



Distribution Of Wild Life in The Thar Districts Of Rajasthan



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TYPES AND DISTRIBUTION OF WILD LIFE

Abstract

Wildlife has been considered as integral part of physical ecosystem being rich with her natural beauty and inherent some of the most rare species one can even found in the whole world. India in particular endows a rich account of wild life. This great natural resource comprises of about 8125 species of animals, among which 372 species of mammals, 1228 species of birds, 446 reptiles, 204 are amphibians, 2546 are fishes, 5050 are mollusks and 60383 are insects species.

Keywords:- Wild Life, Mammals, Birds Insects, Species

Introduction

India has nearly 5000 years old conservation practicing history. People regard wild animals and birds as exalted or sacred. They continue to hold usually affectionate respect for them. Several animals and birds are associated with gods and goddesses in the mythology. Finding temples devoted to animals, birds and a prominent place for such species by the side of god in a temple are not uncommon in India even today. Buddhism and Jainism have only added to the ethose of non violence and love for all living beings.

Types and Distribution Of Wild Life In Study Area

Mammals: The name ‘Mammal’ in itself describes something, which is distinctive of mammals. It refers to the possession of mammae or teats for suckling the young. Mammals are the only animals, which have mammary or milk producing glands. Mammals are commonly described as quadrupeds or four-legged animals. Now most reptiles have four legs, while whales and dolphins, true mammals though they have legless fish-like bodies and might be mistaken easily for fishes.

It would also be quite correct to define a mammal as an ‘animal with hair’. No other animal hair. The hair like growths on the body of a caterpillar or a crustacean is not hair. The so called ‘hairs’ of lower animals have neither the structure nor the mode of growth and development of true hair whereas every mammal, even the seemingly hairless whales, grows hair on some part of its body at some period of its life.

The animal kingdom which also includes the birds, reptiles, fishes and amphibians. But very distinctive in mammals is the mode of attachment of the lower jaw. It is directly hinged to the skull. All the other vertebrates have a loosely hung bone which links the lower jaw of the cranium. A mammal’s lower jaw is again unique in its structure. It is made up of a single bone. In other vertebrates it is composed of several distinct bones joined together. This may seem a trivial point, yet it is sufficient to distinguish a mammal from all other animals. A lower jawbone is all the evidence needed. Another important feature which distinguishes a mammal is that its heart and lungs are separated from its stomach and intestines by a muscular wall or partition called the diaphragm or mid-riff. Other animals have no diaphragm heart, lungs and bowels lie together in a single undivided body cavity.

Finally, it may be said of mammals that the great majority of them bring forth their young alive instead of laying eggs as nearly all other animals do. Those curious mammals the duckbills and the spiny anteaters lay eggs. When the young hatch out the mother in the manner of true mammals suckles them.

Classification of mammals: Classification is the grouping together of things, which bear the same relationships or affinities. Mammals and other back boned animals are grouped together in one great division of the animal kingdom - the Vertebrates. The main characters by which any mammal can be distinguished from any other vertebrate have been indicated. These characters common to all mammals, place them in distinct class of the Vertebrates - the Mammlia. Now different methods which they follow in caring for their young enable the sub-classification of mammals into three groups: (1) the egg-laying mammals or monotremes, (2) pouched mammals or marsupials, (3) the placental mammals. These groups are again divisible on the basis of relationships and affinities into orders, family genera and species. All rodents have chisel-shaped incisor teeth. United in this character they form a natural order- the Rodentia. In the same way a distinctive dentition enables us to place all beasts of prey in another natural order - the Carnivora, and all insect eaters in yet another - the Insectivora. There are 12 such natural orders of placental mammals, all of which are represented in the Indian region. An order may be divided into sub-orders. The order rodentia has, for example, two sub-orders. One includes squirrels, rats and mice and porcupines, distinctive in having a single pair of incisors in the upper jaw, the other - the hares and the marmots which have a double set. The family is a sub-division of the order or sub-order. Squirrels have certain family resemblance, which distinguish them from rats and mice, and these again have common family characters, which distinguish them from porcupines. The sub-order containing all these animals is therefore separable into distinct tribes or families. Carrying the classification further we pass from family resemblance to particular distinction between members of family. In the squirrel family - flying squirrels, giant squirrels and diminutive palm squirrels are quite distinctive. To specify these distinctions we place them in separate genera. Finally the members of a genus are distinguishable as different species. We may go even further and reduce the classification to its smallest unit. Minor differences in size, colour etc. may for example be seen in animals of the same species inhabiting different geographical areas. These variants are classed as sub-species or geographical races.

The classification of animals is based, as we have seen on mutual relationships and affinities. The major characteristics of some important mammals found in the study area are as follows:-

Chinkara: A full grown male measures about 65 cm at the shoulder and weights about 22 Kg. The average length of horns 25-30 cm and rarely exceed this length in southern India. The best heads are seen in Rajputana and the arid tracts of the north-west. The length of horns usually found 10-15cm but it is recorded over 40cm.

The body above is light chestnut, the colour depending where it joins the white of the under parts on the flanks and buttocks. The white disc around the tail, so prominent in the Tibetan gazelle, is absent. There is the usual white streak down each side of the face, so characteristics of all gazelle, and a dusky patch above the nose. The horns of the male appear almost straight when seen from the front; in profile they take a slightly S shaped curve. They have 15 to 25 rings. Horns of female are smooth. Hornless females are not uncommon. It is a very common animal of the Rajasthan desert.

Wastelands broken up by nullahs and ravines, scattered bush and thin jungle are the usual haunts of chinkara. They are common in the sand hills of the desert zone, and in the salt ranges, Punjab ascend to levels of about 4,000 ft. They are shy of man and are not so frequently seen in cultivated areas. They differ from the Black buck which prefers plains and undulating country and commonly enters fields. Chinkara lies up earlier in the day and come out later in the evening. When alarmed the herd goes off at a wild pace and stops some 200 - 300 mts. away to discover the cause of the alarm. Slight, scent and hearing are all equally developed in these animals.

The food consists of grasses, leaves, crops and fruits such as pumpkins and melons. They go without water for long periods and survive without it completely in desert country, deriving such moisture as they need from herbage and dew, but drink when there is water to be had, particularly in the hot weather.

Chinkara are much less gregarious than Black buck and lie in small herds of 10 - 20 animals. They have no particular breeding season. The bucks are much less pugnacious than is the case with antelope. One or two fawn is born at a time.

Table 1

Age Structure and the sex ratio of chinkara population in IGNP area

Age Class	No. of animals			Percentage			Sex ratio
	M	F	Immature	M	F	Immature	M : F
Infant<1yrs.	-	-	34	-	-	16.2	
Sub-adult<5yrs.	19	39		9.1	18.6		1:2.1
Adult>5yrs.	7	111		3.3	52.8		1:15.8
Total	26	150	34	12.4	71.4	16.2	1:5.77

Table 2: Incidences of Chinkara deaths in IGNP Area year 2006

Age Class	No. of natural death and sex			No. of accidental death and sex			Total deaths		
	M	F	Immature	M	F	Immature	M	F	Imm.
Infant<1yrs.	-	-	15	-	-	8	-	-	23
Sub-adult<5yrs.	0	4	-	9	11	-	9	15	-
Adult>5yrs.	6	17	-	5	16	-	11	33	-
Total	6	21	15	14	27	8	20	48	23

Blackbuck: They are commonly known as Hiran in India. A well grown buck stands about for 75-90 cm at the shoulder and on the average weight about 40 kg. Horns are usually 120 cm long. The Black buck is the sole representative in India of the genus Antelope. Its striking colour and beautiful spiraled horns, which may reach the shoulder height of the animal, give it an elegance hardly equaled by any antelope. This exclusively Indian animal is perhaps the most beautiful of all its kind.

The newly borned young Black buck is yellowish colour, When it becomes 3 years old it commences to turn black. This darkening of the coat varies in intensity. Well matured brown bucks may again be seen in all parts of the arid region in Rajasthan. In general there is a fading in the richness of tone during hot weather and increase in its velvety luster after the rains.

In the yearling buck the horns are without a spiral. In the second year a large open spiral is developed. It is believed that the full number of spiral twists is attained with the dark coat

about the end of the third year. Horned females are occasionally, but rarely met with. Black bucks are found practically all over Rajasthan. They avoid forest or hill tracts.

Black bucks are usually seen in herds of 20-30, though in Rajputana and the Punjab gatherings may the number may be several hundreds. These antelopes live in open plains covered with scrub or cultivation. They enter open forests, which contain wide expanses or grasses, and where much persecuted seek refuge in such cover. They feed on grass and various cereal crops. Usually black buck graze till near noon, and again in the late afternoon lying down to rest during the hot hours of the day. Their sense of hearing is moderate; scent fair, keen eyesight and speed are their protection. When alarmed the herd moves off in a series of light leaps and bounds and then breaks into a gallop. The leadership of a herd is usually vested in an old and vigilant female. Black buck breed at all seasons, but the main rut takes place between February and March when the bucks fight each other for the possession of the does. They are particularly pugnacious at this time. A buck then struts about with a peculiar mincing gait, uttering short challenging grunts, its head thrown upwards so that its horns lie along its back, and its face glands remain widely opened. During this time a buck may desert his harem taking a favoured usually conceal in the grass. But they gain strength rapidly and soon rejoin the herd.

