Gir Lion–Present Scenario and Future Conservation Strategy

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INTRODUCTION

Gir Protected Area is the single largest tract of forests in Saurashtra region of Gujarat State in India, which covers total area of over 1450 sq. km (Gir National Park and Sanctuary-1412 sq. km + Pania Wildlife Sanctuary 40 sq. km). History of lion conservation during last three decades since constitution of the Gir Sanctuary is one of the most successful conservation stories in the world. As Gir is the last abode of Asiatic lion, *Panthera leo persica*, for over hundred years and so, it would be now appropriate to honour this sub-species by name "Gir lion" because Gir forests had already decided its destiny in the last century and will further decide its future in the new millennium.

The Gir forest has shrunk to almost half of the area from its 3070 sq. km in 1880s. In the early part of this century, Girnar, Mitiyala, Barda, Alech hills, Dhank and Chorwad were connected with Gir by corridors of rough semi-wooded forests, grasslands and sparsely populated villages, which enabled the lions to move freely in the region. All these hills are now fragmentec and there is no scope to restore corridors with Barda, Alech hills and Dhank. Girnar, Mitiyala, Chorwad and coastal forests are near to the boundary of Gir, which are now recaptured by the lion.

Serious attempt to protect Gir lion was initiated in 1965 after declaration of the Sanctuary. The Gir Lion Sanctuary Project (1972-78) laid foundation for restoration of the forests from degradation. Although settlement of 592 families of 845 families under the project was debatable, it proved to be instrumental in restoring wilderness status of Gir. Impact of the project was impressive that with the improvement in the habitat population of lion increased consistently and ungulates multiplied almost ten times from their population that was counted in 1971. Actually, it would not be exaggeration to state that entire credit for recovery of Gir forest and wildlife therein goes to the Gir Lion Sanctuary Project. Except the cyclone in 1983 and the droughts in 1986-87, biodiversity improvement did not look back as things improved consistently on all fronts, but natural areas outside the Gir continued to degrade, further reducing potential lion habitat.

Forest Department worked on the target to expand Gir Protected Area as and when opportunities occurred. An adjoining area of about 40 sq. km was declared as Pania Sanctuary in 1989 with sole objective of expanding the Gir Sanctuary. Forest Department became al ve to the expanding cultivation in wasteland and community land and notified such area of about 118 sq. km in periphery of Gir as protected forests in 1975. This forest along with some reserve and unclassed forests, and wasteland were used as multiple use zones by both wildlife and people.

DISTRIBUTION OF LION IN GIR

Records of lion counting, estimates, censuses and distribution for 120 years were studied, which revealed that Gir lion has had many ups and downs during the period. Lowest number was recorded in 1880s, when only few dozen lions survived in Gir. Population was estimated between 60 and 100 in 1905 (Anon. 1905; Carneg 1905). Population again reduced between the year 1910 and 1920. Lion population was very good between the period from first lion census in 1936 to fourth census in 1963. Gir and Gir lion had bad days in 1960s, when the Sanctuary was declared. Number of this great cat was again reduced to 177 in 1968. Since then improvement continued till close of the mille nnium as a result of conservation measures.

It is very important to discuss here that Gir never supported lions more than 300 in its entire history of at least 120 years, even when the Gir was double of its present size. Maximum population was recorded at 287 and 290 in the years 1936 and 1955, respectively (Dalvi 1969). For the first time population exceeded 300 lions in 1995. Lion census, due in May 2000, was postponed, however, unofficial reports and field studies indicate that there is further marginal improvement in population by about a dozen or so.

Another interesting change took place slowly in the distributior pattern of the lion during the last three decades since declaration of the Sanctuary. Critical examination o? lion censuses from 1968 to 1995 revealed that there has been shift of population from Gir West to Gir East. Historically, lions were always concentrated in Gir (W) ('Junagadh Gir' or 'Gir Gol') and Gir (E) (Gir of old Baroda Estate) had thin population of the lion as well as ungulates. Only 19 lions were counted in Gir (E) in 1968 as against 143 lions in Gir (W). Final counting with rectification of results proved beyond doubt that over 80% of total

lion population were estimated from Gir (W). Situation was worst in 1974 when only 14 lions were seen in Gir (E) as against 153 in Gir (W) (Dalvi, 1969; Acharya, 1974). Situation started changing after settlement of maldharis. Now population distribution has shifted gradually in favour of Gir (E). In 1995, out of 304 lions, 106 were counted in Gir (E), which is almost half of the size of Gir (W). Encounter rates, breeding success and information from local forest officials revealed the fact that there has been further increase of lion population in Gir (E) compared to Gir (W) in May 2000. Thus, now lion population density in eastern part of the Gir is higher than the density in its traditional strong hold.

