally associated with riverine environments over a range of altitudes (Timmins pers. comm.). In western and northern parts of its range it seems to occur in a wider array of environments. It is highly adaptable to man-made habitat. Its generation time is 12 years (Molur *et al.* 2003).

Food and Feeding Habits

This species is diurnal and omnivorous but they are mostly herbivorous, feeding mainly on fruit, but also eating seeds, roots, buds, bark, and cereals. They are estimated to consume around 99 different plant species in 46 families. During the monsoon season, they get much of their water from ripe and succulent fruit. Macaques living far from water sources lick dewdrops from leaves and drink rainwater accumulated in tree hollows. They have also been observed eating termites, grasshoppers, ants, and beetles.

Threats in the Study Area

This species is generally unthreatened, though its original habitat is increasingly being lost to development. While M. mulatta exists easily around humans, the increasing level of cohabitation has been associated with waning levels of human tolerance for the animals (Molur et al. 2003).
Confiscation for laboratory testing is a mostly localized threat, but it is considerable in certain areas (A. Kumar pers. comm.).
Capture and release of laboratory and “problem monkeys” from rural and urban areas into natural forests is a major threat to wild macaques.

CONSERVATION PLAN FOR REPTILES

INDIAN COBRA (Najanaja)

Introduction

Zoological name– *Naja naja*

The Indian cobra is a poisonous snake occupying large areas of the Middle East, from India through China and Indonesia. Indian natives call it nag, naga, pambo, gokhura and nagarahavu. The Indian cobra normally grows to a length of around one meter. It lives anywhere it can find suitable shelter,

even in are as occupied by humans. Cobras do not normally attack humans when not threatened, except during mating season. When meeting a cobra, the best strategy is to remain calm, since cobras react aggressively to rapid movements. The cobra's poison, similarly to that of other rat snakes (genus *Elaphe*) has primarily neurotoxic effects.

Classification

Kingdom: Animalia

Phylum: Chordata

Class: Reptilia

Order: Squamata

Suborder: Serpentes

Family: Elapidae

Genus: *Naja*

Species: *N.naja*

Local Names: In most parts of India derivatives of the Sanskrit Nag; Bengali Nagagokurra (binocellate form), Keauthia (monocellate form); Pushtu Chajitiwalla; Tamil Nallapambu, Nagapambu; Kannada Nagarahavu; Malayalam Moorkan, Surpam; SinghaleseNaya.

Size: Longest measured 2250mm. usually from 1371 to 1625mm.

Identification:

The cobra can be immediately distinguished from other land' snakes by the presence of as mall cunete scale between the 4thand 5th in Fra labials. Rarely two may be present and very rarely the cuneate may be absent. Another distinguishing characteristics the preocular touching the intranasal, a character seen in too their species of Indian snakes also but the cobra can be separated from these in having the 3rd supraliminal in contact with the eye. The hood is formed by the elongated ribs of the 3rd and the following 27 vertebrae, the 9th on the left and 10th on the right are the longest, the preceding and succeeding ribs short unprogressively giving an oval out line to the expand edhood. At rest their belie along the length of the body, the overlying skins but loosely attached. When erect the dorsal skinis stretched making the hood markings conspicuous and the head bent strongly at the atlas (1stvertebra) is carried at right angle stothe hood. The hood when dilated is diagnostic, more so when the markings are visible. The markings may be absent and in death the hood may not be demonstrable. The King Cobra has a well-developed hood and many other snakes have the ability to flatten the neck are at more limited degree. Head depressed with short, rounded snout. The nostrils are large and pupils round. Obvious welling at the temporal region over the under lying poison glands. Head shields glossy, body with a more or less distinct groove down the spine.

Coloration

Extremely variable in coloration and markings. Three races are recognized on the basis of the hood pattern: The spectacled or binocellate Cobra of peninsular India (*Naja naja naja*) yellowish, brownish or black above with or without a black and white mark on hood, a black and white spot on the inside of the hood with one or two black cross bars below hood. Sri Lankan and south Indian cobras are usually of shades of brown with well – defined hood marks. Cobras from the north are more often black and the hood pattern may not be well defined or may be absent. Monocellate Cobra (*Naja naja kaouthia*) differs in having only a single yellow or orange O-shaped mark on the hood. General colour olive, brown or black. This is the common Cobra of

eastern India and east wards of India. The Black Cobra (*Naja naja oxiana*) occurs in the extreme North West. Light grey or brown above when young with dark cross bars. Adult brown or black uniform.

