

## IMPACT OF CHANGING CROPPING PATTERN ON MAN-ANIMAL CONFLICTS AROUND GIR P.A. WITH SPECIFIC REFERENCE TO TALALA TALUKA

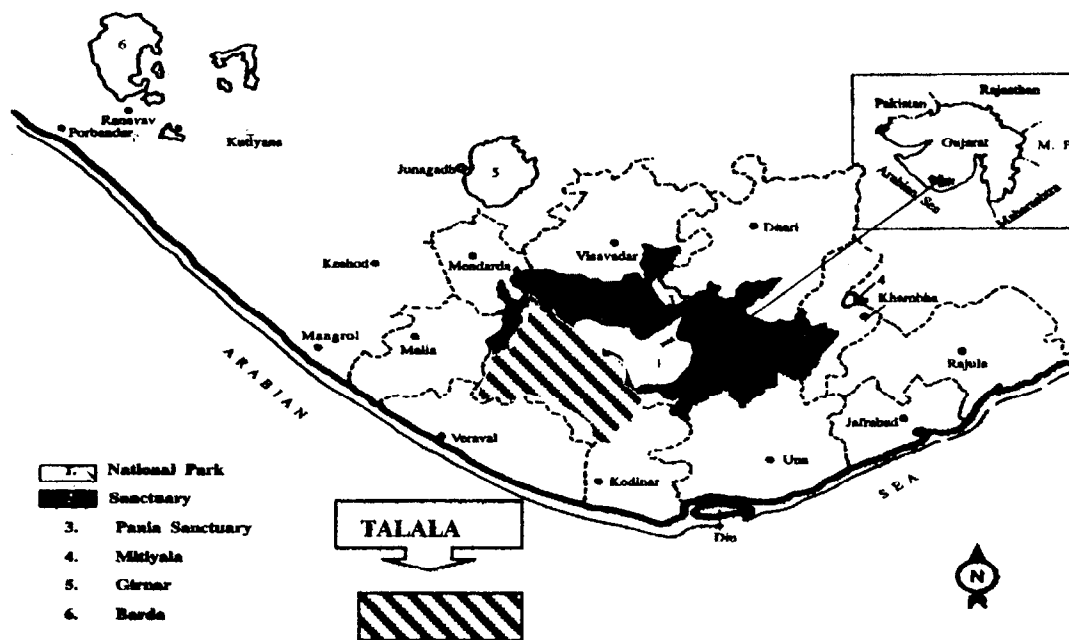
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### Introduction

The Gir National Park and Sanctuary, which is famous for Asiatic Lion (*Panthera leo persica*) is located in the Saurashtra region of Gujarat peninsula. The total area of Gir is about 1,412.12 km<sup>2</sup>, of which 258.71 km<sup>2</sup> constitutes the National Park and rest 1,153.41 km<sup>2</sup> falls in sanctuary area. It supports a rich biodiversity comprising of 38 species of mammals, 32 species of

reptiles, 300 species of birds, 2,000 species of insects and 450 species of flowering plants (Singh and Kamboj, 1996).

The Gir Sanctuary is surrounded by 97 villages, within 6 km from the Protected Area (PA) boundary and many more beyond that. Total human population of these village is 1,60,000 and in addition to this it supports huge population of livestock, which totals around 1,20,000.