It is very difficult to explain reasons for increase of lion's number in Gir (E). There is a difference of opinion on this issue. At present, maldhari and resident livestock population in Gir (E) is higher than those in Gir are (W) after their part settlement. Some experts believe that Gir (W) has become very dense and it is now more a tiger country than lion habitat, whereas Gir (E) supports thorn and savannah type forests. During recent years, developmental activities and habitat improvement have improved the availability of food and water for lion, especially in Gir (E). These could be reason for improvement of wildlife population, including lion in the area. Peripheral villages in Gir (W) have intensive cultivation and relatively high human population whereas similar areas in Gir (E) have relatively sparse human population and open areas, which facilitated movement of lion outside the Sanctuary, radiation upto Palitana in Bhavnagar district. Probably, this also contributed to such changes.

Analysis of series of census data after declaration of the Sanctuary revealed the fact that population of the great cat has increased consistently till 1990 in the PA and subsequently established at the level of 260 to 270 (267 in 1990 and 262 in 1995). On other hand lions in satellite areas, increased from 17 to 42 during the same period.

As per census data of 1995, 10 forest blocks out of total 37 forest blocks in the PA had very low density of ungulate population due to shortage of water, biotic pressure and terrain of the area. Lion population was also less in these blocks. It is possible to improve habitat conditions in the blocks to support higher population of herbivores, and the top carnivores. Further improvement of habitats and herbivores number may bring about marginal improvement of population within Gir, however the present PA may not support more than 300 lions (Singh *et al* 1996).

DISTRIBUTION RANGE

Dispersal of lion, out of Gir forests, started after drought in 1987. A decade ago Girnar, Mitiyala and coastal zone had floating population, however, some of the lions opted for these areas as permanent home. 13 lions in Girnar, 3 in Mitiyala and 26 in coastal zone were encountered in the census in May 1995. Girnar and some areas in coastal zone are now established breeding grounds for the lion. Hopefully, trend of dispersal continued after 1995, but intentional killings of lions also increased due to increasing man-lion conflicts in villages. It is expected that increasing lion numbers will not follow same trend as it was observed during last 30 years. Space is a limiting factor and hence population resistance factors will operate at increased level. Also, there is a constraint for the expansion of the PA and hence only alternative available to manage still higher population is by consolidating Gir, developing satellite areas with effective corridors.

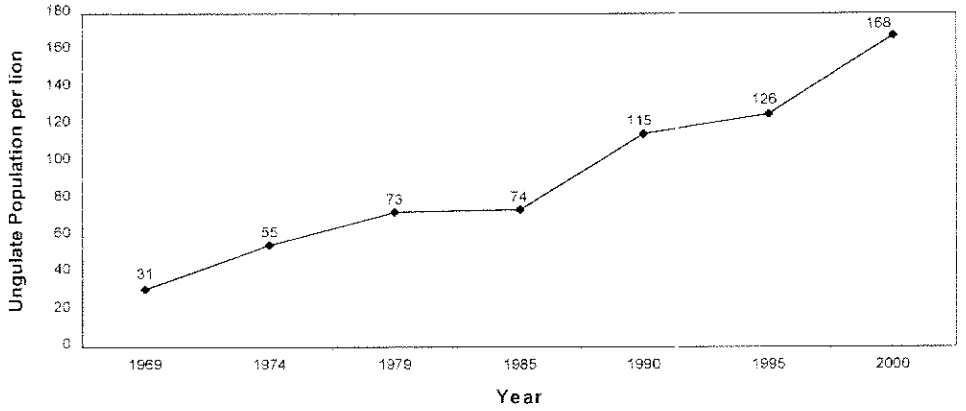
On the basis of evidences of frequent visits of lions and records of kills in villages, present home range of Gir lion is estimated about 8000 sq. km, which covers the Protected Area, satellite zones (Girnar, Mitiyala and coastal forests) and villages within the home range. This does not include areas in Palitana, Mahua and Savarkundala talukas, where lion occasionally visit during recent years. This home range of Gir lion includes 1452 sq. km of Protected Areas, 403 sq. km of peripheral forests and 308 sq. km of satellite area of Mitiyala, Girnar, coastal forests and villages within this range. Management of Mitiyala forest has already been transferred to Gir (E) Division in 1999 to integrate conservation programme in the area with lion conservation. Another exercise revealed that the expansion of Gir Protected Area has limitation. After carrying out serious attempt with the support of people and the Government, an adjoining area of 100 to 150 sq. km can be added to the Sanctuary to expand the Protected Area upto maximum of 1600 sq. km.