Table 3 Antelope carvicapra: Showing total population, Age and Sex Composition

Year	Adult Male	Adult Female	Sub-Adult male	Sub-Adult Female	Juvenile Male	Yearling male	Sex-unidentified infant	Total
2004	9	79	5	20	5	6	15	139
2005	11	55	9	16	13	15	14	133
2006	8	35	7	12	8	7	9	86
2007	5	22	3	8	1	1	4	44
Total	33	191	24	56	27	29	42	402
Average (X)	8.25	47.75	6	14	6.75	7.25	10.50	100.50
Percentage	8.20	47.51	5.97	13.93	6.71	7.21	10.44	99.97
S.D.	2.17	21.53	2.44	4.47	4.38	5.02	4.38	38.53
CF	26	45	41	32	65	69	42	38

Adult male	:	Adult female ratio 1 : 5.79
Adult	:	Immature ratio 1.26: 1
Sub-adult	:	Juvenile-yearling-Infant ratio 1: 1.23
Adult female	:	Infant ratio 4.55: 1
Male	:	Female ratio 1: 2.19

White blackbuck(White variant of Antelope cervicapra):White coloured Antelope cervicapra is normally called White black buck instead of whitebuck. White individual of the blackbuck is neither a different sub-species nor true albino, but this is a white variant of the blackbuck. Status of whitebuck in Gujarat is similar to the white tiger recorded in Madhya Prdesh in the past. The present study does not deal with biology and genetics of white blackbuck but intend to put on record about existence of this variant in western Rajasthan. The adult male has a blackish brown to black coat with white underparts and a white patch around the eyes. The female has a yellowish brown coat with white underpart. The immature males also exhibit same colouration as adult females. In case of white blackbuck, both male and female are complete white in colour with light coloured hooves. The male possesses light coloured pair of spiral horns.

A healthy White buck male was at first time seen in Churu district in year 1998 and a female Whitebuck in a herd of about 140 blackbuck was observed in Kenchian Sriganganagar) in the same year. Similarly, white male was also seen near Dabla in Sriganganagar district. All three whitebuck (1 adult Male, 1 female and 1 fawn) has been introduced in Bikaner Zoo in December 1998.

Table 4 Population of whitebuck in natural habitat and captivity recorded during December 1996-Oct. 2007

(a) Natural habitat:

District	Site	Date	male/Female	Date of death	Cause of death
Churu	Ladaria	11-9-98	Male	01-04-03	Asphyxia
Shri Ganganagar	Kenchia	17-12-98	Female	28-08-02	Shock
Shri Ganganagar	Dabla	05-02-01	Male	Alive	-

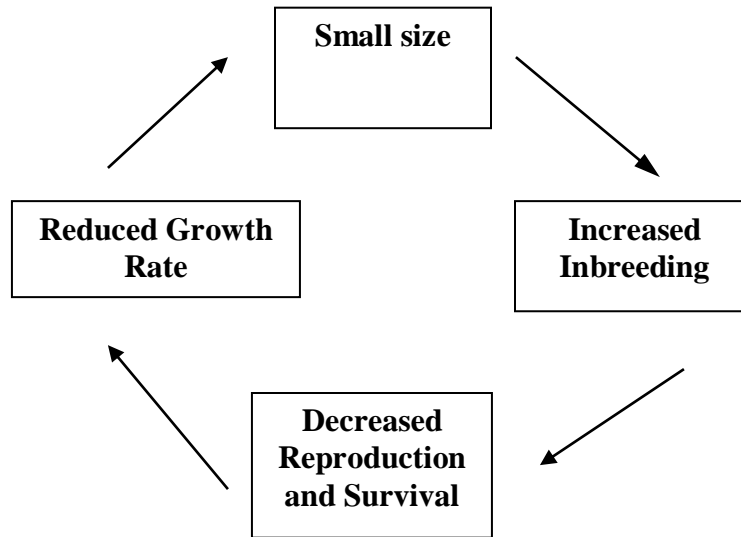
(b) Number in captivity breeding in Bikaner Zoo

Date of birth	Sex	Date of death	Cause of death	
24-7-99	Male	28-08-04	Syncope	
09-02-2000	Male	24-07-01	Septemea	
24-08-2000	Female	29-11-02	Asphyxia	
05-02-01	Female	14-09-04	S.Pneumonia	
23-09-01	Male	03-10-01	Infant	
03-02-03	Female	26-12-03	Infant	
30-01-04	Male	28-02-05	Shock	

A normal occurrence of mating between white black male and female white bucks has been observed in natural habitat as well as in captivity. There is no social differentiation or isolation among the newly born or adult individuals. Most of the whitebucks in Bikaner Zoo have been obtained form crossing between white male blackbuck and female whitebuck.

All the above whitebucks born at Bikaner zoo is not an albino but a different individual of same species. There are a few whitebucks in natural population and they are to be preserved in the interest of the antelope's conservation. There is need to examine the release of whitebuck population from capitivity to natural hyabitat to maintain the viable number for its existence.

The genetic problems of inbreeding depression and lack of adaptability of finding a mate and reproducing leading to further decline in numbers and thus more inbreeding and loss of genetic diversity. The population toward extinction at an ever accelerated pace.



Caracal: It is locally known as Siyeh gush. It has head and body a little over 60 cm long and tail about 23 cm. It has the broad head and tufted ears of a lynx. Like the lynx it stands higher on its hind limb than on the fore, but it is smaller and lighter in build, has a longer tail and no ruff of hairs around its face. Its skull bears a general resemblance to that of a lynx, but is narrower in the cranial and facial portions and recalls in some of its structural characters the skull of the typical cats (*Felis*). Its coat though not as dense as that of the lynx is yet thick and soft. The colouring is a uniform reddish Grey above fading into buff or white below. Faint indications of spots are present on the under surface and sometimes on the back. It is found commonly in the study area.

It is uncommon and elusive animal, fast approaching extinction in India. Little is known about the caracal in the wild state. It is a creature of desert and scrub jungle where it preys on birds, which it is said to take in flight by springing up at them, and on rodents, antelope and small deer. There is a record of a caracal attacking a man in Mirzapur district, U.P., but it is believed that the individual was driven to the act by hunger and was in a very emaciated condition, so perhaps it made the attack in error. A captive caracal in the Mysore zoo killed and partly ate a large cobra which had entered its cage.

Like the cheetah, it is easily tamed and trained to show in prowess in hunting small deer, gazelle, hares and foxes, and also birds such as peafowl, crane and pigeon. It relies for success upon its extraordinary agility. So perfect is the accord of eye and foot, that champion performers in this sport, once popular in Persi, it may kill 9-10 of a flock of feeding pigeons before they can leave the ground. It is interesting to note that of all the species of cats the

caracal comes nearest to the cheetah in the structure of its hind feet, thought cannot compare with it in speed or staying power. It is trained to hunt in much the same way as a cheetah.

Wolf: It is known as Bheriya, Hurar, Tola etc. in our country. Its height varies 60-90 cm., body length 91-106 cm. and tail 35-42 cm with a weight of 16-25 Kg. Its size, large skull and teeth distinguish a wolf from the rest of its tribe. In general, animals from the plains of India have sandy fawn coats stippled with black. The fawn may bleach to grey and the black become less evident in the scantier summer wear. Their winter coats are variegated with long black and white, or black and buff hairs, and dense, grey or bright buff under wool. It is found in the arid district of Rajasthan, Punjab, Haryana, U.P. and in Himalayas.

Wolves may live in forests, but in India they are more common in bare and open regions. In the barren uplands of Kashmir, Ladakh, and Tibet they lie as nomads coming down to the valleys in winter, migrating with game and grazing flocks to the snow line in summer. In these parts holes, caves, and cavities in rocks provide them with shelter in winter and thickets of reeds and scrub with a refuge in summer. In the Indian desert wolves' shelter from the heat in burrows, dug in the sand dunes. Elsewhere, there is more shade and they remain above ground, lying up in fields, or patches of scrub and thorn forest. They hunt by day or by night. What they hunt depends on the nature of the habitat. Near human settlements where there is little else to eat, wolves prey mainly on cattle, occasionally carry off children and when driven by hunger, become a serious menace to human life. In areas more remote from human influence they hunt blackbuck and gazelle, course after hares and foxes, in fact, they can eat any animal or bird they capture.

In India, the main breeding season is at the end of the rains and the majority of cubs are born in December. Three to nine whelps are born in litter. The duration of life is 12-15 years. Young wolves are easily tamed.

Jackal: It is known as Gidar, Shial and Kota in India. Its height varies about 38-42cm, length of head and body 60-75 cm, tail 20-28 cm. with weight of 7-11 Kg. They are found throughout the county. Its nearest wild relative is the wolf. But the jackal is smaller in build and meaner in aspect. It jacks the arching brows and elevated forehead, which give the wolf its nobler profile. Coat varies with season and locality. Typically, a mixture of black and white washed with buff about the shoulders, ears and legs. Himalayan animals have more buff on their coats and a deeper tan on ears and legs. Black variants are not uncommon in north India. It

is very commonly found in western arid region in Rajasthan including the northern as well as central parts in the country.

Jackal lives in almost any environment, in humid forest country, or in dry open plains and desert. The greater number live in the low lands, about towns and villages and cultivation, sheltering in holes in the ground among ruins or in dense grasses and scrubs. Jackals usually come out at dusk and retire at dawn, but in cool or cloudy weather they may be up and about by day; also on a very good day jackals often come out in quest of water to drink or lie in. Sometimes they form packs, but usually go about alone or two more may hunt together. They do well work in the clearance of carcasses and offal with vultures, the only sanitary service known to many of our towns and villages. The hunting instinct is not wholly dormant in the jackal; some become poultry thieves, or take to killing lamb kids and sickly goats and sheep. Any small or wounded animal may be attacked. They have been known even to collect in a pack to hunt small deer or antelope much as wild dogs do. In seasons, jackals raid in melon paths and sugarcane fields, and gather during the cold weather in coffee plantations. Where ber trees grow, they collect to feed on fallen fruit. Little is known about the jackal's family life. It is so secretive in habits. How long the male remains with its mate or family, what part, if any, it plays in caring for the young upbringing, growth and dispersal, all remains to be discovered. Cubs are born at any time in the year, usually in a hole in the ground, in a drain or any natural shelter. The duration of life is about 12 years.

Red Fox: It is known as Lomri, Hill Fox and Desert Fox in India. The length of head and body is 68-75 cm, and tail inclusive of hair is 45-50 cm with weight 4-6 Kg. richly coloured for with long silky fur and a superb brush. The black backs to the upper half of its ears and the white tip to its tail distinguish it from other Indian foxes. Red is the dominant colour of its lovely coat, but this is very variable-bright yellowish, grey, silvery and black individuals occur. In spring when the luxuriant winter coat is shed the red fur is scarcely recognizable, the dark under fur showing through the moulting coat gives it a grey brown tinge. These are normally found in Kashmir, Himalaya, Tibet as well as in the North western arid region on Rajasthan.