Location Map of Gir National Park and Sanctuary

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There are also 14 settlement villages, covering an area of 5,176.44 hectares existing in Gir forest. The human and livestock population of these villages stands about 4,500 and 4,300 respectively. With such huge population of humans and of domestic animals, there is constant pressure on the PA to support them and to fulfill their daily needs. This has given rise to more intimate contact with wild animals and in turn increase of conflict between humans and wild animals. The conflicts identified are livestock predation, human injury/death, wild animal mortality and crop damage. In addition to this changing land use pattern i.e. conversion of 'Gauchar' land, community land, panchayat land, revenue wasteland and encroachment of forest land into agriculture land also leads to tremendous pressure on wildlife. Wild animals are frequently visiting those areas for foraging and shelter. Recent trend to change traditional crops like Ground nut into Sugarcane and conversions of agriculture crops into horticulture crop (Mango) also cause an escalated condition of Man-Animal conflict. This is in terms of providing shelter to Panthers and Lions near human habitats. From these new shelters the big predators found a way to get easy prey like buffaloes, cows, village pigs, dogs etc. A recent study conducted also pointed towards the problem of natural dispersion of Asiatic Lion to unprotected areas like Girnar hills, Mithiala forests and Coastal plantations (Soni, 2000) by using this agricultural field as corridor. Permanent settlement of the Asiatic Lion creates man animal conflicts with a new situation and interface (Srivastav *et al.*, 1997). So for our study we focussed on changing crop pattern vis-a-vis Man-Animal conflicts.

### Study Area

The Gir Sanctuary is surrounded by seven Talukas of two districts, Junagadh and Amreli. In this study Talala taluka is chosen for studying the "Impact of changing cropping pattern on man animal conflict." Talala taluka has 49 villages and equal number of 'nesses' (hamlets). The total area of Talala taluka is 94,176.02 ha, including reserved forests and protected forests and in addition to this 9,761.16 ha of forest area falls inside Gir Sanctuary. The human population of this taluka is more than 1,00,000. Domestic animals, which total more than 55,000 in number share the same area. The main occupation of the villagers in this taluka is agriculture and animal husbandry. The land surrounding the sanctuary is fertile black soil that supports rich harvest of crops. Land is used mainly for agriculture supported by good irrigation facility.

### Objective

1. To assess and compare the extent of cropping pattern changes in Talala taluka.
2. To assess human injury/death, cattle depredation, crop damage due to wildlife in Talala.
3. To assess the frequency of straying incidence of wildlife in different farmland of Talala taluka.
4. To assess the wild animal mortality/injury in Talala taluka.
5. Correlate the entire four objectives to determine the impact of changing crop pattern in Talala taluka.

### Methodology

1. Data on cropping pattern of last 8 years was collected from Talala Agriculture Extension Office, in Talala.
2. Data of livestock predation, human injury/death, wild animal mortality/capture was collected from office of the Forest Department.
3. A structured interview was conducted with the elderly farmers (n=10) who have their agriculture land near the PA boundary to find out the movement of wild animals in the area.
4. To concentrate on the man-animal conflicts, a sample survey (straying of animal, crop depredation etc.) of 7

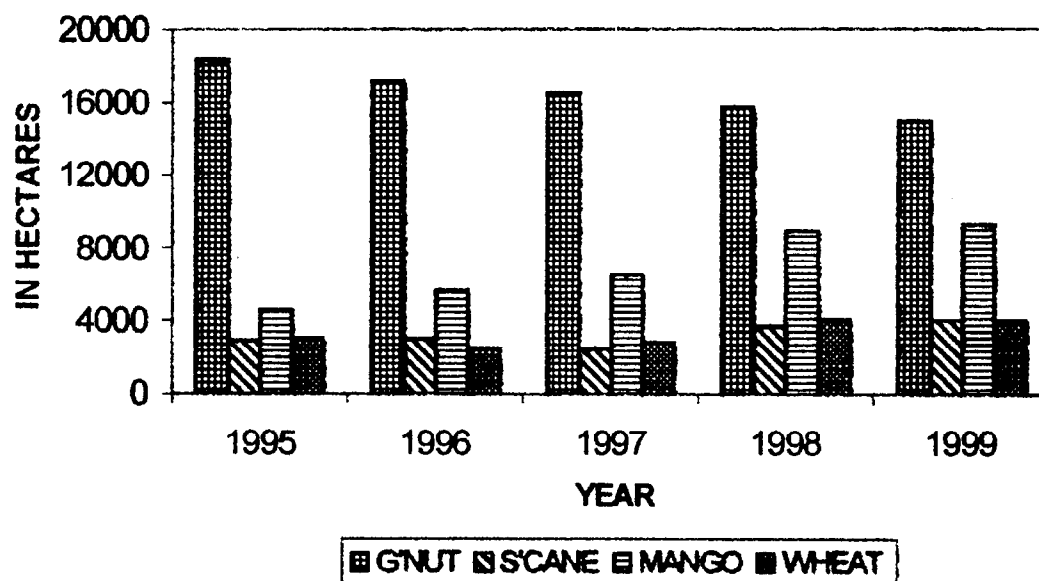
villages was done. The villages are Bojde, Hiranvel, Chitrod, Ankolwadi, Haripur, Sanghodra and Bhalchel, which are located within 5 km from boundary of Gir PA.