For effective utilisation of home range by dispersed population, it is essential to develop and manage satellite areas as shelter ground for lions. This big cat and man have developed an understanding to co-exist by respecting each other. Unlike tiger, small groups of lions can manage to survive in small areas in satellite zones. They can breed and take shelter in these areas and for food; they can operate in larger area. Habitat improvement, creation of waterholes, and building up herbivore's population in these areas are important to manage the increasing number.

PREDATION PATTERN

The predation ecology of the Gir lion was studied over the years (Joslin, 1973; Sinha, 1987; Chellam, 1993; Singh *et al.*, 1997; Dharaya *et al.*, 1998). Analysis of lion scats collected in 1971-72 throughout the Sanctuary showed that about 75% of the lion's food was from domestic livestock, reflecting its great availability and shortage of wild ungulates. Gradually, changes took place and domestic livestock reduced during last three decades. On the other hand wild ungulate's number increased consistently more than ten times from 5600 in the year 1969 to 38000 in 1995 and 52,800 in the year 2000. This has resulted into gradual change in food habit of the lion in favour of wild ungulates. The last 30 years have witnessed a complete reversal in the predation pattern of the Gir lion. Sinha (1987) reported that 52% of the scats contained traced of wild prey. Ravi Chellam's study (1987 to 1989) revealed that the composition of lion's food was 60% to 65% wild ungulates.

Analysis of census results of wildlife in Gir revealed that availability of wild ungulates per lion increased consistently from only 53 in the year 1974 to 168 in the year 2000. Recent study indicates that



lion's dependency on wild ungulates was 62% as against 38% on livestock (Dharaya *et al.*, 1998).

To manage the group of lions in satellite areas, it is necessary to understand the lions hunting strategy there. A separate study on predation pattern of the lions in Girnar and coastal zone revealed that the animals derived food mainly from livestock, but their dependency on wildlife is considerable. In Girnar, 55.2% of scats were from livestock (buffalo, cow and goats) whereas wildlife, mainly wild boar, bluebull and sambar etc. contributed 43.6%. In coastal zone, wildlife population is poor and hence only 16.6% scats had wildlife (bluebull, pig and birds etc.) and 67.2% had domestic livestock (Buffalo, cow and goat). Surprisingly 16.2% scats had unidentified. species including plants (Singh *et al.*, 1997).

HOW MANY LIONS?

What is the carrying capacity or how many lions can be managed in Gir may not be very relevant for conservationists and many wildlifers do not believe in such exercise. However, sometimes, such figures become useful to decide conservation strategy. Majority of scientists believes that single population of a species is always threatened and hence it is necessary to develop alternative population. This issue has been deliberated in case of lion. Two initiatives in the past, including rehabilitation of lion at Barda could not yield any result. Unless another population is developed at an alternative site, it is necessary to improve carrying capacity of existing habitat with a comprehensive regional planning.

For a species like Gir lion, the big cat, a single population of about 500 individuals with satellite populations in the region would be relatively safe and authority would like to achieve this target. This is a very difficult, near impossible task, however there is no harm in giving a try. It would be a great success, if management reaches near the target.

Carrying capacity of Gir can be improved marginally by positive changes in habitat condition in about dozen forest blocks. There is limitation for expansion, however, existing Sanctuary can be expanded marginally (about 10%) by including peripheral forests. If all these are done systematically in scientific

manner, it is possible to manage about 300 lions in Gir. What shou d be done for rest of increasing population? This question can be answered partly by developing comprehensive regional planning.

