CHAPTER-2

STUDY AREA

2.1 Introduction

The Gir forest was part of the former state of Junagadh and Baroda. Forest were mainly managed and worked with an idea to get revenue and for shooting the wild animals by ex. rules. In addition to the sale of timbers and other forest produce, grazing fees were also charged.

Gir National Park and Sanctuary (GNPS) is the only home of Asiatic Lion \((Panthera leo persica)\) in the world and a resort of many threatened species. It supports a rich biodiversity comprising of about 450 recorded flowering plant species, 39 species of mammals, 26 species of reptiles, about 300 species of birds and more than 2000 species of insects.

2.2 Location and size

GNPS lies 40 km from the coast in the Kathiawar peninsula also known as Saurashtra peninsula of Gujarat situated between 20° 40' to 21° 50' N latitude and 70° 50' to 71° 15' E longitude. It stretches over a length of about 70 km from west to east and 40 km from north to south. The sanctuary is narrowest at the east and west ends. In 1877, Gir forest covered 3,107 km². Uncontrolled commercial exploitation of forest and expansion of human settlements over the years reduced it to present size. The total area of GNPS extends to 1412.13 km² of which the
national park comprises of 258.71 km\(^2\) surrounded by 1153.41 km\(^2\) of sanctuary. Another area known as Pania sanctuary of 39.63 km\(^2\) in Dalkhania range constitutes an integral part of Gir forest also been included as part of the Gir Conservation Unit (GCU). Additionally, there is a buffer area of Reserved forest (245.90 km\(^2\)), Protected forest (107.51 km\(^2\)) and Unclassed forest (77.19 km\(^2\)) comprising of valuable grassland and forests, makes the total wildlife protected area to 1869.37 km\(^2\).

GNPS is divided into 16 ranges and 38 blocks managed by three deputy conservator of forests (DCF), namely two territorial divisions DCF (West Gir) with head quarter at Junagadh, DCF (East Gir) with head quarter at Dhari and the DCF (wildlife) with head quarter at Sasan, reporting under the chief conservator of forest (CCF), Wildlife Circle Junagadh.

2.3 Topography
Gir forest is hilly and undulating hills extend one after another in different directions. The altitude range from 152 m in western part of Gir to 648 m at Sarkala hill in Pania Sanctuary. The Gir hills drop off to flat and valley areas. Small streams cris-cross the entire Gir that in turn join major rivers. Gir forms major catchments for 9 rivers of which 4 rivers have been dammed. The rivers are Hiran, shingavade, Machundri, Raval, Malan, Dhatardi, Shetrungi and Popatedi.
2.4 Geology and soil

Gir hills are of volcanic origin. The general formation of Gir hills consist of traps (basalt) of varying composition associated with granite and gneiss overlain by beds of calcareous sandstone which in part assume the nature of lime stone. The soil varies place to place. They are mainly laterite with patches of Black cotton soil in low lying areas. The other types of soil found are red, yellowish red, white clay and sandy loame. Water holding capacity is lowest on sandy loam and highest in black clay, which remains waterlogged during monsoon. Soil layer thickness varies in different areas which are up to 1 meter thick in valley areas.

2.5 Climate

The climatic condition of Gir is generally hot with an erratic monsoon. Season in Gir is fairly distinct. June through September is monsoon, followed by a post monsoon season. Late November to early March is winter season. Winter season is followed by a hot dry season from mid March to mid June.

The maximum and minimum temperature 44.4°C and 10°C respectively. Rainfall is erratic and irregularly distributed, maximum and minimum annual rainfall being 1866mm and 199mm respectively with an average being 980mm. Wind blows mainly from north-west to south-east during October to March and change south-east to north-west during summer and monsoon. Eastern portion of Gir is more arid than western Gir.
2.6 Drainage system

GNPS is drained by seven rivers namely Hiran, Datardi, Singhoda, Machundhry, Ghodavadi, Raval and Shetrunji. Four major reservoirs are there in Gir – Kamleswar, Shingoda, Machundri and Raval. All rivers, except Shetrunji, flow southwards and drain into the reservoirs. Numerous small seasonal streams flow through the forest. During the dry season, water is a limited resource and restricted to perennial rivers, reservoirs and deep rock pools of small streams. Drainage pattern of western Gir is subdendric to parallel or trellis. This is due to dykes and the large number of fractures that cuts across area in a definite pattern. In the eastern Gir the drainage pattern is mainly sub parallel to trellis. At higher altitudes it is radiating and dendritic. A prominent stream in the central part of western Gir forms a gorge. A major part of the area that lies to the south of these water divides is drained by various rivers like, Jatardi, Ardak, Shinghoda and tributaries of Hiran in the west; and tributaries of Jamri and Raval in the east.

