
CHAPTER 3

STUDY AREA : DETAIL

The study area

Gir is the largest compact tract of dry deciduous forest in the Saurashtra region of Gujarat State and is synonymous with the only gene pool in the world for Asiatic Lion. The Gir National Park and Sanctuary (GNPS) has earned global acclaim for its singular success under Gir Lion Sanctuary Project launched in 1972. This has led to the comprehensive recovery of habitat and conservation of entire floral and faunal community. Gir forest was notified as Sanctuary by the State Government in 1965 under provision of Gujarat Wild Animals and Wild Birds Protection Act, 1963. Subsequently, in 1975, the core area of the sanctuary which comprised of 258.71 sq km of forest falling in Jamwala and Chhodavadi range was notified as National Park. Gir National Park and Sanctuary has been also proposed for inclusion in the list of World Heritage by the Forest Department. Gir is one of the oldest sanctuaries in the country harbouring the majestic Asiatic Lion. The Gir National Park and Sanctuary supports a rich biodiversity comprising of about 507 recorded flowering plant species, 32 species of mammals, 26 species of reptiles, about 300 species of birds and more than 2000 species of insects (Singh and Kamboj, 1996).

In a scenario of rapidly changing economic realities and over-exploitation of natural resources, preparation of Biodiversity Conservation Plan for Gir required not only long and painstaking efforts to collect, analyze and comprehend all relevant ecological, social, economic and biological information but also evolving the appropriate scientific management plan and application of technology. Biodiversity conservation plan of Gir National Park and Sanctuary calls for the preparation of inventory of existing major flora, knowledge of which is vital to the subsequent understanding of the ecosystem for formulating appropriate strategies for its conservation. Thus inventory of major plant taxa will provide a deep insight into various facets of Gir forests. The inventory of flora would also decide the migration pattern of Lions. Earlier, it was noted that home range of Lions were seen in National Park but now it is found even in East side of the sanctuary. Because of more nesses and constituent large herds of domestic animals (buffaloes, cows) there is overgrazing of ground flora, leading to the establishment of more thorny shrub vegetation. The area has become more open and making it easy for Lions to hunt the domestic animals. This could be one reason for extension of home range of Lions from National Park to East Sanctuary.

In some parts of Gir sanctuary, a cattle grazing is the most effective component of biodiversity degradation. There is also a forest fire contributing to the profound effect on forest biodiversity. The net result is a severely degraded, biodiversity-poor ecosystem. This is the way it leads to open the land, which is then further prone to

the normal successional environmental factors. Gir forests with its myriad of biological diversity and inalienable association with socio-economic and cultural milieus of Saurashtra region constitutes an important but interesting ecosystem.

To understand the diversity of floristic components, its phytosociology and to prepare an inventory of major plant taxa in Gir National Park and Sanctuary the present study was initiated in October 1999.

Physical location

Gir is one of the largest tracts of dry deciduous forests. The Gir Sanctuary and National Park comprising a total of 1412.1 sq km forms a part of long stretches of forest in the Saurashtra peninsula of Gujarat. The sanctuary extending over 1153.4 sq km completely surrounds the National Park measuring 258.71 sq km from all sides. The GNPS lies between 20° 55' N to 21° 20' latitudes and 70° 25' E to 71° 15' E longitudes and stretches over a length of about 70 km from West to East and 40 km from North to South. It is also the only abode of majestic-Asiatic lion (*Panthera leo-persica* Linnaeus), the only gene pool in the world. This also boasts of the largest concentrations of Leopard (*Panthera pardus* Linnaeus) and Marsh Crocodile (*Crocodylus palustris* Lesson) apart from the other mammals, reptiles, birds and insects. The most important aspect of this forest is the fact that it has become a conducive ecosystem leading to be the best habitat for conservation of the rare and threatened keystone species-the Lion.