Satellite areas as discussed in this paper can be called as safety net areas where surplus lions get their alternative home. These safety net areas would be the shelter and breeding ground from where they can operate in peripheral areas for food.

Girnar already supports over a dozen lion and this number can be improved with effective management. Over two dozen lions have been reported in coastal area, but there is scope to improve carrying capacity by developing coastal forests as suitable habitat for lion. On the basis of experience, it may be guessed that about three dozen can be managed by consolidating and improving coastal forests and corridors.

Mitiyala is another safety net area, which can be extended to a new territory of network of *vidis* in and around Sansariya *vidi* (Dholi kui) and Hipavadlle. Hipavadlle zone can be important new area for lion. About half dozen lions stay in two groups. This area has good population of bluebell and also chinkara. About two to three dozen lions can be managed in the area with the support of local people.

Population of bluebull and feral pigs is increasing throughout Gujarat, including in the home range of lion. Farmers often agitate against crop raids by them and in some villages in coastal zone, people were happy to see reduction in feral pig population as a result of presence of a group of lions. Predation pattern of the lion in satellite areas indicates that lions hunt bluebull and wild boar in considerable number and this can be a strong point for managing lions in the satellite areas.

It may be concluded that effective development of safety net areas and corridors with their possible expansion would help to manage about 60 to 80 lions outside the Gir. Thus, total about 350 to 380 lions (250 adult lion) can be managed in the region in Junagadh, Amreli and Bhavnagar district. In idealistic situation, this number may reach upto 400, however it is almost difficult or near impossible to reach a magic figure of 500 lions, which may be acceptable figure to redu ce the degree of threat.

STRATEGY–REGIONAL PLANNING

Area for Regional Planning

Present home range of Gir lion extends in three districts- Junagadh, Amreli and Bhavnagar. Ten talukas of Junagadh (Una, Kodinar, Talala, Maliya, Mendarda, Junagadh, Visavadar, and part area of Keshod and Mungral), five talukas of Amreli (Dhari, Khambha, Jafrabad, Rajula and Savarkundala) and part of three talukas in Bhavnagar (Mahuva, Palitana and Gariyadhar) cover extended home range, where Gir lion visit for food, water and shelter. Home range of the lion has been roughly estimated over 8000 sq. km, which extends in 18 talukas as mentioned above. This may further expand, if present trend continues. If areas, where lion visited recently, are accounted as home range, this may cover as much as 10,500 sq. km, there may be over estimation as some of villages within the boundary of home range demarcated on map for this paper were not visited by the lions, but they fall within the region in the area.

The plan may be divided into two sections. One section should deal with management and conservation of Gir Protected Area along with peripheral areas. Second section of the plan should cover regional planning for entire home range of lion, with satellite areas, except the PA. Area under present home range of lion may be debatable, but it has become necessary to cover entire area of 10,500 sq. km or 18 talukas in this district to prepare comprehensive plan on following subjects in the second section of the plan.

1. Identification, consolidation and development of corridors and satellite areas as discussed.
2. Identification, demarcation and protection of forests land, wasteland, panchayat lands and private *vidis* from encroachment or change in land use pattern.
3. Development of important areas (forests, wasteland, panchayat lands, etc in home range area within 10,500 sq. km) as shelter ground and habitat for bluebulls, chinkaras, wild boars, leopard and lions)
4. Development and maintenance of adequate number of waterholes in the region.
5. Regulation of mining, industries and other anthropogenic activities detrimental to lions movement and their satellite habitats.
6. Establishment of network of ranges, rounds and beats in the region to address problems and issues related to lions and also for managing conflicts in the area, including dealing with compensation cases and emergency situation.

7. Comprehensive regional planning for education and broadening participation-nature camps, lion behaviour, and how to deal with lions under a difficult situation.
8. Inter-agency cooperation.

Developing Satellite Areas and Corridors

Implementing Greater Gir Management Programme in the field with an aim to manage expanded home range of Gir lion is really a difficult task, which is achievable only through collective actions. Consolidation and development of Gir, corridors and four satellite or safety net areas have to be core strategy of the management in future.