In the desert zone, it lives among the sand dunes or in the broad sandy beds of dry rivers and also in wasteland covered with scrub. Its distribution within our limits suggests a preference for dry rather than a moist climate. Red foxes shelter in a burrow dug in the ground or under or among rocks and where there is vegetation among reeds and bushes. Foxes are not social in

habit like wild dogs or wolves. They usually hunt alone or in pairs. Food varies with habitat and season. They prey chiefly on rodents, Ground birds like partridges and pheasants are killed and in the Himalayas their rodent fare includes squirrels marmots voles and mouse hares. In the desert gerbils and other sand rats are their main prey. The diet of meat is varied in season with fallen fruit berries and the combs and honey of wild bees.

Rodents: Squirrels, marmots, rats and mice, porcupines, hares and their kinsfolk are grouped together in a single order- the rodentia the rodents or gnawing animals. Both in species and numbers this is quite the largest single group of mammals. They are all comparatively small animals, earning a livelihood in diverse ways. Some live on the surface of the ground others bellows it some in trees and some in the water. With such diversity in habits and modes of life rodents naturally display great diversity of form and structure. But there is one character by which any rodent can be distinguished from all other mammals viz. its teeth; their distinctive structure etc.

All rodents are essentially herbivorous animals. There is probably no edible vegetable substance that rodent will not eat. The mode of eating is peculiar to the tribe. Rodent first breads up its food by scraping and nibbling at it with its front teeth. Its front or incisor teeth are especially designed for such work. They are sharp, chisel- shaped cutting implements. Most rodents have four such incisors two in the upper jaw and two in the lower. Rabbits, hares and their kin are an exception. They have four incisors in the upper jaw a large anterior pair, and a smaller pair set behind them. These incisor teeth are implanted in sockets reaching far into the jawbones and there is a remarkable provision to prevent there being worn away form long use and to keep them always sharpened to a fine chisel like edge. Actually a rodent incissor are built much like a chise. A chisel is made of soft iron and faced in front with this layer of hard steel. In much the fine layer of hard enamels usually bright orange or yellow in colour. In it's facing of steel. A fine beveled edge is thus maintained. The same thing happens with the incisor teeth of a rodent. In process of gnawing the soft dentine composing the body of the tooth wears quicker than it facing of hard resistant enamel. Thus as with the chisel the incisor teeth constantly maintain their sharp cutting edge.

Striped Squirrels: It is commonly known as Gilhari, Beral etc. Its head and body 7.50-10 cm, tail slightly longer. A number of local races of these squirrels are recognized -the

differences being based on the lightness or darkness of the coat or variations in the tone of the dorsal stripes.

Both species inhabit the Indian peninsula from the base of the Himalayas southwards. The 5 - striped is common in northern India, particularly in the south. It is essentially more communal with man. The three-striped species predominates in the south, and the moister parts of western sandy Rajasthan Tract. Both species may however be found living in the same area.

Five striped squirrel is the commonest and most familiar of all Indian wild animals. It is not found in forest, but has forsaken forests to live with Man in about his dwellings and fields. It has become almost as dependent on Man for food and shelter as house rare and mice, and lives in crowded towns and cities, or in villagers; in houses, gardens, groves, and hedges, and on road side trees. Lively active sprites, frisking about on the ground, or scampering about the house, or in the trees, their antics are always pleasing to watch. But like most squirrels they are noisy creatures. The 3 striped palm squirrel on the other hand is a forest animal. It has a particularly shrill bird like call, which it repeats again and again. Accompanying its music with quick jerks of its tail. Their food is the usual food of all squirrels - fruits, nuts, young shoots, buds and bard. When the silk cotton trees are in bloom these squirrels visit the flowers to drink the nectar and so probably help in their pollination. They also eat the pods. They are partial to 'prickly pears' and, in fruiting time, may be seen in the thorny cactus hedges, their mouths and feet stained red with the juice of the ripe fruit. Insects are eaten at a pinch, as also the eggs of birds. They are persistent egg-robbers.

The breeding habits of these the commonest wild animals of India are imperfectly known. When they are about to breed her young, the female builds an untidy nest of grass and leaves and fibers. This is placed in a tree, or in the rafters of a house, or in holes in the walls. Two or three young are produced. They are born blind and remain in the nest till able to fend for themselves.

Metads: The size of their head and body is 7.50-12 cm and tail nearly long. The dense soft fur and large rounded ears distinguish these rats from other commonly found in cultivation. The general colour is pale brownish greyish white on the underside. The palest coloured forms are found in the desert zone. They are found mainly in Peninsular India in the Arid and Semi Arid Regions.

Metads live chiefly near cultivated fields. They may be found sometimes in heavy scrubs surrounded by forest, or living among rocks and in tumbled down walls. In the Deccan they specially favour the plains of black cotton soil. They live in pairs or in small colonies. The 'burrow' is a very slight hole at the roots of a bush, or under a hedge: prickly pear hedges are favoured. Some make no burrow and are content to hide under a heap of stones. In black cotton soil they quite commonly make a home in the deep cracks and fissures, which from hard, baked ground during the hot weather. When in large numbers they do some damage to paddy and other food crops, and, in cotton fields, which they favour so much, metads can become a serious pest. Little precise is known of the breeding habits of these rats. They are said to produce 6-8 young at a birth. In the Deccan and South India metads periodically increase in enormous numbers and then become a perfect plague.

Field Mice: In addition to these common field rats, there are numbers of field mice. One of the commonest is the Indian Field Mouse. It is about 5-8 cm in body length, with a tail slightly over 5 cm. The dorsal fur varies from pale sandy in the desert and thorn forest zone, to brown or dark grayish brown in moister country. Under side white. It is common in our fields, is also found in compounds and gardens and may even venture into a house. A second equally common species is the brown Spiny Mouse. The fur in the mouse, both above and below, are composed almost entirely of latted spines, those on the back stiffer and coarser than those on the lower parts. The colour above is sandy or dark brown, white below. The separation of the two colours is sharp and well defines. In the Deccan these spiny mice live in burrows of moderate depth. On going in, the mouse closes the entrance with small pebbles, a quantity of these are usually collected outside the burrow. The sleeping chamber may also be furnished with a bed of pebbles.

House Rats: The habits of house rats and the damage they cause to human property and the deadly role they play in the spread of disease have already been discussed. An account of the common species inhabiting Peninsular India follows:-

The Common House Rat: This is our common species. It is believed that its original home was somewhere in India and Burma from whence this animal has been conveyed by human commerce to all parts of the world. The brown dingy-bellied rat is largely restricted to the towns and cities of the Peninsula, and to places where there are substantially built houses. Finally we have the white belied forms of *Rattus*, which usually live wild in open country and

forest areas both in the hills, plains and desert. These white bellied rats display more or less marked variation in colour and other details in different parts of India and have been split up into a number of geographical races.

Brown Rat: The original home of the brown rat is believed to be the temperate lands of Central Asia from whence this animal has spread or been carried to all parts of the world. It remains the dominant species, established everywhere, while the brown rat is limited largely to seaports, where it has been introduced by ships, and to larger towns and cities in the interior where it has been transported by railroad or navigable rivers. The brown rat is a larger and more robust looking animal than the black rat and can be distinguished immediately from the latter species by its shorter tail, which is shorter than its head and body. The general colour is brown, darkest on the back, lower parts white or whity brown or light brown.

The size of their head and body is 18-20 cm and tail 15-20 cm. In large cities this rat is found chiefly in drains and sewers. The availability of water seems essential to its existence in our warm climate.

Bandicota seems to be distinctive in character shown in the description of the Indian mole rat. The mole bandicota, as we have seen, is largely a creature of fields and forest, but the other bandicota found in India, are essentially parasites on Man, living in or about human dwellings. They are creatures of large size measuring about 30-40 cm from nose to base or tail- the tail about equally long. They weigh from 1-1.50 Kg. Their large size is sufficient to distinguish bandicoots from other house rats. Four species are known from Peninsular India. Bandicota gigantean has been recorded from the United Provinces, Rajputana and Kaithawar. Bandicota Malabarica from south-western and Southern India. Bandicoots are seldom found far from villages and towns, and though not as common or numerous as house rats (*Rattus rattus*), in parts of India, especially in the south, they are quite as domestic.

They chiefly occupy the outskirts of human such as compounds and gardens, stables and outhouses. Here from their burrowing habits they do much damage to grounds and floorings, or by tunneling through bricks and masonry. Their large burrows are always an indication of their presence. Like other rats they are omnivorous and feed on household refuse, on grain and vegetables and occasionally attack poultry.

Table 5 WILDLIFE CENSUS (2007) OUT SIDE IGNP AREA (DISTRICT BIKANER)

D.F.O. BIKANER		<i>Chinkara</i>	<i>Black buck</i>	<i>Neelgai</i>	<i>Wild boar</i>	<i>Fox</i>	<i>Rabbit</i>	<i>Jackal</i>	<i>Wild cat</i>	<i>Common</i>	<i>Peacock</i>	<i>Procupaine</i>	<i>Tortoise</i>	<i>Parrot</i>
1	Gajner	87	105	33	133	2	49	56	4	-	65	4	1	-
2	Kolayat	21	-	18	-	6	8	19	2	-	67	4	-	-
3	Gadhwala	332	-	93	-	24	45	4	3	-	8	-	-	-
4	Lunkarans ar	16	-	14	-	2	-	9	-	2	8	-	-	-
5	Bikaner (North)	24	-	10	-	6	12	-	2	-	6	-	-	13
6	Dungargar h	1144	-	113	-	11	-	-	1	8	477	-	-	-
7	Bikaner (South)	77	-	43	-	2	6	-	1	-	3	-	-	-
8	Nokha	1213	-	158	-	17	2	19	5	-	123	5	-	-
	Total	2914	105	482	133	70	122	107	18	10	757	13	1	13
D.F.O. Chhattarg arh														
1	Chhattarga rh	50	-	115	-	32	75	33	16	-	40	-	-	-
2	Beriyawali	686	-	194	-	77	38	70	13	-	2	-	-	-
3	61 KYD	299	-	178	-	28	39	47	6	-	3	-	-	-
4	Sattasar	670	-	302	-	58	29	-	28	7	240	-	-	-
5	Dantour	462	-	158	-	51	82	46	-	-	38	-	-	-
	Total	2167	-	947	-	246	263	196	63	7	323	-	-	-

Faunal diversity of the area is high and also the area has very high conservational values. Population density of Chinkara is relatively very high whereas other major mammals have low encounter rates. At present total of 14 species of wildlife has been encountered in Bikaner district out side IGNP area Chinkara is key species of the area Forest Department counted 5081 Chinkara in May 2007 in and around the forest area. Black buck is recorded only in Gajner Sanctuary Neel gai is found in whole area Wild boar is key species in Gajner Sanctuary. Fox is recorded as number 316 and Jackal is counted 313. Wild cat is also counted as 81 in May 2007.