Habitat, Distribution and Status

Absent in arid desert sand in the hills above 1800m. Occurs from Trans caspiain the north, through Indian subcontinent to southern China in the east and to the Philippines in the south. Andamans and Sri Lanka. Found almost anywhere, in heavy jungle, open cultivated land, in populated areas where old masonry constructions form ideal refuge. White ant nests, holes in the ground or the tangle of roots at the base of a tree are particularly favoured frequently found near or in water and is a strong swimmer. Usually not aggressive and often exceedingly timid but occasionally fierce and aggressive when disturbed. Young are much more dangerous than adults being more easily excited and ready to strike repeatedly and with determination. When alarmed it adopts the well-known pose with erect fore body and spread hood. The height to which the fore body is raise dis-approximately one-third the total length of the snake and forms the effective striking range. Whilst thus poised the snakes ways backward sand forward hissing in an explosive manner brief and high pitched during in halation and longer, louder, lower pitched and intermittently explosive during exhalation. The throat is pouched; more so, during exhalation and the whole body is inflated. The tongue flickers in and out during inhalation and exhalation. The bite is often a mere snap but sometimes bites and hangs on and the jaws have to be forced open. Occasionally when the snake misses, the poison is ejected as pray by the forceful thrust of the lunging snake. Usually more active and alert at night though hunts for food during the late afternoon and early evening.

Food

Feeds principally on rats, frogs and toads. Also takes birds, lizards, other snakes including other cobras and is an invert is rate egg stealer. Eggs are swallowed whole and digested in about 48 hours.

Breeding

Mating has been seen in January and the majority of eggs are laid in April/May but clutches have been obtained up to August. The period of gestation is about sixty-two-day set may extend considerably. Eggs hatch in 48 to 69days. Twelve to twenty-two, in one instance 45 (36 fertile) eggs are deposited data time. The eggs are soft-shelled elongate oval measuring 49x28mm. The parents cohabit before pairing and the eggs are guarded by one or both. Both parents known to incubate. Hatchlings measure 250-280mm at birth. The poison in glands are active from birth.

Poison Apparatus and Poison

Usually two fully operative canaliculated fangs on each side. These are shed singly at intervals. Fangs about 7mm in length are small compared to viper in fangs but are more solid. The bore of the fang opens widely at the base and by a small aperture at the tip. The poison in glands are analogous to the parotid salivary glands in mammals and have the shape and size of an almond kernel. The venom is a clear, viscid fluid resembling olive oil in appearance and consistency which solidifies into an amorphous mass. The amount secreted varies with age, vitality and temper of the animal and the average discharge at a bite is about 211mgm in dry weight. Comparative data on the basis of experiments on other animals gives the lethal dose form as 15 to 17.5 mgm for a weight of 60Kg person. However, the poison can be swallowed without ill effects provided there are no internal ulcers. The poison acts mainly as a neurotoxin and blood and cell destroyer. The

neurotoxin paralyses the respiratory Centre and is the chief cause of death. Other effects are loss of clotting power of the blood and destruction of red blood cells. The symptoms produced in man; start with a stinging or burning pain accompanied by swelling and oozing of blood-stained serum. The constitutional effects are a gradual but rapidly advancing paralysis commencing with the legs, the neck droops, the muscles of the tongue, lips, and throat, are affected and speech becomes difficult. The lower lip falls and allows saliva to dribble, swallowing becomes difficult or impossible. Breathing becomes difficult, laborious and stops. Other symptoms are vomiting and hemorrhaged from the various orifices of the body. It does not necessarily mean at the bite of a cobra is fatal at all times, depending as it does on the quantity of venom injected, the natural resistance of the victim, the condition of the snake and various other factors. Records indicate that case of recovery from a bite is equal to if not more than cases of death and there is always hope however serious the symptoms. The Haffkine Institute's polyvalent serum is fully effective even when symptoms are far advanced.