Boundaries

Reserve, protected, unclassed forests, grasslands and revenue areas of Amreli and Junagadh district constitute boundaries of the sanctuary. The total area of covered forests is 1882.64 sq kms. Boundaries of the Gir National Park and Sanctuary are as under,

- North: Revenue areas of Junagadh and Amreli districts.
- East: Revenue areas of Amreli and Bhavnagar districts.
- South: Revenue areas of Junagadh and Amreli districts.
- West: Revenue areas of Junagadh district.

The boundary is demarcated by boundary stonewall, pillars and trenches at places.

Ecological boundaries

The legal boundaries stated above encompasses a major portion of Gir eco-unit, which is almost a continuous forest. A couple of centuries ago, the forests were spread over an area of 5000 sq km approximately. Till 1877, at the time of the great trigonometrical survey carried out in Saurashtra, the forest of old Junagadh state measured to 3,108 sq km. Within 25 years, this was reduced to an area of about 1882.64 sq km. There are many forests adjoining the Gir National Park and Sanctuary, which are almost contiguous with the present sanctuary. In total 407.5 sq km area is available at present (Reserve forest); most of the areas are being managed as protected, unclassed forests and vidis. Another adjoining area of 39.64 sq km of Pania Sanctuary is in Dalkhania range, which also constitutes an integral part of Gir forest.

Key indicator species, ecosystem linkages, similarities in ecosystems and historical background are the main basis for deciding ecological boundaries of Gir National Park and Sanctuary. Hence, ecological boundaries of Gir extend to Girnar in the north-west, Mitiala forests in the east and coastal forests in the south (Singh and Kamboj, 1996).

Geology and geomorphology

The forest area is rugged and hilly, height of hills ranges from 150.3 to 530.7 m above MSL, the highest being Nandivela in Jasadhar range. Slopes are generally moderate. The hills are of volcanic origin. Chief geological formation is of Deccan-Trip type. It occurs in two varieties of formation, one in acidic dyke and the other in basic dyke. A major part of the study area is composed of Deccan trap with constitutive differentiates and associated intrusives of cretaceous-eocene age. Major part of the Gir area is covered by fine-grained olivine basalt. In addition to this glomero-porphyritic and porphyritic basaltic lava flows are also found with several basic and acidic dykes, intersecting with each other (Patel, 1993). Two main types of soils noted are black cotton, red-brown soils.

Climate

The climate of the region is tropical, arid to semi-arid, characterized by hot summer, dryness in the non-rainy season and a very short and erratic monsoon. There are three distinct seasons in Gir National Park and Sanctuary i.e. summer, winter and monsoon, with longest season being summer. April-May are the hottest months.

Monsoon is usually active between mid-June and September. Eastern Gir has slightly higher temperature than the western Gir, but has much less rainfall.

Droughts and famines are quite common in this region. Starting from 1559 AD, the recorded histories reveal that this area had experienced moderate droughts every decade and have water scarcity. The area suffered from frequent droughts but since last year it has been receiving good rains.

Temperature

A wide variation occurs in temperature from season to season with wide ranging fluctuation in diurnal temperature. This is the peculiarity of the tropical conditions. Hot days are generally experienced in the months of May-June when temperature rises to 40°C. The coldest days are generally experienced in the month of December-January when the temperature falls to 10°C.

Rainfall

The monsoon in the area is erratic and irregularly distributed. The average annual rainfall is 980 mm and average number of rainy days is estimated to be 45 to 50. Minimum rainfall was 199 mm, whereas maximum rainfall was 1916 mm in days of the year 2001. However, the area is drought prone and variation in rainfall from year to year is considerable. The phenomenon of drought is recurring, to the extent that the area experiences at least one severe drought and one to three moderate droughts every decade.

Wildlife

The Gir forest has a diverse assemblage of wildlife harbouring 32 species of mammals, around 300 species of birds, 26 species of reptiles and more than 2000 species of insects (Singh and Kamboj, 1996).