5. Different data collected are analysed by standards statistical tools to get information and inference.

#### (a) *Status of agriculture and horticulture in Talala taluka*

The major crops grown in Talala taluka are Groundnut, Wheat, Sugarcane, Cotton, Towardal and Bajra (Table 1a, Fig. 1). In addition to these crops, Jowar, Magdal Adaddal and Garlic is also sown in smaller areas. Groundnut is the single largest crop grown in this taluka and amounts to more than 50% of the total

Fig. 1



Sowing pattern of Major Crops in Talala

Table 1 (a)

Showing cultivated area of major crops in Talala

Year	Crops (in hectares)										Total (ha)
	G'Nut	S'cane	Bajra	Jowar	Cotton	Towar	Mag	Adad	Orchard	Wheat	
1992	17733	2141	964	100	80	13	145	124	NA	1985	21300
1993	22175	1880	980	20	70	65	240	188	NA	4000	25618
1994	21200	1725	1000	16	235	100	200	20	NA	2940	24496
1995	18445	2905	964	14	320	104	180	220	4568	3040	23152
1996	17244	2992	838	12	437	158	163	258	5641	2515	27743
1997	16563	2515	700	5	700	257	230	667	6500	2850	28137
1998	15700	3700	660	75	1145	465	260	830	8940	4080	31775
1999	15000	4000	600	80	1030	1100	250	400	9300	4000	31760

Table 1 (b)

Showing cultivation of sugarcane and mango in sample villages

Year	Sanghoda		Chitrod		Haripur		Ankolwadi		Bojde		Hiranvel		Bhalchel		Total (ha)
	SC	MO	SC	MO	SC	MO	SC	MO	SC	MO	SC	MO	SC	MO	
1992	110	40	82	36	35	40	240	55	135	45	36	5	53	25	937
1993	85	55	20	43	27	2	215	60	130	56	35	11	25	35	799
1994	70	65	25	56	60	65	105	85	85	61	14	-	25	45	761
1995	55	68	75	59	55	70	60	105	85	64	21	30	50	52	849
1996	165	70	85	75	60	90	80	140	170	75	40	50	65	65	1230
1997	170	90	107	145	62	145	115	180	95	125	42	55	33	80	1444
1998	240	160	167	235	110	210	235	200	270	255	30	85	60	90	2347
1999	175	204	40	305	105	303	130	290	164	305	88	107	141	92	2449