Table 6 Wild life census (2007) shri ganganagar:

D.F.O. Sriganganagar		<i>Chnkara</i>	<i>Blackbuck</i>	<i>Neelgai</i>	<i>Wild boar</i>	<i>Fox</i>	<i>Rabbit</i>	<i>Jackal</i>	<i>Wild cat</i>	<i>Common angoose</i>	<i>Peacock</i>	<i>Vultures</i>	<i>sehi</i>	<i>tortoise</i>	<i>parrot</i>
1.	S. ganganagar	80	700	210	-	3	70	-	-	-	210	-	-	6	-
2.	Vijaynagar	50	6	280	-	8	40	13	16	-	42	-	-	4	-
3.	Suratgarh	308	69	203	-	8	-	-	-	-	51	-	-	4	-
4.	Birachwal	26	6	175	-	32	266	88	8	-	161	-	-	4	-
5.	Rawala	420	21	159	-	114	232	40	23	-	1	-	-	-	-
6.	Ghadsana	-	-	202	-	21	44	23	27	-	-	-	-	-	-
7.	Raysignagar	177	3283	1099	-	116	429	223	43	-	242	-	-	-	-
8.	Anupgarh	219	18	322	-	13	35	-	-	-	74	-	-	-	-
	Total	1280	4103	2650	-	315	1116	387	504	-	781	-	-	1	8

In Sriganganagar maximum population of Black buck has been recorded in this region especially in Raysrinagar. Black buck counting in May 2007 have revealed the fact that Black buck population has exceeded 4100 in the 8 Tehsils.

Table 7 WILDLIFE CENSUS (2007) HANUMANGARH

D.F.O. HANUMANGA RH		<i>Chinkara</i>	<i>Blackbuc</i>	<i>Neelgai</i>	<i>Wild boar</i>	<i>Fox</i>	<i>Rabbit</i>	<i>Jackal</i>	<i>Wild cat</i>	<i>Common Mangoos</i>	<i>Peacock</i>	<i>Vultures</i>	<i>Procupin</i>	<i>tortoise</i>	<i>parrot</i>
1.	Tibbiy	22	-	105	1	16	39	-	4	4	47	-	-	-	-
2.	Pillibanga	145	-	18	-	4	20	7	5	-	19	-	-	-	-
3.	Hanumanga rh	-	440	233	-	26	118	136	2	51	94	-	-	-	-
4.	Nohar	114	-	218	-	54	96	-	34	-	94	-	-	-	-
5.	Bhadra	62	-	316	-	32	272	-	21	71	96	-	-	-	-
6.	Ravatsar	17	-	61	-	17	0	14	0	-	0	-	-	-	-
	Total	360	440	951	1	149	545	157	66	126	350	-	-	-	-

Analysis of 14 species have revealed the fact that only 10 species are found in Hanumangarh district. Chinkara is recorded in 5 Tehsils whereas Black buck is only recorded in Hanumangarh. Desert fox is also recorded in whole region of district.

Table 8 Wildlife Census (2007) IGNP Area May 2007

IGNP Stage - II RD 620-1400 RD

D.F.O. DIV.-I	<i>Transect</i>	<i>Chinkara</i>	<i>Blackbuck</i>	<i>Neelgai</i>	<i>Wild boar</i>	<i>Fox</i>	<i>Rabbit</i>	<i>Jackal</i>	<i>wild cat</i>	<i>Common Mongoose</i>	<i>Peacock</i>
	II	198	-	116	31	48	103	71	-	8	107
	VI	182	-	89	13	4	7	22	2	-	53
	VII	169	-	31	16	2	23	19	2	8	74
Total		549	-	236	60	54	133	112	4	16	234
D.F.O. DIV.II	I	267	-	114	-	7	-	-	-	-	44
	II	356	-	73	6	27	-	75	1	-	221
	III	150	-	165	26	17	-	65	3	-	144
	IV	215	-	-	-	31	60	-	-	-	21
	V	280	-	-	-	3	9	-	8	-	12
	VI	361	-	65	-	11	6	-	8	-	81
	VII	465	-	-	-	0	-	-	28	-	42
	VII I	212	-	52	5	21	16	22	10	-	30
Total		2306		406	37	117	91	162	58	595	-
D.F.O. WFP	I	409	-	1	-	25	14	-	2	20	33
	III	135	-	10	2	8	8	4	1	-	12
	Bh akh ola	571	-	2	-	35	4	4	5	-	6
	Na chn a	372	-	98	-	18	27	36	10	3	155
	V	280	-	8	1	17	3	-	1	5	56
	VII ,	183	-	5	-	6	1	-	1	3	-

Total		1950	-	124	3	109	57	44	20	31	262
D.F.O.	I	161	-	46	-	30	52	-	17	-	121
OECE											
	II	35	-	12	-	18	5	-	-	4	80
	III	77	-	23	-	12	-	-	-	-	27
	IV	54	-	6	-	13	5	-	3	3	24
	V	129	-	6	-	8	2	-	-	12	-
Total		436	-	93	-	81	64	-	20	19	252

A total of 14 species have been recorded from the area. 8 species have been directly sighted, viz., Chinkara, Neelgai, Wild boar, Fox, Rabbit, Jackal, Wild cat, Peacock, and 6 species have been obtain from the indirect evidence.

Birds

Bird observations: Fixed width point transects of 40 m radius were used for collecting data on birds. Fixed-width point transects have been recommended for collection of data on bird communities in areas with heterogeneous fine grained habitats, where large amounts of data are to be collected over a short period of time and where sufficient sample sizes are required for statistical analysis (Bibby et al, 1992; Raman, 2003). Further, data collected using fixed-width transects have been found to be highly correlated with data collected using variable-width transects from the same habitat although density estimates utilizing fixed-width transects have been found to be generally lower than those obtained using variable-width transects. However, in a comparative study of bird densities across habitat categories, such differences are not likely to affect results.

Each of the forty point transects were covered five times for sampling during the period of the study on a rotational basis. At each selected site, birds were recorded for fifteen minutes on a given sampling day and birds spotted within a 40-m radius of the given point/site were identified and recorded. Calling birds were not recorded unless it could be ascertained that they were calling from within the 40-m radius. Birds were identified using Ali and Ripley, (1983). In addition, detailed notes were made on the breeding and foraging activities of birds during each point count, specially with reference to the tree/shrub species on whose flowers or fruits the bird was seen feeding on. Birds observed to be flying over the area of the point transect or soaring overhead were not recorded. However, flying birds were recorded if they were flushed out from

within the area of the point transect by the observer or observed to be flying into or out of the transect area during the fifteen-minute duration of the count

Counts were started half-an-hour after sunrise and continued for 3 hours after that, approximately between 7:00 and 10:00 O'clock each morning. Bird observations were made during the peak breeding season between March, 9 and June 4, 2006.

Vegetational characteristics: Within the 20m radius of the central point of each point transect, all trees having a girth of 30 cm or above were identified and counted. Woody plants (ie, shrubs and saplings) greater than 1 m in height but having a girth of less than 30 cm were also exhaustively counted and identified within the 20-m radius of the central tree of each point transect.

Vegetational structure was quantified using two indices: extent of canopy cover and foliage height diversity. Extent of canopy cover was quantified using a circular eyepiece. At each point transect, one of the 40-m diameter lines was chosen randomly. The observer, walked along this diameter line, looking up at the canopy every 2 m through a cardboard tube 2" in diameter. If more than 50% of the viewing area of the tube was covered by foliage, a '1' was recorded while if less than 50% was covered by foliage, a '0' was recorded. The canopy cover for a particular transect was calculated as the total number of '1's along that 40-m diameter line and thus ranged from 0 to 20. To quantify vegetational structure, using the same points along the chosen diameter line as used for canopy cover observations, presence or absence of foliage was noted as 0, if absent and 1, if present, within each of three height categories 0-2m, 2-6m and >6m. Foliage height diversity (FHD) was then calculated as $\sum p_i \cdot \log(p_i)$ where p_i refers to the proportion of foliage seen in a given height category.

Indicators of habitat disturbance were additionally recorded in terms of proportion of trees lopped by people and frequency of human use. At each point transect, the number of trees showing signs of lopping by humans, was recorded at each transect. From this number, the percentage of trees showing signs of lopping was quantified. During each of the five visits to each site, signs of human use such as grazing livestock, people seen collecting plant material and presence of cattle/goat dung were noted. Disturbance was quantified on an ordinal scale as the number of times out of five visits, that any such signs were seen and thus ranged from 0 to 5. Weed density was calculated as the number of plants of *Adhatoda visica* that were counted within each point transect. This was the only weedy species seen inside the transects

Bird community: A total 54 species of birds have been observed during the course of the study, of which 31 species have been recorded during point transects while 23 were seen only outside of transect counts. The latter category includes species that naturally occur at low densities such as brown fish owl and grey hornbill and possible passage migrants such as the blue-tailed bee-eater and little pied flycatcher. A complete list of bird species recorded during the study is given in Table . bird names follow Grimmett and Inskipp, (1998).

There are indications that the species-effort curves for most sites are tending towards saturation, implying that birds have been exhaustively covered in the study transects, at least for the season that was covered . However, considerable change in species composition of birds has been observed in Gajner during monsoon, which is likely to continue with passage and winter migrations (per. obs.). Therefore, it is likely that the species-effort curves for some or all of the study sites may slope upwards again if further observations are made during the monsoon and winter.