Facts about Cobra

a) The Indian cobra is one of the most dangerous snakes in India, killing around 10,000 people each year.

b) The Indian cobra is attracted to places like rice paddies, where many cases of biting occur.

c) The poison of the Indian cobra is used in research, and for manufacturing analgesics and anti-cancer medications.

d) Cobras are deaf, and their 'dance' is action to the movements of a fakir's flute, rather than the music.

e) Indian cobras kept in captivity may live up to 30 years.

f) Indian cobras are considered holy animals and certain days of the year are dedicated to their worship.

g) The Indonesian subspecies of the Indian cobra can spray its venom to a distance of several meters.

Threats

Direct threats include killing due to its venom potency, fear due to its aggressive behavior known to lay man encountered with it and road kills. This snake is exploited extensively by all Indian snake charmers and comes in skin trade too. Many communities consume this species for edible use. Its venom is used in production of Anti-Venom Serum and various research use so venom harvesting is done illegally in some parts of India and many other countries of its range. This is one among many venomous snake which are in high demand for Chinese medicines and snake vine.

RUSSELL 'VIPER

(Daboia Russlii)

Introduction

Zoological name - *Daboia russelii*

Russell's viper (*Daboia russelii*) is a species of venomous snake in the family Viperidae. Daboia is a monotypic genus of venomous Old World vipers. The genus Daboia is represented by a single species,

Daboia russelii. Apart from being a member of the big four snakes in India, Daboia is also one of the genera responsible for causing the most snakebite incidents and deaths among all venomous snakes on account of many factors, such as their wide distribution, generally aggressive demeanor, and frequent occurrence in highly populated areas.

Classification

Kingdom:Animalia

Phylum:Chordata

Class:Reptilia

Order: Squamata

Suborder: Serpentes

Family:Viperidae

Genus:*Daboia*

Species:*D. russelii*

Geographical Distribution: India, Bangladesh, Bhutan, Nepal, Pakistan and Sri Lanka.

Appearance

This species can be identified easily by robust and stout body covered with keeled scales. In three rows eye or almond like spots found in whole dorsal body. This character helps people to differentiate between Russell's viper and non-venomous Indian Rock Python which is found in the same range. It can be easily identified by checking oval shaped hollow or solid spots in three rows in dorsal body and highly keeled non-shiny scales.

Description:

- New born - 24cm.
- Average length-100cm (3.3ft).
- Maximum length- 180cm (6ft).

Dorsal

Body stout, robust and covered with highly keeled pointed and dry looking scales. Dorsal light or dark grayish-brown, reddish, orange or entirely gray occasionally. Color and patterns become faint in adults or sometimes adults fund to be completely pattern less. Continuous or discontinuous eye or almond like hollow or solid spots of dark brown or blackish color present in three longitudinal rows along the body; starts from head and generally become faint or absent on tail side. Side spots smaller and more rounded than spots present on the top and generally discontinuous.

Ventral

Belly white or light yellow with deep dark brown or blackish semi lunar spots on the edge of most of ventral scales. Underside of tail usually darker (brown or deep yellow) than ventral scales with paired sub-caudals.

Head

Head triangular, pointed with small keeled scales; clearly broader than neck. Two triangular shaped spots of rounded edge present on the top. Upper lip pinkish white mostly. Supra nasal crescentic with large nostril. Moderate eyes have vertically elliptical pupil. Two very long fangs present in front side of mouth from birth.

Tail

Rather small tail with pointed tip and covered with typical keeled scales; usually without patterns.

Geographical Distribution

Distributed throughout the country up to Assam. Not found in Indian islands, Himalayan hills and most of the North-states. Recorded from following states: Andhra Pradesh, Assam, Bihar, Chhattisgarh, Daman & Diu, Delhi, Goa, Gujarat, Haryana, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Puducherry, Punjab, Tamil Nadu, Telangana, Uttar Pradesh, Uttrakhand, West Bengal. Also found in Bangladesh, Bhutan, Nepal, Pakistan and Sri Lanka.

Habitat and Behaviour

Found both in plains and moderate elevation up to approximately 4800ft; more common in plains. Distributed in variety of forests including rainforest, mixed, dry, moist deciduous forest, scrub lands, grassland, wetland etc but does tend to avoid dense forests. Habitat includes dry open lands, agricultural fields, open country, scrubs having low bushes, rocky terrain having mounds & vegetation etc. Hides in mounds, holes, piles, caves, cracks, dense leaf litters, dense vegetation etc. Humid environments, such as marshes, swamps, and rain forests, are avoided. D. russelii is terrestrial and active primarily as a nocturnal forager. However, during cool weather, it alters its behavior and becomes more active during the day.