The main carnivores of the Gir are the Asiatic Lion (*Panthera leo-persica* Linnaeus), Leopard (*Panthera pardus* Linnaeus), Jungle cat (*Felis chaus* Guldensta edt.), Hyena (*Hyaena hyaena* Linnaeus), Jackal (*Canis aureus* Linnaeus), Mongoose (*Herpestes edwardsi* Geoffroy), Civet cat (*Viverricula indica* Desmarest), Fox (*Vulpes benghalensis* Shaw), Ratel (*Mellivora capensis* Sehreber), and Desert cat (*Felis libyca* Forster). Chital (*Axis axis* Erleben), Nilgai (*Boselaphus tragocamelus* Pallas), Sambar (*Carvus unicolor* Kerr), Four horned antelope (*Tetracerus quadricornis* Blainville), and Chinkara (*Gazella gazelle* Pallas), constitute the major wild

herbivores of the Gir forests. Wild boar (*Sus scrofa* Linnaeus) also depends largely upon vegetation and roots of grasses.

Amongst the smaller mammals, Common langur (*Presbytis entellus* Dufresne), Porcupine (*Hystrix indica* Kerr) and Hare (*Lepus nigricollis* Cuvier) are common but Pangolin (*Manis crassicaudata* Gray) is rare.

The reptilian fauna is represented by Crocodile (*Crocodilus palustris* Lesson) which is found in the four dams as well as in the main rivers, the star Tortoise (*Geochelon elegans* Schoepff.), the Monitor lizard (*Varanus bengalensis* Schneider) and number of snakes. Python (*Python molurus* Linnaeus) is also sometime met with along the stream banks.

The avian fauna is represented in plenty by its colourful member, the Peafowl (*Pavo cristatus* Linnaeus) which is found all over Gir forests. There are around 300 bird species listed in Gir, out of which, some are migratory but most are resident. The main scavenger bird is vulture of which about 6 species are recorded. In addition to peafowl, other ground birds commonly found are Grey quail (*Coturnix coturnix* Linnaeus), the Jungle bushquail (*Perdica asiatica* Latham.), the Grey partridge (*Francolinus pondicerianus* Gmelin.), Night jar (*Caprimulgus asiaticus* Latham). Around Kamleshwar reservoir and other water pools, water birds such as Snake bird (*Anhinga rufa* Gmelin), the Black ibis (*Pseudibis popillosa* Temminck) and Grey heron (*Ardea cinerea* Linnaeus), Little egret (*Egretta garzetta* Linnaeus), the Paddy bird (*Ardeola gravis* Sykes), Cattle egret (*Bubulcus ibis* Linnaeus), the Indian moorhen (*Gallinula chloropus* Sykes) etc are met with easily.

The main predator birds of Gir are the Great horned owl (*Bubo bubo* Linnaeus), the Spotted owl (*Athene brama* Temminck), the Tawny eagle (*Aquila rapax* Franklin), Shikara (*Accipiter badius* Gmelin), Brahminy kite (*Haliastur Indus* Boddaert), the Black winged kite (*Elanus caeruleus* Desfontaines) etc (Singh and Kamboj, 1996).

General Description of Forests

According to Champion and Seth's revised classification of Forest Types (1966), these areas fall under the type 5A/C1a. - very dry teak forests. Teak normally occurs mixed with dry deciduous species. The degradation stages of the sub-types are also met within this tract as under:

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|----------------|---|-----------------------------|
| Type 5A/C (1a) | - | Dry deciduous teak forests |
| Type 5/DS1 | - | Dry deciduous thorn forests |
| Type 5/DS2 | - | Dry savannah forests |

Chavan (1993) classified entire GIR forest into thirteen vegetation types as:

- | | | |
|----------------|---|------------------|
| Type 5A/C (1b) | - | Dry teak forests |
|----------------|---|------------------|

Type 5A/C (1a)	-	Very dry teak
Type 5A/C3	-	Southern dry mixed forests
Type 5/DS1	-	Dry deciduous scrub
Type 5/DS2	-	Dry savannah
Type 5/DS4	-	Dry grasslands
Type 5/E2	-	<i>Boswellia serrata</i> forest
Type 5/E3	-	<i>Acacia nilotica</i> forests
Type 5/E5	-	<i>Butea</i> forests
Type 5/IS1	-	Dry tropical riverine forest
Type 5A/C3	-	Southern thorn forest
Type 6/E3	-	<i>Acacia senegal</i> forest
Type 6B/C1	-	Desert thorn forest
Type 6B/DS2	-	Tropical <i>Euphorbia</i> forest.