Bird density: Bird density at a given transect was calculated as the cumulative number of individual birds of each species that were seen at a given site over all five sampling days. Bird densities were not significantly different between disturbed and undisturbed sites according to a Kruskal-Wallis test (Sokal and Rohlf, 1981; $X = 1.26$, $p < 0.2615$;). Kruskal -Wallis test is the non-parametric equivalent of an analysis of variance test that is used to test for quantitative differences between one or more groups (Sokal and Rohlf, 1981).

Bird species richness: Bird species richness was calculated as the cumulative number of bird species seen in a site over all sampling days. Kruskal-Wallis test revealed that there was no significant difference between the bird species richness of disturbed and undisturbed sites ($X = 0.3741$, $p < 0.3741$).

Bird diversity: Bird diversity was estimated for each site using two indices, the Shannon-Weiner Diversity Index and the Simpson's Diversity Index (Magurran, 1988). Diversity indices take into account both number of species present in a given site, as well as their relative proportions in a community. More diverse communities exhibit greater evenness of abundance across species and harbour greater numbers of species. However, while the Shannon-Weiner function (X') and Margalef's Richness Index (RI) emphasizes the species

richness component of a community, the Simpson's index emphasizes the degree of evenness across species.

Neither of the two calculated indices showed significant differences between disturbed and undisturbed sites (Shanon-Weiner: $X=0.8243$, $p<0.3639$ and Simpson: $X=0.0885$, $p<0.766$).

Variable numbers of individuals that are seen at different sites can bias estimates of species richness. For example, if one sees fewer individuals at a site, it is probable that fewer species will be seen as well. Thus in some cases, gross species richness may not be a good indicator of community structure. In order to find out whether there were any significant differences in species richness, taking into account net numbers of individuals observed at various sites, rarefaction analysis was carried out using the programme Ecosim (Gotelli and Entsminger, 2001). The analysis, using bird composition data from transect D26 where most individuals were seen, further confirmed that any difference in species richness between disturbed and undisturbed sites is unlikely. The rarefaction curve shows that most of the sites are located well above the 95% confidence intervals for species richness generated using 1000 randomization. Comparison also indicates that disturbed sites have slightly higher species richness than undisturbed sites, than would be expected by chance.

Bird community composition: Species composition of a community indicates the identity of species and their relative abundances in the community. In this case, the identity of individuals becomes important rather than simply numbers of species. In order to study the variation in bird species composition across sites in the Reserve, Detrended Correspondence Analysis (DCA) was carried out with the bird abundance data ordered according to sites using PC-Ord package (Jpngman et al, 1995; McCune and Mefford, 1999). No down-weighting of rare species was done as it was felt that naturally rare species should be allowed to contribute as much to community differentiation as the more common species. DCA indicates weak differentiation of sites based on bird species composition. The first axis accounted for only 33.67% of the variation in bird species composition and the second axis 11.34%. Thus bird communities show weak differentiation across disturbance categories. As expected, sites within each of the four habitat types were clustered. However, there is distinct differentiation of bird communities between disturbed and undisturbed forest in the case of two of the four vegetation types date-palm forest and mixed forest, indicating that disturbance strongly impacts the bird

communities of such areas . Bird communities of scrub of forest or plantation, however, do not show much difference between disturbed and undisturbed sites.

Ordination gives only a qualitative picture of how different communities are and such differences cannot be quantified in any way. In order to explore quantitatively whether bird communities differ significantly between disturbed and undisturbed sites in terms of species composition, similarity analysis was carried out using three widely used similarity indices: Jaccard's index, Sorensen's index and Morisita-Horn index (Magurran, 1988; Colwell and Coddington, 1994; Colwell, 1997). While Jaccard's index takes into account only presence or absence of species in a given site, Sorensen's and Morisita-Horn indices take into account relative abundances of species as well (see Colwell, 1997 for definitions of indices). In order to find out whether disturbed sites were significantly different from undisturbed sites in terms of bird species composition, each of the 40 sites were compared with each of the others, by calculating inter-site similarity using the programme Estimates (Colwell, 1997). This yielded 780 inter-site comparisons. Similarity indices between pairs of disturbed and undisturbed sites were separated from the indices calculated between pairs of disturbed and undisturbed sites, thus giving two groups of similarity indices. These two groups of indices are referred to as 'within-group' (n=374) and 'across-group' (n=406) similarities, respectively. These two groups were then statistically compared using the Kruskal-Wallis test. This procedure was carried out for each of the three chosen similarity indices.

The results indicate that 'within-group' similarities were significantly greater than 'across-group' similarities, showing that disturbed and undisturbed sites differ significantly in terms of bird species composition. These results were consistent across all three similarity indices used (Jaccard: $X = 13.37$, $p < 0.0003$; Sorensen: $X = 18.24$, $p < 0.0001$; Morisita-Horn: $X = 27$, $p < 0.0001$).

Relative abundance of various feeding guilds: Feeding guilds of birds (or any other taxon) are groups of species that feed on similar resources in the ecosystem. For examples, birds that feed on insects from leaf litter on the forest floor, form a single feeding guild. Intensive habitat use or human disturbance is likely to affect the food resource base in a forest ecosystem and this may affect the structure of a community in terms of relative abundance of various feeding guilds. In order to study the effect of habitat use on various functional guilds of birds, the bird species recorded during transect counts were first classified into feeding guilds based on their food sources as reported in Ali (1996). The different categories of food sources

that were mentioned in Ali (1996) and that were therefore, considered, were fruits, insects, carrion, smaller vertebrates, seeds, nectar and aquatic organism. If a species was reported to be feeding primarily on one of the above food categories, it was assigned to one of the following guilds: frugivore (fruit-eating), insectivore (including bark-gleaning, sallying, understory and canopy-feeding insectivores), graminivore (seed-eating), raptor (smaller vertebrates such as birds and reptiles), scavenger (carrion), nectarivore (nectar) or aquatic (wetland species). If a species was reported to be feeding principally on more than one category of food, it was assigned to one of the following combined feeding guilds: insectivore-reptor, insectivore-nectarivore, insectivore-frugivore, insectivore-graminivore and frugivore-graminivore. When a species was reported to be feeding equally on more than two categories of food, it was assigned to the omnivore category. The feeding guilds to which the bird species were assigned are given in Table 1. A total of fourteen guilds were constituted of the 31 species of birds that were recorded during transect counts.

A series of chi-square tests for goodness of fit, were carried out to explore differences in relative proportions of various feeding guilds between disturbed and undisturbed habitats. Abundance of birds in various feeding guilds was found to differ significantly between disturbed and undisturbed habitats in all vegetation types and in all the forty sites taken as whole (Plantations: $X=171.25$ $df=10$, $p<0.001$; open lands: $X=864.12$, $df=10$, $p<0.001$; agriculture and pasture land: $X=106.42$, $df=10$, $p<0.001$; natural forest: $X=115.42$; $df=9$, $p<0.01$; combined habitats: $X=419.33$, $df=12$, $p<0.001$). Results are shown in the foot note .

These results indicate that the feeding guild composition of the bird community differed significantly between disturbed and undisturbed habitats. Taking all habitats together, disturbance appears to reduce the insectivore-nectarivore guild and increase the guilds of omnivores and graminivores the same pattern is amplified in the plantations habitats. Additionally, in this habitat, frugivore-graminivore and frugivore guild is highly reduced in disturbed habitat in comparison to undisturbed habitat. However, omnivores seem to be reduced by disturbance, rather than increased, in scrub forest and mixed forest. Thus ways in which some of the feeding guilds are affected by disturbance, vary across habitat types. The only pattern which is common to all four habitat types is the reduction in the insectivore-nectarivore guild and expansion of the graminivorous guild after disturbance.

Species-wish analysis: In order to study the effect of habitat disturbance on specific bird species, the abundance of each of the 31 species recorded during transect counts, was compared between disturbed and undisturbed habitats using Kruskal-Wallis tests. The results are given in out of 31 species recorded during the point counts, 9 species showed significantly higher abundance in disturbed forest in comparison to undisturbed forest . These include species such as common myna, house crow, house sparrow, greater coucal, collared dove and Indian robin. Eleven species were significantly more abundant in undisturbed habitat such as common woodshrike, great tit, redvented bulbul, grey-crowned pygmy woodpecker, magpie-robin, tree-pie and white-eye. The remaining 23 species showed no significant differences between disturbed and undisturbed habitats. These include species that were spotted ten times or during the entire set of transect counts.

lists the species that were seen ten times or less during the course of the transect counts. Of these 15 species, common, 24 species shows the number is likely to increase 2 species migratory 4 species migratory but number is likely to increase 4 species abundant 5 species abundant number is likely to increase were seen in both disturbed and undisturbed habitats. Of the 23 species seen outside of transect counts, 6 were wetland species seen at a seasonal lake in the escape area of 750 RD main canal and at Gajner, and artificial reservoir near the village Goleri. Apart from these dry wetland species, 17 species were seen in various categories of forest habitat of which 10 were restricted to undisturbed habitat.

Thus of a total of 54 bird species recorded during the course of study, eleven were significantly affected by habitat disturbance, while twenty additional species are likely to be affected , given their presence and absence from various habitats.

Changes in vegetation characteristics: In terms of disturbance levels, all three disturbance indicators were measured to be significantly higher in disturbed sites in comparison to undisturbed sites (frequency of human disturbance: $X=18.85$, $p<0.0001$; density of weeds: $X=6.83$, $p<0.009$, % trees lopped: $X=25.05$, $p<0.0001$).

Canopy cover was found to be significantly higher in undisturbed sites in comparison to disturbed sites ($X=11.3262$, $p<0.0008$). However foliage height diversity (FHD) was not found to be significantly different between disturbed and undisturbed sites, although mean FHD was higher in undisturbed sites than in disturbed sites ($X=0.279$, $p<0.5974$).

Undisturbed sites had higher tree density and tree species richness than disturbed than disturbed sites. However, these differences were not statistically significant (Tree density= 1.11, $p < 0.2911$; tree species richness: $X = 0.31$, $p < 0.5758$).

Understorey density (including shrubs, saplings and weeds) was significantly higher in disturbed sites in comparison to undisturbed sites ($X = 4.23$, $p < 0.0398$). The number of species in the under story was also higher in disturbed sites, though this difference was not statistically significant ($X = 2.23$, $p < 0.14$).