2.7 Flora

According to Champion and Seth’s revised classification of forest type, 1966, the area fall under the type 5A/Cia, i.e., very dry teak forests. Teak occurs mixed with dry deciduous species. The main forest types are as under.

TEAK FOREST (Type 5A/Cia): This type occupies nearly half of the area. The crown density varies from 0.3 to 0.6. The main associates of teak are khair, sadad, timbru, babul, amla, moledi, dhavado, kadayo and bahedo.
NON TEAK FOREST (Type 5DSI and 5DS2): The remaining half of the forest is occupied by this type of forest. Teak form less than 10 percent of total growing stock in these areas. Consist of khair, dhavdo, saded, timbru, babul, amla, moledi, teak, kadayo, saleri, bahedo, bor, khakhro, asundro etc.

RIVERINE FOREST: A distinct type of vegetation is found along the peripheral rivers and streams. The main species are jambu, karanj, umro, vad, kalam, charel, siru and amli etc.

COSTAL BORDER FORESTS: These are areas afforested in the recent past along the coastal borders. Saru and Gandobavval are the two main species raised in the areas. The oldest plantation is of 1965-1966, and few of them have attained maturity.

Composition of important tree species in GNPS in descending order is - T. grandis (31.3 %), Wrightia tinctoria (11.2 %), A. catechu (9.2 %), Zizyphus mauritiana (7.5%), A. nilotica (4.2%), Anogeissus latifolia (3.9%), A. leucophloea (3.4%), Terminalia crenulata (3.1%), Diospyros melanoxylon (2.4%), Bauhinia purpurea (2.4%), Grewia tiliaefolia (1.9%), A. ferruginea (1.8%), Boswellia serrata (1.7%), Lannea corromandelica (1.5%), Butea monosperma (1.3%).

(Sharma and Johnsingh, 1996).
2.8 Fauna

GNPS has a diverse fauna having 39 species of mammals, about 300 species of birds (Appendix-II), 37 species of reptiles, and more than 2000 species of insects. The main carnivores found in the forest are lion, leopard, striped hyena, fox, jackal, cats, mongoose and ratel. Main herbivores are chital, sambar, nilgai, four horned antelope, chinkara, wildboar etc. Monkey, porcupines and hares are also found. Crocodiles are found in water reservoirs. Pangolin and python are found with occasional. The main birds found in the tract are peafowl, quils, partridge, nightjar, heron, black ibis, vultures etc., the predator birds being owl, shikra, brahmini kite etc.

2.9 People

The economy of Gir is farm based agriculture, horticulture and animal husbandry. In recent years, in the western and southern boundary of Gir, the crop pattern has shifted from agriculture to horticulture with the introduction of kesar mangos as an important cash crop. With the replacement of intensive irrigation drought resistant traditional crops such as maize and bajra have been replaced by groundnut and sugarcane. There are 97 peripheral villages with over a lakh human population and over 90,000 livestock.

Small temporary settlements known as Nesses are occupied by Maldharis throughout GNPS. Though there is no authentic record of precisely when Maldharis arrived in Gir, they are there probably for the last 150 years. The
Maldharis are resident cattle graziers belonging to ancient tribes such as the Charan, Bharwad, Rabari, Ahir and Kathi; over 2000 Maldharis with 10,000 livestock in 54 nesses across the GNPS and about 4000 people in 14 forest settlements with a livestock of nearly 5000 are resident in the sanctuary.

2.10 Approach and access

GNPS is approachable by road from Junagadh-Mendarda-Talala and Junagadh-Visavadar state highways from Junagadh; Veraval-Talala-Sasan state highway from Veraval; Amreli-Dhari-Kodinar state highway from Amreli, Una-Tulsishyam-Dhari and Una-Jamwala state highways from Una. Sasan Gir is the main rail head situated on the meter gauge line of the Western Railway. It is 60 km from Junagadh and 40 km from Veraval via Talala. Veraval is well connected to Ahmedabad on broad gauge line via Junagadh and Rajkot. The nearest airport is Diu, 100 km from Sasan Gir. There is Air service from Mumbai to Diu.

2.11 The statement of significance

GNPS, the last abode of Asiatic Lions, falls in Bio-geographic Zone-4 (Semi arid) and Bio-geographic province 4-B Gujarat Rajwara. GNPS is the largest compact tract of dry deciduous forest in the Saurashtra region of Gujarat State and is synonymous with the majestic ‘Asiatic Lion’, Panthera leo persica, only gene pool in the world. The Gir ecosystem can take legitimate pride in saving the rare and threatened lion from the threshold of extinction at the beginning of this century by affording it a relatively secured habitat. The most important aspect is
that it has become a very stable eco-system with tremendous regenerating, self supporting and self sustaining capacity due to its rich and diverse flora and fauna.