Food and Feeding Habits

Feeds chiefly on rodents and small mammals; also feeds on birds, lizards, frogs. Juveniles are crepuscular, feeding on lizards and foraging actively.

Threats in the Study Area

Road kill mortality, killing due to its venom potency and aggression on encounter with humans on field are two most commonly known threats. Illegal venom trade for various use including medical and research use is regularly noticed in parts of its range. In many parts of country, it is exploited for skin and edible use.

VERANUS SPS. INDIAN MONITOR LIZARD (Veranus bengaleneses)

Introduction

Zoological name- *Veranus bengaleneses*

Common Indian monitor is a monitor lizard found widely distributed over the Indian Subcontinent, as well as parts of Southeast Asia and West Asia. This large lizard is mainly terrestrial, and its length can range from about 61 to 175 cm from the tip of the snout to the end of the tail.

Classification

Kingdom:Animalia

Phylum: Chordata

Class: Reptilia

Order: Squamata

Family: Varanidae

Genus: *Varanus*

Species: *V. bengalensis*

Vernacular name: Ghorpad

Appearance

The common Indian Monitor is a medium-sized, dark brown monitor. It measures from 72 to 75 cm. in the head and body length. The young possess pale ring-spots and blackish cross-bars. The blackish cross-bars sometimes also persist in the adult.

Characteristically, the scales on the crown are larger than those on the neck region and those of the anterior part are rounded and keeled posteriorly. The snout is convex terminally. The nostrils are oblique slits lying midway between the eye and the end of the muzzle. The teeth are acute, long, sharp and re-curved. The tongue is very long, forked and pro-triable. Head and body length.

Geographical Distribution

The Common Indian Monitor occurs throughout the Indian subcontinent. It is also found in river valleys in eastern Iran, Afghanistan, Nepal, Sri Lanka, Bangladesh and Burma.

Habitat and Behaviour

The monitor is mostly diurnal. It is found in variable habitats, such as, forest, desert, river bank, by the side of nullah, marshy land, tidal creek and the sea coast. It occupies burrows, dense clump of vegetation, hollows of trees, cracks and crevices. This monitor is graceful in its movement and is a good climber and swimmer. It is a formidable reptile, bites hard, lashing with the tail and scratching vigorously with its powerful claws, when approached or caught in the wild condition. Its main food items are small terrestrial vertebrates, preferring ground birds and their eggs; also takes arthropods and fishes. It breeds from July to September. The eggs, 19 to 30 in a clutch, are deposited in holes and are covered with leaves, rubbish and sand.

Food and Feeding Habits

Their normal prey consists of beetles, grubs, orthopterans, scorpions, snails, ants and other invertebrates. Vertebrate prey is comparatively rare, and includes frogs, fish, lizards, snakes and rodents. Bengal monitors are also scavengers. They sometimes feed on dead animals.

Threats in the Study Area

The population of the Common Indian Monitor lizard has alarmingly dwindled throughout the country, due to excessive exploitation of the adults for their commercially valuable skins.

COMMON RAT SNAKE (*Ptyas mucosus*)

Introduction

Zoological name- *Ptyas mucosus*

Rat Snake is a commonly seen snake which is famous for its fast crawling speed and much larger size than most of the widely distributed species found in India. *Ptyas mucosus* belongs to the genus Ptyas of the family Colubridae and is the largest family of snakes which constitutes about two-third of all known living snake species. The genus Ptyas is represented by two species *Ptyas Mucosus* and *Ptyaskorros.*

Order: Squamata Family: Colubridae Genus: *Ptyas* Species: *P. mucosa*
Vernacular name: Dhaman

Appearance

Very long body with dark color patterns on the whole dorsal surface are its general identification features. Apart from these it can be identifies precisely by checking posterior body reticulated with black color net like markings. Traditionally people differentiate between Cobra and Rat Snake by accepting Rat Snake to be a snake having head broader than neck or neck thinner than mid body.

Description:

New born - 32-47cm.
Average length - 210cm
(7ft).
Maximum length- 350cm (11ft & 6inch)

Dorsal

Body slender with smooth and keeled scales (majority of scales smooth). Keeled scales present on 4-8 topmost rows mostly on the posterior body. Regular black, yellow and white band like markings present on the whole body according to the color of the dorsal. These black colored patterns become net-Like on tail side and more prominent than rest of dorsal. Dorsal color varies from jet black (Central India and parts of North-East), greenish black, range of brown, yellow etc. Sometimes black colored specimens lack any patterns.