Relationships between bird species abundance and vegetation characteristics: In order to explore the relationship between abundance of bird species that were found to be affected by habitat disturbance and features related to vegetation, simple correlations were carried out between bird species densities and each of the eight vegetation features that were calculated for each transect. shows the results of this analysis. The vegetation variables with which most of the bird species showed a significant positive correlation were canopy cover and tree species richness, including the great tit, magpie-robin and oriental white-eye. Percentage of lopped trees and human disturbance was also significantly negatively associated with densities of some of these species. Weed density, foliage height diversity and understorey richness were not correlated with any of the bird species densities. Thus loss of canopy cover with tree species appear to be the two important habitat features related to intensive human use that cause decline in sensitive bird species.

Common birds around the Indira Gandhi Nahar Project

<i>Zoological Name</i>	English Name	Occurrence
<i>Phalacrocouax niger</i>	Little Cormorant	C+
<i>Ardeola grayii</i>	Pond Heron	C+
<i>Bubulcus ibis</i>	Cattle Egret	C+
<i>Egretta garzetta</i>	Little Egret	C+
<i>Pseudibis papillosa</i>	Black Ibis	C+
<i>Anas strepera</i>	Gudwall	C+M
<i>Anas clypeatay</i>	Shoveller	C+M
<i>Milvus migrans</i>	Pariah kite	C
<i>Aquila rapax</i>	Tawny Eagle	C
<i>Gyps bengalensis</i>	Whitebacked Vulture	A
<i>Neophron percnopterus</i>	Egyptian Vulture	C
<i>Frncolinus pondicerianus</i>	Grey Partridge	C
<i>Pavo cristatus</i>	Common Peafowl	C+

<i>Gallinule chloropus</i>	Indian Moorhen	C+
<i>Porphyrio porphyrio</i>	Purple Moorhen	C+
<i>Fulica atra</i>	Coot	C+
<i>Himantopus himantopus</i>	Blackwinged Stilt	A+
<i>Vanellus indicus</i>	Red-wattled Lapwing	A+
<i>Philomachus pugnax</i>	Ruff and Reeve	C+M
<i>Pterocles exustus</i>	Indian Sandgrouse	C
<i>Columba livia</i>	Blue Rock Pigeon	A+
<i>Streptopelia decao???</i>	Ring Dove	A+
<i>Streptopelia senegalensis</i>	Little Brown Dove	A+
<i>Psittacula krameri</i>	Roseringed Parakeo	C+
<i>Athene brama</i>	Spotted Owlet	C+
<i>Haleyon satynensis</i>	Whitebreasted Kingfisher	C+
<i>Merops orientalis</i>	Groon-Boo-oater	C+
<i>Coracia benghatensis</i>	Indian Boller	C+
<i>Upupa epopis</i>	Hoopoe	C
<i>Eremopterix grisea</i>	Ashycrowned Finch Lark	C+
<i>Eremopterix nigriceps</i>	Blackcrowned Finch Lark	C+
<i>Galerida cristata</i>	Crested Lark	C
<i>Hurundo fluoicola</i>	Indian Cliff Swallow	C+
<i>Lantus exabitor</i>	Grey Shrike	C
<i>Lanius schach</i>	Rufousbacked Shrike	C
<i>Dierurus actsumilis</i>	Black Drongo	C+
<i>Sturnus ???eus</i>	Rosy Pastor	CM
<i>Stu??us vulgaris</i>	Starling	CM
<i>Sturnus contra</i>	Pied myna	C
<i>Acridotheres tristis</i>	Common Myna	C
<i>Corous splendens</i>	House Crow	A
<i>Corvus corax</i>	Raven	C
<i>Pyenonotus leucogenys</i>	Whitecheeked Bulbul	A
<i>Pycnonotus cafer</i>	Radvented Bulbul	C+
<i>Turdoides caudatus</i>	Common Babbler	A
<i>Turdoides malcolmi</i>	Large Grey Babbler	C+
<i>Acrocephalus stentoreus</i>	Indian Great Reed Warbler	C+
<i>Sylvia curruca</i>	Lesser Whitethroat	C
<i>Cercomela fusca</i>	Brown Rock Chat	C
<i>Oenanthe picata</i>	Pied Chat	C
<i>Matacilla alba</i>	White Wagtail	C+M
<i>Nectarinia asiatica</i>	Purple Sunbird	C+
<i>Petronia xanthocollis</i>	Yellowthroated Sparrow	C+
<i>Lonchura malabarica</i>	Whitethroated Munia	C+

KEY:

Significance Levels

C = Common

p < 0.05

+ = the number is likely to increase

p < 0.10

A = Abundant

 $p < 0.01$

- = the number is likely to decrease

M = Migratory

Discussion: The study indicates that though species richness and diversity of bird species was not affected by habitat disturbance, there was a substantial difference between bird species composition of intensively used forest and those of relatively undisturbed areas inside the study area. 14% of forest bird species showed quantitative decline in densities in disturbed sites while 11% seemed to be encouraged by habitat degradation. Taken together, similarity analysis and comparison of the relative abundances of feeding guilds confirm that structure and composition of bird communities is significantly affected by intensive forest use. The findings of this study closely concur with numerous other studies on the effects of land use change on bird communities that been undertaken in tropical areas (Johns, 1989; Pramod et al 1997; Raman et al 1998; Zakaria et al 2002).

The present study may be the first to examine the effects of chronic and intensive biomass collection on bird communities in western Rajasthan. The study shows that the effects of long-term human use may be similar to those that are brought about by large scale and drastic land use change such as agriculture and conversion of area into plantation (Raman and Sukumar, 2002; Zakaria et al, 2002; Craig, 2002). Such dependence on forests needs to be taken into account, if we are to sustainably manage forests for biodiversity conservation, particularly in national parks and wildlife sanctuaries.

The above findings with respect to the impact of human disturbance on bird communities may be conservative, for two reasons. First, as mentioned earlier, sufficient data could not be collected on as many as 102 species, that were seen either outside transect counts or fewer than ten times, due to the short-term nature of the project. From the presence-absence, one can infer that several other species are likely to show effects of disturbance. Second, the disturbed sites that were sampled during the study included both those located inside small 'disturbance patches' (<100 m in diameter) as well as those located inside large patches such as are seen around villages, some of which extended for more than 5 km in diameter. In addition, the degree of degradation was not uniform across sites in the disturbed category, with certain disturbed sites being completely bereft of natural vegetation and others showing less intense disturbance. Generally, smaller disturbance patches were also less disturbed (pers. obs.). It is

likely that confining sampling to large-scale disturbances and to highly degraded areas, would have considerably amplified, the observed effects on bird communities. Though some bird species are strictly habitat-restricted, other species may breed in certain habitats but move across a heterogeneous habitat mosaic during the course of their daily foraging activities. Due to this, it is possible that some of the smaller and less disturbed degraded patches that were sampled, harboured some bird species that are normally restricted to good forest habitat. The painted spurfowl, for example, was seen in Kankwari.

Reasons underlying impacts of changing habitat structure on birds: Changes in bird composition in disturbed habitat could not be linked strongly or definitively to changes in habitat in this study, as has been possible in other studies in tropical areas (Greenberg *et al*, 1997b; Raman *et al*, 1998; Raman and Sukumar, 2002,). This could be due to the fact that not all features related to vegetation structure and composition was significantly different between disturbed and undisturbed habitats. This could be due to two reasons. One, there were great differences in structure across the four habitat types that were studied. For example, understorey density was naturally higher in scrub forest in comparison to plantation, even when undisturbed. Second, degraded forests of certain habitat types resembled forests of other categories, at least in some features. For example, understorey density was high in both disturbed scrub forests as well as in undisturbed plantation. Similarly, degraded plantation was quite different in structure from that of disturbed scrub forest. Possibly due to these reasons, sharp differentiation between disturbed and undisturbed forests was not seen.

The change in abundances of the eleven sensitive bird species appears to be related most to drastic reduction in canopy and loss of diverse food plants for birds, at least during the study period. This also explains the fact which change in composition of bird communities was seen most strongly in plantations.

Change in bio-diversity: in IGNP area quantification of the changes in bio-diversity is hampered by the lack of quantified baseline data. That there has been a very significant increase in Bio-diversity as a result of the internation of IGNP canal waters is indisputable, and is implicit in the flora and fauna. Where the many non-desert species that are now found are clearly indicated.

Since increase in bio-diversity is not a prime objective of the project, and the increases are generally beneficial, Command Area Development (CAD) should not use its scarce

resources in monitoring the overall changes. However, there are several and the Indian Botanical and Zoological Societies, all of which have offices - of are based - in Jodhpur. In order to produce a clearer picture of the changes in flora and fauna as a result of IGNP, it is recommended that formal links with these organization be established and attempts made to generate data specific to the irrigated areas.

Desert Habitat:

Wildlife and Plants: The quantitative data on wildlife numbers and distribution in and around the IGNP area have not been collected on a systematic basis, are seldom specifically related to the changes in habitat brought about by the project and lack a baseline survey with which to compare the result. For the purposes of generalized statements on the broad effects of the scheme, the limited observations and anecdotal evidence- coupled with the obvious effects of the infrastructure and irrigation practices - are sufficient to indicate the main environmental impacts. However, there area no detailed data to allow precise statements to be made on the impacts on specific species, nor to make clear comparisons with the situation outside the IGNP area. Similarly, there are insufficient data to define the critical areas and their locations necessary to ensure the survival of particular species in the locality. It is clearly impractical to investingate the impacts on all the wildlife species, but given that the Project covers such a large area of the desert and will in time cover even more, the key requirement for IGNP/CAD now is a careful inventory of at least the rare and endangered species and the areas they inhabit. At the same time, the consultants see a vital need to develop clear project policies and strategies, complying with state and national objective, for Project activities which are likely to affect the natural ecology (both the wildlife and the habitat) and appropriate modifications to project practices. These considerations must include land out side the stict physical limits of IGNP but subject to its influence and must, necessarily involve consultations with environmental and social agencies and with local people.