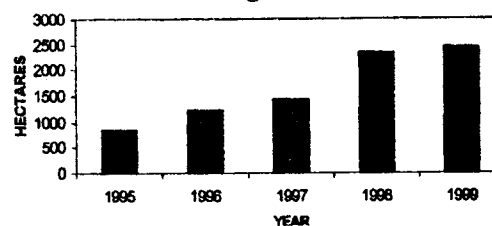
SC - Sugarcane, MO - Mango orchard

cultivated area. But recently it has been noticed that the cultivation of Groundnut compared to last 8-10 years is in declining rate (15% decrease). The possible reasons identified for the decline is erratic rainfall, more expenses incurred for continuous protection measures from Wild boars, Porcupine and village pigs, which regularly raid the crop. Sugarcane cultivation has increased (87%) to nearly double the actual area that was cultivated a decade ago due to availability of ground waters (one of major contributions of Gir to local economy). A majority of farmers have taken to Sugarcane cultivation (cash crops) as there is good demand from market for sugar and jaggery and fetches a good amount of money. Farmers tend to sell their produce to the sugar factory, which is situated near Talala thus incurring less transportation expenditure. One of the important features of changing crop pattern is increase in Horticulture practices. i.e. Mango plantations. Talala is world famous for its 'Kesar' variety which is of great demand throughout country and exported to other countries as well. Mango cultivation has great advantage for farmers because it requires less protection measures to save the crop (after 3-4 years of plantation), less labour requirement for maintaining the crop and fetches good money from market. These advantages have given rise to increase in mango cultivation (103%) at the expense of other crops and this trend is on increase annually. The total area that was used for cultivation in Talala taluka in the year 1992 was little more than 21,300 ha but in 1999 it has risen to more than 31,760 ha (49% increase). The increase in area was due to betterment of irrigation facility, conversion of Gaucher land, revenue wasteland into cultivated area and in a few cases, encroachment of protected forests.

(b) ***Status of Sugarcane and Mango cultivation in sample villages***

Cultivated areas of Sugarcane and Mango orchard in seven villages are chosen for a sample study (Table 1b, Fig. 2). There has been steady increase in Sugarcane cultivation in almost all the villages except in year 1999 where it declined due to poor rainfall. The growth rate in mango orchard is phenomenal (650% increase from 1992 to 1999), and all the villages have shown great increase in cultivated area (261% increase from 1992 to 1999) of these two crops. During field visit it was found that many farmers have planted mango saplings in their field along with other regular crops and they intended to develop mango orchard in near future.

Fig. 2



Cultivated area of Sugarcane and Mango Orchard in 7 sample villages

(c) ***Observations related to man-animal conflict***

The following type of conflicts between humans and wild animals were identified inside farmland :

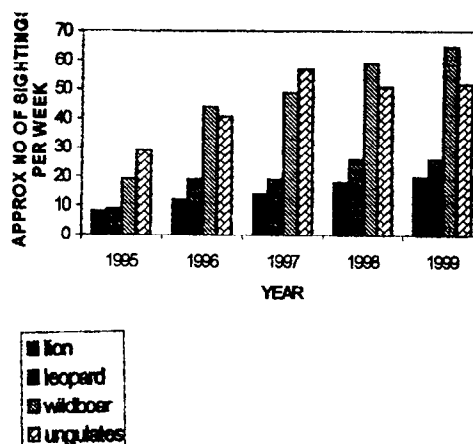
- (a) Straying of large carnivores from Gir PA to new shelters in form of sugarcane fields and mango orchards.
- (b) Wild animal injury/mortality due to retaliatory attack, falling into farm well etc.

- (c) Human injury/death due to increase in level to contact with wild animals.
- (d) Domestic livestock predation by big cats in farm lands.
- (e) Crop damage by wild ungulates and other small animals.
- (f) Fear psychosis among villagers leading to loss of man-days and delay in agricultural process like sowing, harvesting etc.

(a) *Straying of wild animals* : Wild animals straying out of the protected area in search of food and shelter is not an uncommon phenomenon recorded in Gir PA. A structured interview was conducted with elderly farmers to know the approximate number of wild animals that were visiting the farmland in search of water, food etc in present year as well as the previous years. It has been noticed that the number of big cats (250% increase in Lion and 288% in Panther) that has been visiting the peripheral farmland has increased considerably (Table 2, Fig. 3).