Human habitation of Surajgadh, Chhatariya, Majapur and Bhalchhel form deep intrusion into the PA, which result into the hindrance of the free movement of wildlife, including lions. This has also resulted into the continuous man-animal conflicts. Relocation of these villages is a difficult task, but attempt should be made to consolidate the Sanctuary. If it is not possible to relocate these villages, special programmes like protection of wasteland and activities facilitating free movement of lion should be taken up.

Girnar: Distance of Girnar from the nearest boundary of the Sanctuary in Gir (W) Division is about 22 km. Lions use streams, wasteland/gaucherland, agricultural field and scrubland for migration and also for shelter when it becomes necessary. Some of the cultivated lands are not suitable for agriculture, which may be reverted back under pasture or thorn forest for multiple use. Wastelands, riverbeds and some of the private lands may be acquired or purchased and the corridor area should be afforested by suitable species to allow free movement of lions between the two areas. Lion population in Girnar can be managed without declaring area as a Sanctuary. To minimise lion-people conflict, it is necessary to increase population of herbivores, mainly chital and sambar. Sakkarbag Zoo is at the border of Girnar and part of this forest (over 200 ha) has been allotted to the Zoo to develop a modern Zoological Park. The Zoological Park should be used as breeding centre of chital and sambar to build up ungulate population in the forest maintain about one to two dozen lions. Waterholes should be developed in adequate number in corridors and Girnar so that animal does not move in villages in search of water.

Coastal Zone: Six principal rivers of Gir viz. Hiran, Datardi, Shingoda, Machhundri, Ghodavadi and Raval flow in South to Arabian Sea. 110 sq. km of coastal forests in Sutrapada, Dhamlej, Kodinar, Una, lions for shelter and breeding have used Jafrabad and Rajula. Breeding population was recorded in 1995 at four sites and total 10 cubs were seen in coastal zone. Most of the coastal forests have vegetation cover of *Prosopis juliflora* and *Casurina equisetifolia*. Herbivore population is low, but bluebull and wild boar are seen in the areas. There was wild boar menace before lions settled in the area. Lions controlled increasing population of wild boar, however, livestock remained major food for them in the area.

Increasing illegal mining of limestone and development of cement industries in corridors are main disturbances for lions. There are more than two corridors, which connect coastal forests with Gir. It has become essential now, to identify and develop corridors for easy movement of lion. There is scope to expand coastal forests by afforesting adjoining wasteland. Wide shelter-belt plantation along the coast is beneficial to people, which work as barrier against salt winds and cyclones. Large area of coastal forest will save people and their property against cyclones, which occur frequently in this area. Habitat should be developed in this area to build up reasonably good population of herbivores so that food pattern of lions changes from livestock to wildlife.

Mitiyala: Distance of Mitiyala from the nearest boundary of the Sanctuary is about 5 to 6 km. Degraded hills, wastelands, private vidis and cultivated lands in the corridors connect the two areas. This does not create many problems for movement of lions in night. Chinkara, blue bull and wild boar also use the areas. Extent of private land is not large here, and if, some of the private lands in the corridors are purchased or acquired, and developed along with wasteland and degraded forests, safety of animals migrating from one area to other will improve. This will improve conservational value of Mitiyala, Gir and also the corridor.

Hippavadlle Zone: Natural dispersal of lion continues beyond Mitiyala in east in Bhavnagar district. A group of lions visited Chak near Palitana hills, thorn forest and vidi in Vadal village and Sansariya vidi in Dholi kui. Breeding was recorded near Dholi kui in 1999 and Mr. B. S. Adhavariya saw two cubs in the area in May 2000, when they were about 5-6 months old. Exact route of migration is not confirmed,

however the lion used scattered patches of vidis, reserve forests, wasteland, riverbeds and agricultural fields between Mitiyala and Dholi kui. Ravi Shankaran (1999) confirms the occurrence of lion in *Ranigalo, Hipavadlle, Kedariya, Kan bhodi* and *Gebar* vidis as he saw kill and pugmarks and collected information from people *(per. comm.)*. Visits by the lion in these areas were heard from the year 1997 and a confirmed report provided information of a group of five lions (2 male and 3 female) which roamed around in search of alternative home.