To date, such an integrated approach is entirely lacking, and there appears to be little effective communication between those concerned with environmental conservation and the planners and developers of the IGNP. The former all too often merely catalogue the (qualitative) changes they discern in the area with few realistic and detailed prescriptions for more environmentally sensitive practies, whilst the latter appear to have proceeded with the

design and implementation of the scheme with minimal regard for the environmental consequences.

Although the rare and endangered species are identified, and the natural desert habitats are known in terms of their floral composition and - to some extent - their ecology, the essential parameters needed to ensure the survival of rare and endangered species have not been defined in ways that can be used by project planners and implementers to guide their actions. This essentially means identifying which species (and not just the rare and endangered ones) require special provisions and which specific areas of land are especially vulnerable to project interventions.

The tracts of land occupied by *sewan* grass are an example: irrigation development effectively destroys these natural pastures and their wholesale destruction should be prevented. To do this, however, needs the active cooperation of CAD, IGNP and wildlife specialists to define on what basis the critical areas should be defined, their extent and their locations.

The urgent priority is clearly to review, and implement recommendations on, the situation with respect to the rare and endangered species, and -most importantly - to the imminent construction of the Gadra Road Extension canal in the Desert National Park. The latter is likely to have major adverse environmental implication for the park and has the potential to destroy much of the conservation effects that the park is intended to produce. Because the canal construction is so close to the park boundary already, this issue has been highlighted as the priority for the stage II EIA. It is very strongly urged that the canal development in the park should not proceed until the environmental impacts have been thoroughly assessed.

VULTURES: Out of ten species of vultures found in India (based on taxonomy), seven vulture species has been recorded this study. Species observed by us is listed in Table Details of vulture population of different species borned in the study area is given in Table A total of vultures of 7 species were observed in 11 district of western Rajasthan. The district wise details of vulture population in study area in given in Table .

Generally, most of the vulture populations of different species were observed near water bodies, availability of livestock and wildlife in the area and presence of Municipal Carcass Dumping Grounds of villages, town and cities. Vulture populations were also observed near safe nesting and roosting trees and cliffs (particularly close totemples) in the study area.

Vulture Species observed in the study area.

S. NO. *	Common Name	Scientific Name	Size	Sighting	Status
1.	Long-billed vulture	<i>Gyps indicus</i>	80-95 cm	Common	Resident, breeding
2.	White-backed vulture	<i>Gyps bengalensis</i>	75-85 cm	Rare	Resident, breeding
3.	King vulture	<i>Sarcogyps calvus</i>	80-85 cm	Rare	Resident, breeding
4.	Egyptian vulture	<i>Neophron percnopterus</i>	60-70 cm	Very common	Resident, breeding
5.	Himalayan griffon	<i>Gyps himalayensis</i>	115-125 cm	Common in winters	Migrant, non breeding
6.	Eurasian griffon	<i>Gyps fulvus</i>	95-105 cm	Very common in winter	Migrant, non breeding
7.	Cinereous vulture	<i>Aegypius monachus</i>	100-110 cm	Rare in winters	Migrant, non breeding

Vulture population found in western Rajasthan year 2006-07

S. No.	District	Vulture population Observed	Species found * (S.N.)
1.	Barmer	63	1,3,4
2.	Bikaner	1433	1,3,4,5,6,7,
3.	Churu	95	1,2,3,4
4.	Jaisalmer	89	1,2,3,4,5,6,7
5.	Jalore	65	1,3,4
6.	Jhunjhunu	15	3
7.	Jodhpur	1174	1,2,3,4,5,6,7
8.	Nagour	138	3,4
9.	Pali	152	1,2,3,4,5
10.	Sikar	24	1,4
11.	sirohi	58	1,3

Monthwise population of feeding associates (eagles, cattleegret, black ibis, dogs) of vultures (year 2004-2005 to 2006-2007)

s. No.	Months	Year 2004-2005				Year 2005-2006				Year 2006-2007			
		Eagles	Cattle egret	Black ibis	Dogs	Eagles	Cattle egret	Black ibis	Dogs	Eagles	Cattle egret	Black ibis	Dogs
1	April	55			95	36	-	-	88	40	-	-	90
2	May	21			93	26	-	-	85	25	-	-	80
3	June	14			90	10	-	-	81	13	-	-	70
4	July	13			90	10	-	-	40	12	-	-	50
5	August	14			87	13	-	-	45	11	-	-	65
6	September	12		11	89	20	-	10	50	12	21	40	70
7	October	27	37	31	92	30	32	25	100	30	60	35	70
8	November	34	49	52	97	50	55	40	120	38	115	110	80
9	December	47	53	57	105	50	60	30	75	52	110	90	65
10	January	48	57	56	104	70	67	35	80	70	120	126	70
11	February	48	61	52	98	100	69	40	85	75	120	122	108
12	March	40	37	42	91	80	35	45	90	55	51	95	85
Min.]	Population	12	37	11	87	10	32	10	40	11	21	40	50
Max.	Population	48	61	57	105	100	69	45	120	75	120	126	108

Ecology of vultures:

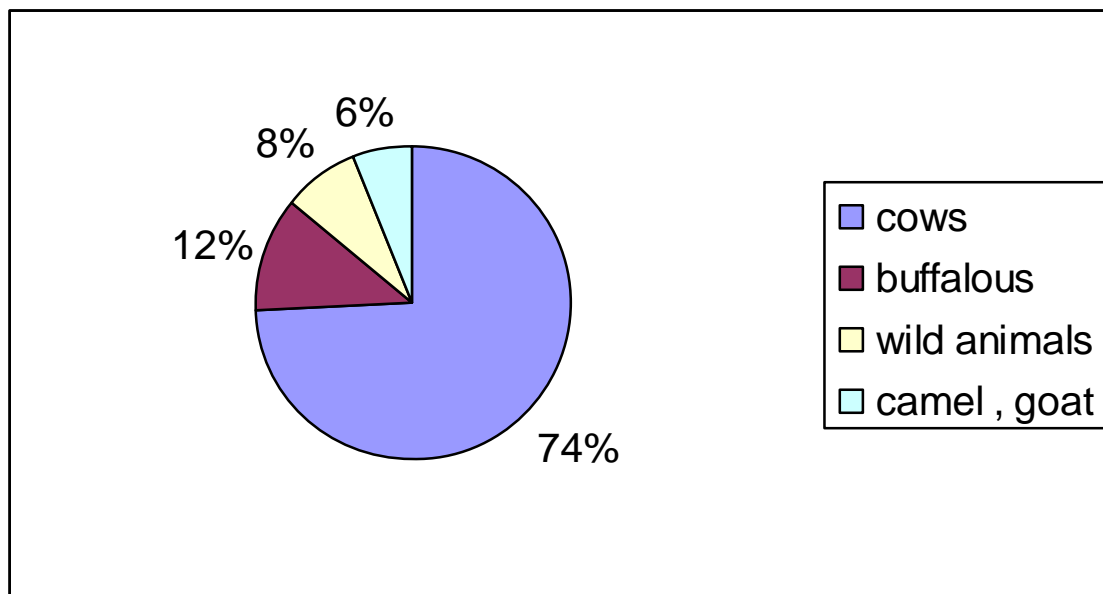
(i) Food and feeding:

All vulture species observed in the study area are found feeding on carcasses in association with other birds and mammals. The observed common birds and mammals are feeding with vultures are listed in Table. Most of the feeding is observed on the carcass dumping ground of cities and nearly 73 villages in Bikaner. About 74% of vultures of different species were observed feeding on the cow carcasses, 12% on buffalos and 8% on wild animal

which includes chinkara, black buck, blue bull, rabbits, etc. The remaining 6% were comprised of camel, goat, sheep, donkey, horses, dogs, pigs, etc.

Showing Carcasses of Different Animals 01-01-07 to 07-01-07

S.No.	Name of Animals	No. of Carcasses	Percentage
1.	Cows	204	74%
2.	Buffalo	33	12%
3.	Wild Animal (Chinkara, Black Buck, Blue Bull, Rabbits, birds etc.)	22	8%
4.	Camel, Goats, Sheep, Horse, Dogs, Pigs etc.	17	6%
	Total	276	100%



The main sources of food

Home Range of Vultures in Bikaner district

S. No.	Name of Vulture	Area covered by the bird	Percentage area covered
1	Long billed vulture	1440	16.66%
2	White Backed vulture	1584	18.33%
3	Eurasian Griffon vulture	4680	54.16%
4	Himalyan Griffon vulture	4680	54.16%
5	King vulture	1728	20%
6	Cinereous vulture	4680	54.16%
7	Egyptian vulture	8640	100%

Total area: 8640 sq.km.

Vultures showing percent of time budget spent in different activities during daily schedule of activities (7.00 hours- 18.00 hours) Year 2004-2005 to 2006-2007

S.No.	Vulture Activities	Long billed vulture	White backed vulture	Eurasian griffon vulture	Eurasian griffon vulture	King vulture	Cinereous vulture	Egyptian vulture
1.	Resting	59.09	67.22	53.78	48.93	50.45	47.87	52.87
2.	Sunning	0.30	0.60	0.45	0.037	0.30	0.60	0.45
3.	Scratching	0.068	0.05	0.23	0.069	0.21	0.034	0.024
4.	Disturbance	0.048	0.06	0.28	0.034	0.16	0.040	0.033
5.	Feeding	2.57	2.72	2.27	2.87	2.87	2.42	3.94
6.	Fighting	0.005	0.009	1.51	2.72	0.15	1.96	0.15
7.	Flight	36.96	27.87	41.03	45.59	45.15	46.21	42.72

Maximum Population of Different vultures arranged year wise (year 2004-2005 to 2006-2007)

Name of the Vultures	2004-05	2005-06	2006-07	Total	%
King Vulture	3	2	3	8	0.19
Cinereous Vulture	59	63	70	192	4.36
Egyptian Vulture	645	677	590	1912	43.33
Long Billed Vulture	6	7	6	19	0.43
White Backed Vulture	6	5	6	17	0.38
Eurasian Griffon Vulture	479	518	507	1504	34.08
Himalayan Griffon Vulture	270	239	251	760	17.22
Grand Total	1468	1511	1433	4412	100

Vultures showing home range: name of villages and estimated population of different vultures on the basis of questionnaires.