V**entral**

Belly color also depends on color of dorsal; from pale yellow or white mixed with green, brown, gray, yellow etc. sometimes dark color patches exist on the whole belly. Subcaudal scales paired in zig-zag manner.

Head

Head pointed, not depressed with shiny smooth scales, clearly broader than the neck. Blackish color border present on upper lip and underside scales. Large eyes have rounded pupil. Tongue color purplish-black with darker color on the front side.

Tail

Long and slender tail typically like other arboreal snakes with a pointed tip. Blackish reticulations present on the whole posterior body.

Geographical Distribution

All over the India including North-east and Andaman also found in Islands ,Afghanistan, Bangladesh, Burma (Myanmar), Cambodia, China (Zhejiang, Hubei, Jiangxi, Fujian, Guangdong, Hainan, Guangxi, Yunnan, Tibet, (Hong Kong), India, Sri Lanka, Indonesia (Sumatra, Java, Bali), Iran, Laos, West Malaysia, Nepal, Myanmar,

Pakistan (Sindh area), Taiwan, Thailand, Turkmenistan, Vietnam.

Habitat and Behaviour

Remain hidden in dark and silent places like rat holes, termite mounds, wood caves, under rocks or any narrow and dark place. Distributed in variety of forests including rainforest, scrub lands, semi-desert, dry, moist and mixed deciduous forests, grasslands, mangroves, wetlands etc. Lives in almost all kinds of habitat due to its tendency to survive in tough conditions; this includes urban areas, dense & open forest, hills & plains, agricultural lands etc. Prefers wet surroundings during summer (shows semi aquatic behavior few times), while dry during monsoon.

Food and Feeding Habits

Feeds on a variety of prey mostly on rodents and toads; also feeds upon birds, small mammals, other snakes, all kind of lizards, eggs etc.

Threats in the Study Area

Threats includes killing due to misidentification with venomous species like King Cobra, other Cobra species. This is one the most intentionally threatened snake in its range due to its prone activity in and around humans and large size. In many parts of its range it is exploited for skin and edible use. Snake charmers use this species in snake charming because of its large size and harmless to display nature.

ACTION PLAN AND FINANCIAL PROJECTION

INTRODUCTION

Each organism on this earth has a unique place in food chain that helps contribute to the ecosystem in its own special way. After independence India saw exponential growth as a result more and more forest land has been destroyed for development activities. Hence natural habitats of animals and plants are being destroyed which result many of the animals and birds are getting endangered. To protect these birds and animals many initiatives like Project tiger, Project elephant, Crocodile Conservation Project etc. have been taken up along with these conservation projects of the wild animals, few schemes that are worked upon to protect the biodiversity and minimize the mortality of critically endangered and threatened animals has also initiated. Instead of numerous initiatives in India, the wildlife is facing many problems in terms of survival by way of habitat loss, human invasion of inviolate spaces and developmental related activities obstructing the natural corridors of migrating animals. Hence it is necessary to conserve the forest and its wildlife for maintaining ecological balance. Wildlife conservation is the attempt to protect endangered animal and plant species, along with their natural habitat. The main objective is to make sure that their habitats will be preserved so that the future generations of both wildlife and human can enjoy it. To conserve wildlife awareness must be created among the people about its importance and involvement of local people is must in the wildlife protection.

Following action plan and financial projection has been proposed for implementation of the conservation plan in the project area.

ACTION PLAN

Special Staff for the Protection and Anti-poaching

Special Staffs will be deployed by the forest department for patrolling and protection of the fauna and flora under their jurisdiction because the regular staff deployed for this purpose, due to their busy schedule, is unable to perform their work properly. Each of the special staff will be equipped with dress, raincoat, gumboots, sticks and wireless set for communication. Financial burden for the same has been included in financial project on of this report.

Reducing man wildlife conflicts

Unauthorized entry into forest for illegal grazing, cutting or poaching are the major causes for Man-Wildlife conflicts. These practices will be reduced as much as possible.

Protection and development of habitat

Activities which may damage the habitat will be kept on watch.