Water bodies

There are four dams and seven perennial rivers within the protected area, which forms permanent water sources. Part of the Gir (E) and north of Gir (W) face scarcity of water in summer. About 500 water holes are identified in Gir during Lion census in summer (Singh and Kamboj, 1996).

Status of Forest

At present, the Gir forest extends over an area of 1882.64 sq km distributed in Junagadh, Amreli and Rajkot districts. Out of the total area of 1882.64 sq km, 1586.46 sq km has been declared as reserve forest, while the rest falls under protected and unclassified forests.

The total area of the Gir National Park and Sanctuary extends to 1412.13 sq km of which the National Park comprises of 258.71 sq km surrounded by 1153.41 sq km of Sanctuary. Another area of 39.63 sq km of Chanchai Pania Sanctuary in Dalkhania range constitute an integral part of Gir forest, raising the total wildlife protected area to 1451.76 sq km. The distribution of area, ranges, rounds and beats has been given (Table : 3 and 4).

Table-3: Distribution of Ranges, Rounds and Beats in two divisions of GNPS

Gir West Division, Junagadh				Gir East Division, Dhari			
Sr. No.	Range	No. of Rounds	No. of Beats	Sr. No.	Range	No. of Rounds	No. of Beats
1.	Ankolvadi	4	13	1.	Sarasia	3	3
2.	Jamwala	5	12	2.	Dalkhania	4	11
3.	Babaria	3	11	3.	Hadala	5	11
4.	Chhodavadi	4	11	4.	Tulsishyam	7	14
5.	Visavadar	5	16	5.	Jasadhar	6	16
6.	Talala	3	2				
7.	Sasam	4	15				
8.	Dedakadi	5	11				
9.	Devalia	2	6				
	Total	35	97		Total	25	55

Source: Singh and Kamboj, 1996

Tabel-4: Distribution of Gir area in different ranges (in ha)

Range	Reserve Forest	Protected Forest	Under Sec 4	Unclassed	Area deleted *	Total
Gir West						
Visavadar	17055.64	2548.61	9.32	-	-	19613.57
Ankolwadi	14149.47	1408.15	-	-	-	15557.62
Jamwala	11815.78	1066.06	40.57	570.15	-	13492.56
Babaria	11464.14	-	225.08	-	-	11689.22
Talata	1841.91	3221.98	263.15	96.32	528.08	5951.44
Devalia	4776.92	1520.28	-	-	299.71	6596.91
Dedakadi	13926.95	1540.24	189.74	15.88	-	15769.02
Sasan	13481.30	542.79	-	-	-	14024.09
Chhodavadi	12723.99	-	-	-	96.21	12723.99
Total	101236.10	11848.11	727.86	682.35	924.00	115418.42
Gir East						
Jasadhar	14677.46	-	2303.78	108.65	1137.25	18227.14
Hadala		-				12771.95
Tulsishyam	12771.95	-	-	-	-	19072.00
(Khambha)	16060.39	-	1498.99	259.98	1252.64	
Sarasia	5420.55	-	1047.86	105.91	2865.33	9439.65
Dalkhania	8479.80		4735.55	119.85	-	13335.20
Total	57410.15	-	9586.18	594.39	5255.22	72845.94
Grand Total	158646.25	11848.11	10314.04	1276.74	6179.22	188264.36

* From Sec 4 after settlement and notification under Sec 20 (Possession remained with the Forest Department) Source: Singh and Kamboj, 1996.