The population of Wild boars visiting farmland has increased many folds (340%) from 1995 to the year 1999, as sugarcane is cultivated extensively. But visit of ungulates has remained somewhat constant. The wild ungulates like Cheetal, Sambar and Nilgai also visit the farmland in the evenings and damage the tender shoots of growing crops. The carnivores mainly come to drink water and in search for easy prey like livestock and ungulates. The thick sugarcane cultivation provides good shelter for Leopards and sometimes Lions also prefer staying inside in daytime. The Leopards have started using this shelter for hiding their young cubs and

Fig. 3



Wild animal sighting in sample villages

raising them. Due to year around cultivation of Sugarcane in Talala taluka, several Panthers made their permanent home in this. The cool shade and open area of Mango orchard invites Lion to take shelter in daytime.

Most startling fact come out, when wireless messages are received by Wildlife Division Sasan-Gir for rescue operations of straying animals are tabulated and analysed for year 1997 to 1999. Out of 37 Lion straying cases (more than 7 days) in different agriculture fields, it is found out that Lions prefer Mango orchard (60 %) than Sugarcane field (30%), whereas Panthers prefer Sugarcane fields (64%) than mixed agriculture (27%) and least preferred are Mango orchards (9%). In comparison to Lions, Panthers used to visit farmlands more frequently (22% more). Among Lions, female with cubs used to stray (71%) more in comparison to only adults (29%). It is may be due to easy prey availability to females for her growing offsprings. There is also a steady increase



**Table 3***Straying of big cats for more than 7 days in Talala taluka*

Year	Lion				Panther			
	S'cane	Mango	Mixed	Total	S'cane	Mango	Mixed	Total
1997	3	6	0	9	10	2	3	15
1998	4	7	2	13	13	2	6	21
1999	4	9	1	14	14	1	7	22
Total	11	22	3	37	37	5	16	58

**Table 4***Showing incidences of wild animal rescue*

Animals	Years								
	1990	1991	1992	1993	1994	1995	1996	1997	1998
Lion	-	-	2	1	2	1	2	3	-
Leopard	-	-	2	5	3	4	7	4	6
Wild boar	-	-	-	3	-	-	-	-	-

(10%) in straying incidence both for Panthers and Lions.

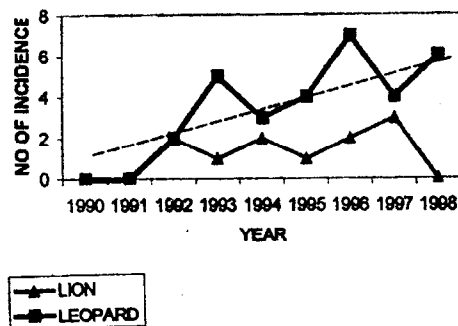
During the census operation in the year 1990, there was no report of Lions staying outside the PA. Census of 1995 shows a figure of 304 Lions, out of which 39 Lions were staying outside the PA (26 Lions had made their home in coastal forest of Kodinar, Veraval and Una Taluka and the rest 13 Lions had shifted to Girnar forests near Junagadh city). A recent study has suggested the use of the agriculture plantation (Sugarcane) as corridor (Soni, 2000) by these big cats.

(b) *Wild animals rescues from Talala taluka*: The total number of wild animals, which has been rescued, from Talala taluka from 1990 to 1999, the percentage of

carnivores (Lions and Leopard) which has been rescued is higher than other wild animals because PA management keep track of key species. The total number of Lions, which were caught in the last eight years, is 11, of which 1 animal was rescued from Farm well, 8 animals were caught from farmland (72%) and 2 animals were caught for giving treatment for illness from village. The total number of Leopards that were caught from the same taluka stands at 32, out of which 10 Leopards (31%) were caught from farm land which included 5 Leopards which were caught specifically from sugarcane field which the animals had made their permanent shelter. Fourteen Leopards were caught from village periphery due to terror, 3 were caught from house, 1 was rescued from well and 4 animals were caught for



**Fig. 4**



## Lion and Leopard rescued from Talala

treatment from agriculture fields. In addition to this 3 Wild boar, 1 Civet cat and 1 Crocodile were rescued from well situated in farm. It has been observed that sick big cats tend to remain near the farmland in search of easy prey, thick shelter and availability of water.