S. No.	Place / Village	Long billed vulture	White Backed vulture	Eurasian Griffon vulture	Himalayan Griffon vulture	King vultures	Cinereous vultures	Egyptian vultures
1	Jorbeer	7	18	498	270	5	70	645
2	Bikaner	5	4	25	20	2	12	40
3	Lalgarh	3	2	12	10	1	8	25
4	Nalbari	0	0	10	5	0	2	28
5	Gadhwala	6	2	35	18	2	15	35
6	Napasar	3	2	23	20		13	22
7	Mundsar	2	1	15	10		10	18
8	Ramsar	2	3	20	17	2	8	25
9	Udramsar	2	2	22	12		12	18
10	Ambasar	1	1	15	8		9	15
11	Barsingsar	0	0	10	8		7	20
12	Palana	2	4	25	10		10	29
13	Deshnoke	0	1	30	15		12	30
14	Raisar	2	1	18	9		10	20
15	Naurangdesar	2	1	10	8		9	25
16	Gusaisar	1	1	8	6		7	15
17	Sinthal	2	2	20	13		7	30
18	Khara			10	7		4	20
19	Husangsar			7	4		2	10
20	Shobhasar			12	8		4	22
21	Kanasar			5	2		2	9
22	Jalwali			15	12		8	25
23	Sudsar			8	4		5	10

24	Belasar			10	7		2	15
25	Tejrasar			8	4		3	18
26.	Badno			16	10		4	14
27	Lalamdesar Chota			7	3		8	10
28	Kuchor Athuni			12	7		10	15
29	Masuri			5	3		2	11
30	Sadasar			7	5		4	9
31	Gogasar			4	2		3	8
32	Sowa			10	6		2	10
33	Kukniya			7	4		5	8
34	Berasar			35	20		10	30
35	Surpura			I ⁵	8		7	8
36	Parwa			9	4		8	10
37	Desalsar			8	5		4	10
38	Janglu			10	8		4	20
39	Bhamatsar			12	7		5	25
40	Sajanwasi			10	8		2	15
41	Ghattu							17
42	Kokra							10
43	Himatsar							8
44	Samalsar							10
45	Bachhasar							10
46	Meghasar							20
47	Akasar							15
48	Kolayat							25
49	Chandni							20
50	Sarupdesar							10
51	Kotri							15
52	Chandsar							10
53	Gajner							25
54	Daiyan							20
55	Kawni							18
56	Jaimalsar							16
57	Udsar							8
58	Mariya							6
59	Nokha							40
60	Jamsar							25
61	Jagdevwala							20
62	Sodhwali							10
63	Dharera							21
64	Kanseran							7
65	Lunkaransar							25
66	Khari							9
67	Malasar							8
68	Katriyasar							6

69	Ranisar							7
70	Hemra							5
71	Raj era							10
72	Bara Bas							7
73	Bhairu							14
74	Jasrasar							12
	TOTAL	40	45	1038	607	23	329	1861

Reptiles: Diversity indices: An important aspect of the numerical structure of the Reptiles communities is completely ignored when the composition of the community is described simply in terms of the number of species present. It misses the information that some species are rare and others are common. Intuitively, a community of eleven species with equal number each seems more diverse than another, again consisting of eleven species, but 40% of individuals belonging to the commonest species and only 5% in each of the three rarest groups. Yet each community has the species richness. The simplest measure of the character of a community that takes into account both the abundance pattern and species richness is Simpson's diversity index. The values for species diversity, concentration of dominance and equitability are presented in terms of number per hectare.

The reptile diversity values were comparable with the earlier recorded values for the western region of Rajasthan (Rikhari et al., 1989; Bankoti et al., 1992), but are markedly lower than those reported for tropical forests (Knight, 1975). The lower diversity in temperate vegetation could be due to lower rate of evolution and diversification of communities (Fischer, 1960; Simpson, 1964) and severity in environment (Connell and Orias, 1964). The species diversity on different elevations for all the three forest land, agriculture fields and open lands in the present study with Madhuri Ramesh (2007) reveals that the Reptiles diversity was found to be greatest on flat open lands where human disturbance is minimized.

In the present study density of lizards has been evaluated in the districts of Bikaner, Jaisalmer and Sikar. The density of Spiny tailed lizard in the plain area is five per sq.km. Where tribal community Jogi, Nath, Naik and Kalbelia are absent. Evidently density does influence the diversity of reptiles in the area where tribal community is present the density found in the region is less than 2 per sq.km. The reptile species recorded during the study are mentioned as below in the Table

Reptiles

S.NO.	SCIENTIFIC NAME	ENGLISH NAME
1.	<i>Hemidactylus faviviridis</i>	Northern house gecko
2.	<i>Calotes versicolor</i>	Common garden lizard
3.	<i>Riopa punctata</i>	Snake skink
4.	<i>Eremias guttulata</i>	Long-tailed desert lacerta
5.	<i>Varanus bengalensis</i>	Common Indian Monitor
6.	<i>Varanus flavescens</i>	Desert monitor lizard ¹
7.	<i>Eryx johnii</i>	John's earth boa
8.	<i>Xenochropis piscator</i>	Checkered keelback
9.	<i>Ptyas mucosus</i>	Rat snake ¹
10.	<i>Argyrogina ventrimaculata</i>	Glossy bellied racer
11.	<i>Naja naja</i>	Indian cobra
12.	<i>Naja naja oxiana</i>	Black cobra ¹
13.	<i>Echis carinatus</i>	Saw-scaled viper
14.	<i>Uromastix hardwickii</i>	Spiny-tailed lizard ¹
15.	<i>Vipera russelli</i>	Russel's viper
16.	<i>Bungarus caeruleus</i>	Common Indian krait
17.	<i>Geohelone elegans</i>	Indian starred tortoise
18.	<i>Phrynocephalus laungwalensis</i>	Desert lizard

Note: ¹ Sharma (1996) describes these species as endangered and subject to an enormous pressure of commercial exploiting.

Description of Common Reptiles

Snakes: Snakes are among those reptiles which are the most poisonous of all. Their very name itself leads a person into a chaotic situation. Snake varies in length and thickness depending upon the species from 50-150 cm. These are cold-blooded crawling reptiles with no legs but scales all over the body. They are found in numerous colours. Found all over India, west Rajasthan Deccan plateau, Mountainous Region, Coastal areas etc, these are widely distributed. Some popular species of snakes are 'Naag', Cobra, Pythan, Viper, Grass Snake, Rattle Snake, Ana Conda etc.

The snakes have a well develops fangs inside their mouth along their teeth which kill the victim on biting and letting the poison into the body of the prey at the same time. But some snakes are not poisonous. Only few snakes are their which are poisonous. But one cannot guess which one is poisonous or not. Some snakes like pythons and Anacondas are quite longer than the usual. They can easily kill a big animal or human being not by biting but just by wrapping around and gripping harder. Snakes can survive in water and land at the same time. But there are some different water snakes also.

Lizards: The lizards are not really long reptiles but just 15-30 cm. or some exceptionally longer. The lizards are said to be the belongings of the Dinosaur family. These look very similar to the dinosaurs. They have four legs, a pair of 360 revolving eyes, thorny scaled body and an elongated tough to catch the prey. They are found innumerous colours. This main specialty is the art of changing colour on being terrified of the surrounding according to the background. The common garden or house lizards are not dangerous but yet quite poisonous. Their tough is the most energetic part of their whole body. They can easily eat a prey at a far distance just by licking once upon the victim.

Lizards are found all over the India from Arid regions to the forestlands. Being a rough - tough reptile the lizards can bare all sorts of climate and environment i.e. there is abundant species of lizards like thorny, grass, coloured etc in Arid Regions also.

Conclusion: The present study reveals that numbers of breeding animals become very low, inbreeding becomes inevitable and common. Inbred animals often have a higher rate of birth defects, slower growth, higher mortality, and lower fecundity (inbreeding depression). Inbreeding depression results from two effects: 1) the increase in homozyosity allows

deleterious recessive alleles in the genome to be expressed (whereas they are not in non-inbred, more heterozygous individuals); and 2) in case where heterozygotes are more fit than homozygotes simply because they have two alleles, the reduced heterozygosity caused by inbreeding reduces the fitness of the inbred individuals. In both cases, the loss of genetic variation due to inbreeding has detrimental effects on population survival.

Substantial impact of small scale habitat disturbance caused by intensive human use was seen on bird communities of dry deciduous and scrub forests of Thar Desert. Though met species diversity and bird densities were unchanged in disturbed areas, there were statistically significant differences in bird species composition between disturbed and undisturbed forest habitat. Feeding guild composition and species composition were significantly changed in disturbed forests in comparison to undisturbed forests. Graminivores were more abundant while the insectivore-nectarivores were less abundant in disturbed habitat in comparison to undisturbed habitat.

The population dynamics of vultures (resident and migratory) in the different parts of the Bikaner district is partly explored. Most of the Vulture populations were observed water bodies, having good number of wild herbivores and live stock population around. Their presence near the carcass dumping grounds in Villages, towns and cities is common. The vultures at study area are almost migratory and stay in 8640 sq.km.area at Bikaner district during winters all the species were observed to occupy their home range. The migratory Vultures while staying for the 6 to7 months were observed to visit near by village area for feeding .There is no regular population monitoring and also the demographic data is not available on vultures (other than Jodhpur). Due to these reasons the present study does come out with any practical suggestions. Thus, there is an urgent need for vulture population monitoring, particularly breeding colonies (in particular of resident vultures). A wide conservation and management programmer and minute examination of dead vultures is required to prevent the extinction of vulture species. Above all, the evaluation of habitats and interpretation of various ecological factors like food, water, nesting sites, predation, etc. needed.

The present study reveals that the reptiles is under threat due to natural disturbances and man made disturbances to form an open and degraded forest as 17.82% and 27.04% respectively. On the other hand the dense plantations in IGNP area are 8.13%. The soil erosion is very high as also uniformly known throughout the western Rajasthan (Das et al., 1998) which needs successful attraction and planning. The changing agricultural pattern in subsequent stages like erosion, degradation, blanks etc can be estimated to control the overall protection of Reptiles species and genes. These natural disturbances are causing changes in the present configuration of the reptile species. Conservation of floral wealth is necessary not only for posterity, but also to plan sustainable reptile conservation of the area.