The GNPS has earned global acclaim for its singular success under Gir Lion Sanctuary Project launched in 1972 which led to the comprehensive recovery of habitat and conservation of entire floral and faunal community. Gir Sanctuary was awarded the Challenge Trophy of the Chairman of the Indian Board of Wildlife for being the best managed Sanctuary in the country for the year 1975-76. GNPS is also proposed for inclusion in the list of ‘World Heritage’ by the Forest Department.

Gir is one of the oldest sanctuaries in the country harboring the Asiatic Lions which once was the National Animal of India. The area supports a rich biodiversity comprising of 448 different plant species. The Sag or Taek is commonest and forms over 31 percent of tree cover. It is a breeding ground for many migratory birds. the avifauna of Gir includes a variety of raptors and many other threatened species including lesser floricans, ospray, pitta, king vulture, griffin vulture etc. It also supports a variety of reptiles including the endangered Indian Python and Star tortoise. The area can also boast of harbouring possibly one of the largest population of Marsh crocodile (*Crocodiles palustris*) and also largest breeding colony of them in the country. Gir has one of the largest concentrations of leopards (*Panthera pardus*) in the country. Gir ecosystem thus
constitutes an important protected area of significant conservation value in Gujarat Rajwara biotic province of semi arid biogeographic zone of the country.

Conservation efforts for Asiatic Lions have been initiated from the beginning of the 20th Century. The results of the policy decisions and efforts for the Lion conservation are monitored by periodical estimation of the Asiatic Lion population. Available records indicate that such estimations were done by different methods. The pre-Indian independence period, however, was marked with estimates for which reliable detailed records are not available. Available records indicate that such estimations were done by different methods and for different area coverage. However, detail and well documented lions population estimates are available from 1963 onwards conducted by Gujarat Forest Department.

This ecosystem forms a part of south central highlands in Saurashtra region and is a catchment of important rivers like Shetrunji, Hiran, Saraswati, Shingoda, Machhundri, Raval and Datardi. The forest of Gir help recharge the water table due to infiltration and percolation in conjunction with soil and moisture conservation. The continuous forest covers over a large tract also exert significant moderating effect on the climate in the region. The Gir forest also helps in reducing the salinity problem on the southern coast of Saurashtra. Thus, Gir is a boon to farmers inhabiting the peripheral environs by ensuring sustained agricultural and horticultural production to them. Also, it is a potential place to be
a center for creating environmental awareness and imparting nature education. Presence of the Asiatic lion, aesthetic beauty of the area and famous Somnath temple near Gir have made this place a popular destination for visitors.

It has been observed that the increase in lion population due to adequate protection and better enforcement of conservation strategies have resulted in dispersal of lions outside GNPS. Lions are recapturing their lost territories in Girnar, Mitiala, Shetrungi river basin to forests of Bavnagar districts and also moved into coastal forests. A careful analysis of number of all these migrating lions indicate that increase in number of male lions might be one of the reasons of migration of lions from sanctuary in search of new territories. In recently conducted “13th Asiatic Lion Population Estimate” in April 2010 the concept of “Brahad Gir” (Greater Gir) emerged on the basis of last 10 to 20 years records of lions sighting, kill and indirect evidence data. And for the first time lion population estimation was conducted in areas of four districts namely Junagadh, Amreli, Porbandar and Bhavnagar.

The corridors which previously existed have been lost to cultivation and other commercial activity, and by lime stone mining at some extinct. This has detached Gir from Girnar, Babra vidi, Kanada hill, Malanka, Barda, Alech hill, Mityala, coastal forest and Shetrungi river basin. Gir has been converted into a terrestrial island engulfed by human settlements and cultivation from all around. However, lions still continue to stray into these areas. Further, it has been observed that dispersal route of the Asiatic lion is almost similar to the extinction path adopted
during the beginning of present century. By creating suitable corridors and improved prey base in lion territory can be expanded beyond sanctuary limit of Gir. The areas frequently visited by lions can safely be assumed as the ecological zone and that could be serves as safe refuge. Key indicator species, ecosystem linkages, similarities in ecosystems, corridors and historical background could be the main basis for deciding ecological boundaries of Gir. Hence, ecological boundaries of Gir now extend in forests of four districts namely Junagadh, Amreli, Porbandar and Bahvnagar.
Fig. 2.1: Map showing study area Gir National Park and Sanctuary with their blocks, and location in Gujarat, India.