(c) *Wild animal mortality in Talala taluka:* Animal mortality cases, which had occurred in Talala taluka from last 10 years, show that the number of casualties is again high in case of Lion and Panthers in comparison

to other wild animals. The total number of Lion deaths recorded is 11, out of which 5 died due poisoning (45%) of carcass of livestock in farmland as a retaliatory attack by the owner and 5 deaths due to fall into farm well. The Leopard deaths have totaled to 12 cases; out of which 3 fell into farm well, 2 cubs were found dead inside sugarcane cultivation and the rest due to natural causes. In addition to this a Civet cat (fell into well) and 7 Peacocks were found dead in farm. Almost in all cases, farmlands were the areas where wild animals had been found dead.

(d) *Human injury/death caused by wild animals in Talala taluka* : Lions and Leopards straying outside from the PA in search of shelter, prey and water source pose certain threat to human settlements. This movement has led to some dangerous encounters between the big cats and people, which sometimes prove fatal. Table 6 shows the incidences of such encounters in Talala taluka from last 10 years. Lions accounted for 18 attacks on humans of which 13 took place in farmland (72%), which included specifically 8 attacks in sugarcane field

**Table 5**

### Showing wild animal mortality in Talala

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**Table 6***Showing human injury/death cases in Talala*

Animal	Human Injury/Death									
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Lion	3	3	2	1	2	3	1	0	1	2
Leopard	1		3	4	4(3D)	2	4	6(1D)	1	0

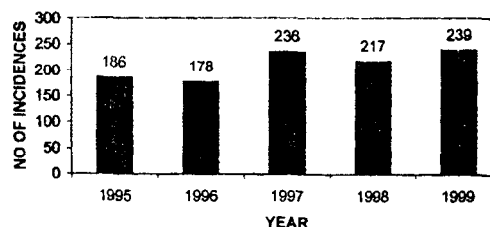
D - Death

(44%) and 2 attacks in Mango orchard (11%). 27 (4 deaths) incidences of attacks by Leopards were recorded in this taluka of which strikingly 16 attacks took place in farmland (59%) which consisted of sugarcane crops and 1 attack took place in Mango orchard. Most of the attacks took place in evening and nights when the farmers and labourers were busy in protecting and harvesting sugarcane crops and irrigation (during nights). During field visit to Bojde village it was seen that a pride of 5 Lions had killed a full grown Sambar stag and had dragged the carcass into a Mango orchard and feasted on it for two days. Sugarcane crops attract Wild boars, which in turn fall victim to Lions and Leopards. In comparison to natural forest areas it is easy to stalk wild prey in agricultural fields. The ready availability of water in agricultural fields in nights when farmers irrigate their crops attracts Lions and Leopards almost every day to the farm. It leads to livestock kills, as bullocks are tied in the farmhouse in the late evenings. Ironically the local farmers many times welcome this movement of big cats as presence of Lion and Leopard prohibits the entry of Wild boar and ungulates, which are responsible for crop depredation.

(e) *Livestock depredation* : The livestock kills in Talala taluka increased to 239 in

1999 from 186 in 1995, an increase of 28%. An analysis of livestock kills of the years 1998 and 1999 reveals that 25 kills (11.5% of total kills) and 62 kills (26% of the total kills) respectively were done inside farmland. The rate of increases in kills in farmland had increased from last two years to nearly 150%. Lions did the majority of kills, and bullocks were main victims of attacks in farmland as they are tied in farm sheds. It is mainly due to thick cultivation of the sugarcane and other crops the Lion can move stealthily and can remain hidden while stalking the livestock in the farmland.