Creating Small Water Hole/Khelis

Water holes will be constructed at the area where “Peacocks” generally (nearby habitat) found. Location of waterholes will be suggested by the local forest department in consultation with the Gram Panchayat.

Conservation of "Lekking Sites" and Dust Bathing Sites

Habitat mosaic of scrub and open areas with ample sites for "dust bathing" and "lekking". Dust bathing is critical as this bird has to condition its feathers and remove feather-degrading bacteria and other external parasites.

Dust bathing sites will be conserved by planting bushes and shrubs around it.

Creation of drinking water facility

Water is the most important factors to all birds and animals. During drier season water availability in forest is limited, hence to provide water safely places suitable for mini watersheds will be identified in the core as well as in the buffer zone to store rainwater, so that water available throughout the year.

Conserving and restoring of forest area water bodies

Promote traditional techniques and practices for conserving ponds and other sources of water in the forest area.

Provision for environmental restoration

Ensure provision for environmental restoration during commissioning and after decommissioning of project.

Habitat Improvement Action Plan

Habitat improvement programme in the different villages will be under taken in the buffer zone area for shelter of the wild animals. This will be achieved by plantation of local varieties of the tree species near villages in buffer area. Plantation will also be carried in some forest patches identified by local forest department.

Habitat improvement programme will include plantation of various plant species like, *Azadirachta indica* (Neem), *Cordia Dichtoma* (Lasura), *Ficus religiosa* (Peepal), *Prosopis cineraria* (Jandi), *Syzygium cumini (*Jamun), *Zizyphus mauritiana* (Beri) and other species reported from the study are should be taken in to priority. In order to improve vegetation cover, it is suggested to carry out extensive afforestation program different phases. These species will help to provide habitat for faunal species, and also increase the species diversity and maintain the naturalness of the surrounding area.

Seed distribution among the villagers

During this habitat improvement programme the seeds of *Moringa oleifera* (Sehjan) will be distributed in the various villages of the study area. Compost packets will be also provided at the intervals of every six months by the proponent (in consultation of forest department).

Training and Awareness Programme

This is the most important aspect of wildlife conservation. People will be educated regarding the importance of wildlife conservation through mass publicity by installing sign boards, conducting audio visual classes and

distributing literature in respective villages in the buffer zone. Experts in the field of wildlife conservation will also be invited to deliver talks through slides.

Signboards: Sign-board strobe displayed are

Wildlife has right to move through roads
Reptiles crossing; drive slow
Plant tree saplings with your name
Fire destroys both the plants and animals
Capturing/ hunting wild animals is punishable offence
Don't throw burning objects
Wildlife is our precious heritage
Inform forest officer if wildlife is in distress

FURTHER SUGGESTIONS/RECOMMENDATIONS

- Stopping the increased vehicle pollution, wildlife road fatalities and damage to precious habitat by peoples to start movement towards these areas.
- To carry annual census research projects to ecology and habitat use by peacock.
- By making provision of veterinary care and cages for injured or sick deformed birds.
- The prolific use of insecticides / pesticides should be checked as these harmful chemicals are detrimental and instrumental for killing of insects / butterflies which are natural prey for the birds.
- Declare the animal as economically valuable
- Enact stricter laws to control the capture or exploitation of females of any endangered species and enforce them.
- Indigenous knowledge of endangered animals should be enlisted in all tribal areas.
- Captive breeding should be introduced on a commercial scale and value-added products extracted with people's participation. Profits should be equally shared. This may also discourage the illegal trade.

14. Suggestions and Recommendations

- The use of plastic products should be banned in the College campus.
- The College campuses are no doubt biodiversified but more plantations specially medical plantations are required in the campuses. Plantation of fruit plants will attract more birds.
- There is urgent need to form a Green Monitoring Team. The priority of this body is to maintain the greenery of the College campuses.
- The Green Monitoring Team should consist of members from teaching staffs, non- teaching staffs, and students and if possible try to include some local interested people.
- Vermi compost facility may be practiced, the product of which can be used as manure or fertilizer for plantation purpose.
- Sustainable use of resource and ecology balance of the college campus must be maintained through the year.
- Sound and air quality monitoring is being done on regular basis.
- Dry leaves can be used as compost fertilizer.
- Water metering required for assessment of actual consumption and prepares the future improvement plan to reduce the water consumption.

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THANKS