From Bhenkara in Savarkundala taluka to Nani Rajthali in Pal tana taluka, the compact block of low hills and grassland have becomes part of lion habitat for last two to three years. Satellite data revealed that compact block covers about 230-235 sq. km, which extends about 55 sq. km in length from west to east. This scrub forest is about 20-25 km in north-east of Mitiyala. Entire area is almost free from cultivation and human habitation, except a few patches of agricultural land. Forests of seven villages of Savarkundala, six villages of Mahua and three villages of Palitana cover 60 sq. km, which is within the compact block of scrub and open land. Private *vidis* is distributed in this block. Typical character of *vidis* in this area should be preserved and improved, if possible. Planting of suitable species as ground shelter for lion should be done because lions require adequate tree cover during summer. Waterholes should be developed at sites to maintain easy access for lions and herbivores.

It is not necessary to develop continuous forests in corridors. Agricultural land can be a part of corridors, but percentage of cultivated field should not be high. Attempt should be made to develop Government and common land as effective corridors. If private land is less productive, it can be acquired easily to the satisfaction of owner, and attempt can be made to purchase the land as part of corridors. In corridors, patches of dense forest should be raised and waterholes should be created so that, lions can find shelter and fulfil their requirements from the corridors.

It is pertinent to mention here that public opinion may automatically build up against the plan, if it is not handled properly with adequate care to tackle each and every problem immediately as and when required. Notification of area as Sanctuary and acquisition of land for declaring forest may possibly create a problem and hence this should not be the target of the plan. Except Mitiyala, rest of the areas need not be declared as Sanctuary and they can be managed as lion habitats without changing legal status of land. Education and training, followed by habitat improvement should be main activities to achieve the goal.

Broadening participation

Education, training and developing understanding among all stakeholders about Gir lion, its behaviour, relationship with man and importance of conservation of biociversity have to be main strategies before the activities are implemented in the region. People have to learn how to co-exist in the area with wildlife by benefiting each other. This may not be possible with other top carnivores, but it has been a reality with Gir lion. Historically, man and lion respected each other as territory of lion overlapped with human habitation and they lived together by using common resources. It is pertinent to mention here that lions in satellite areas and corridors have more interactions with man and livestock. They are also dependent mainly on livestock for their food. Since management of lion in this area is different from PAs, a different approach has to be adopted with support of local people.

Education and eco-development should be the important activities in the area to minimise man-wildlife conflict. Nature education camps have been conducted in Gir from 1970s to involve people in conservation programme. Impact of this programme has been seen around the Gir as people extended support to the Forest Department time to time. Eco-development project has made attempt to broaden people participation in peripheral villages for biodiversity conservation in Gir. Time has come to evaluate the programme so those packages of education programme are designed to address all target groups in the region. Government Departments, industries and local people are also stakeholders in the region, and all of them have to be partners of the regional conservation plan.

Lions, leopards and herbivores like bluebull, wild boar and chinkara use non-forest area in the region, which are under jurisdiction of revenue and other departments. Present management of the lion lies beyond Gir boundary, where authorities can regulate activities with supports of other departments and people. Thus, understanding among all has to be developed to broaden participation to achieve regional goal of conservation.

Inter-Agency Cooperation

Gir conservation was always in State priority and other departments and agencies extended cooperation to the Forest Department, for management of Gir. Scenario has changed during last two

decades. Problems of Gir management appear to be reduced with continuous effort of improvement, but it has been multiplied in revenue areas where lions visit for food and shelter. Forest Department can develop capability to pay compensation in time and also to capture carnivore from the area, but this would not be enough to achieve the regional goal of management. Consolidation of corridors and development of wastelands are not possible without revenue and panchayat departments. In case of emergency situation, police helped is required to deal situation. To control disease, animal husbandry development has to pay important role. Local institution, nature clubs and industries are very important in the regional plan. This is possible, if all agencies own programme in coordinated manner.

Development and consolidation of satellite areas and corridors may involve into transfer of some land, alternation of boundary and habitat development in wasteland. This is not possible with cooperation of revenue authority. Reclamation of minings and minimising impact of mining in the region is necessary and hence a proper understanding has to be developed through inter-agency cooperation. To develop coordination platform, district level coordination system has to be developed to address issues related to Gir lion. This will also facilitate smooth fund flow for sustainable development of the region, keeping lion conservation as prime goal. All of us have to remember that in the new century, the Asiatic lion is on target to expand home beyond Gir.

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