(f) *Crop damage* : Crop damage is an inherent problem for wildlife managers in almost all PAs of India. Due to Gir PA, the peripheral agricultural areas, which are highly developed in terms of agriculture, are subjected to crop damage by different wild ungulates, Wild boar and Peafowl

**Fig. 5**

Livestock kills in Talala

**Table 7**

*Livestock predation by carnivores in  
Talala taluka*

Year	1995	1996	1997	1998	1999
Kills	186	178	236	217	239

(Singh *et al.*, 1998). To study the extent of crop damage in Talala taluka the authors undertook surveys in the selected seven sampling villages. The survey was conducted with help of structured and unstructured questionnaire and field observation in form of quadrates methods. Groundnut as a major crop bears the brunt of the maximum damage and Wild boar are identified as the main species responsible for it. The average damage of Groundnut crop of 7 sample villages came to about 6.3% and maximum damage occurred within 7 days of sowing and crops on the verge of harvesting. Sugarcane suffered a damage of 1.8% basically due to uprooting of stems and nesting of Wild boar. Mango orchards are also damaged due to Nilgai and Wild boar. But percentage-wise per hectare only 1 to 2% Mango samplings are damaged just after planting. During interviews, farmers have pointed that there is very less increase in crop damage during last five years in comparison to cattle depredation and man days loss. The farmers have developed their own method of tackling the crop damage, the rich farmers have constructed stone wall fencing, barbed wire fencing, rubble wall for protection; these constructions many times act as psychological barrier for big carnivores.

(g) *Mandays loss due to fear psychosis* : During interviews with farmers in the sample villages it was found out that on an

average 4 to 5 farmers in each village lose about 3-4 days yearly due to presence of big carnivores in their Sugarcane fields and Mango orchards. Most important is that these man-days are lost during harvesting or tending operations, which directly affect the economic conditions of daily-wage earners. Every year in Talala taluka during harvesting season of sugarcane, farmers used to take help of Forest Department to ward off big carnivores like Panthers and Lions, which pose threat to working labourers.

### Discussion and Suggestions

More and more farmers are taking to sugarcane cultivation and developing Mango orchard in Talala taluka as well as in the peripheral villages of Gir Protected Area. It is favoured against the traditional crops due to good returns in terms of money and requires less protection measures from the wild animals, which frequently cause damage to the traditional crops like Groundnut, Wheat, etc. This trend has given rise to vast thick cultivation of Sugarcane and Mango near the PA boundary resembling an artificial man-made forest. Wild animals especially large carnivores like Leopards and Lions which disperse due to internal territorial fights readily take shelter in this temporary man-made forest. Lions, which have moved out of the PA looking for new home ranges in coastal forests have used this thick cultivation as safe corridor. Panthers are now using the Sugarcane fields as a breeding ground and to raise their offspring and also started making it their permanent home. Day to day conflicts are increasing in these farmlands due to changing crop pattern, which pose more threat to human and cattle lives than crop. Forest officials have suggested undertaking an awareness

programme among the villagers to educate them to deal with big cats. Capturing and releasing of the straying animals has to be done very quickly so as to minimize the dangerous encounters between man and animal and in turn helps to earn goodwill between the forest personnel and villagers. Database of various straying animals has

to be maintained so as to deal with problematic animals effectively. Assistance can be provided to farmers to build parapet wall around the farm well thus reducing the wild animal mortality. Growing of sugarcane should be discouraged within 2 km periphery of the Gir Protected Area boundary.

### Acknowledgements

We acknowledge help of Dr Chandrakant Dohare, Shri B.S. Mehra and Shri Bhikubhai for field visit and observations. We are also very thankful to Agriculture Officer Talala taluka and villagers of 7 sample villages for their help and cooperation during field visit.

### SUMMARY

The Gir National Park is surrounded by seven Talukas of two Districts. Main occupation of the villagers in this area is farming due to fertile black soil and good irrigation facility. Farmers are changing to sugarcane (87% increase in 10 years) and Mango cultivation (103%) leaving their old traditional crops like groundnut, wheat etc, as the former fetch good money in local market. Large-scale cultivation of Sugarcane and Mango orchard in peripheral villages of Gir National Park and Sanctuary has given rise to a thick growth of an artificial dense cover. This attracts large carnivores like Lion (*Panthera leo persica*) and Leopard (*Panthera pardus*) to take shelter, raise their young and stalk domestic animals as well as wild animals like Wild boar (*Sus scrofa*). The straying incidences of Lions and Leopards increased to 411% and 386% respectively from last 3 years (from 1997). This study reveals that in Talala Taluka 72% (13 incidences) and 59% (16 incidences) of the total attacks by Lions and Leopards respectively took place in farmland. In addition to this livestock kill is on increase in farmland (28% increase in 5 years). These encounters have given rise to antagonist attitude among farmers towards the big cats and they have in some cases retaliated by poisoning the carcass. The presence of big cats in farmlands has given rise to fear psychosis among labourers and in turn affects the harvesting of crops and results in loss of man-days and money. More and more requests are received by the Wildlife Rescue Team of the Forest Department for capturing and relocating the big cats from farmlands to its original forest area.

तलाल तालुका के विशिष्ट सन्दर्भ में मानव-पशु संघर्ष पर बदलती फसल-कटाई सज्जा का प्रभाव  
एस० विजयन् व बी०पी० पति

सारांश

गीर राष्ट्रीय उपवन दो जिलों के सात तालुकों से घिरा हुआ है। इन क्षेत्रों के ग्रामीणों का मुख्य पेशा उर्वर काली मिट्टी और अच्छी सिंचाई सुविधाएं रहने के कारण खेती करना है। किसान अपनी पुरानी पारम्परिक फसलों जैसे मूंगफली, गेहूँ आदि छोड़कर गन्ने (पिछले दस वर्षों में 87% वृद्धि) और आम की खेती (103%) पर आ रहे हैं क्योंकि स्थानीय बाजार में इनका अच्छा दाम मिल जाता है। गीर राष्ट्रीय उपवन और अभयारण्य के परिवर्ती गांवों में बड़े परिमाणों पर गन्ने और आम की खेती किए जाने से एक घना कृत्रिम वन सा खड़ा हो गया है। इससे बड़े मांसभक्षी पशुओं जैसे सिंहों (*पैन्थेरा लिओ पर्सिका*) और तेन्दुओं (*पैन्थेरा पार्डस*) को वहां आश्रम लेने, अपने बच्चे वहां बड़े करने और पालतू और जंगली पशुओं जैसे जंगली सुअर (*सुस स्क्रोफा*) का पीछा करने का आकर्षण होता है। सिंहों और तेन्दुओं के उधर भटक जाने की घटनाओं

में (1997 से) पिछले तीन वर्षों में क्रमशः 411% और 386% वृद्धि हुई है। यह अध्ययन दिखाता है कि सिंहों और तेन्दुओं द्वारा किए गए कुल हमलों की घटनाओं में से तलाल तालुके में 72% (13 घटनाएं) और 59% (16 घटनाएं) घटनाएं खेतिहर भूमि में हुईं। इसके अतिरिक्त खेतिहर भूमि पर पशुओं के मारे जाने में भी वृद्धि (5 वर्षों में 28% वृद्धि) हो रही है। इन भिड़ंतों ने किसानों में बड़े विडालों के प्रति विरोध भावनाओं को भी जन्म दिया है और कहीं-कहीं तो अपने मारे पशुओं में जहर मिलाकर उन्होंने उनसे उसका बदला भी लिया है। खेतिहर भूमि में बड़े विडालों की उपस्थिति ने मजदूरों में भय-आतंक भर दिया है जिसके कारण फसल कटाई पर दुष्प्रभाव पड़ा है और श्रम दिनों और धन की हानि हुई है। वन विभाग की वन्यप्राणि बचाव टोली के पास बड़े विडालों को पकड़ने और खेतिहर भूमि से हटाकर उन्हें उनके मूल वन क्षेत्र में वापस पहुंचाने के लिए अधिकाधिक प्रार्थनाएं प्राप्त हो रही हैं।

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