VOLUME-8, ISSUE-12, DECEMBER-2019 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Ecology

FEEDING ECOLOGY OF ASIATIC LION (*Panthera leo persica*) IN THE COASTAL FOREST OF RAJULA, GUAJRAT STATE OF INDIA.

Dr. Vibhuti B. Raval Saurashtra University, Rajkot 360005 Gujarat, India

Dr. Bhupat B. Radadia * Shri M. & N. Virani Science College (Biology Department), Saurashtra University, Rajkot 360005, Gujarat, India *Corresponding Author

ABSTRACT The food habits of animals determine a number of life history strategies such as habitat selection, movement and success of reproduction. To study the feeding ecology of Asiatic lion the widely used technique is the scat analysis. Scat analysis was done by identification and comparison of hairs of various prey species available within the selected study area. Asiatic lion mainly depredated on livestock due to easy catch and availability. Seasonal diet composition revealed that Asiatic lion preferred livestock mainly during summer season and wild prey in winter season. The habitat preferences revealed that the Asiatic lion often used open or scattered shrub-land area which increases the prey visibility.

KEYWORDS : Depredated, Livestock, Scat, Feeding Ecology Etc.

INTRODUCTION:-

To understand the ecology of any wild animal, several environmental components need to be considered such as avaibility of food, water, den or nesting site to survive in any habitat (Nikunj Gajera et al., 2009). Scats provide an essential sample of carnivore diets, but where several comparable size carnivores co-occur, unfailing identification of the proper donor species required (Laura E. Farrell et al., 2000).

The scat analysis remains the crucial tool used to assess carnivore diets, particularly when focusing on individual prey items (Unn Klare et al., 2011). Prey availability and distribution can persuade prey selection and hunting success (Fuller et al., 1992), with activity patterns and spatial distribution (Henschel & Skinner, 1990).

There are a number of different methods for the scat analysis. One of the finest methods used for scat analysis is through hair identification of various preys. Mammal hair plays a significant role in many aspects such as thermoregulation, body shape maintenance, waterproofing and protection from pollution. There are generally two types of mammal hairs: guard hairs that are generally thick and bristly and fine hairs that are curled and thin (Eunok Lee et al., 2014).

In particular, the study of predator feeding habits from the analysis of prey hairs found in scats has been widely used for describing the diet of mammalian carnivores, because this technique is non-destructive and scats are easy to collect throughout the year (Anna maria De Marinis and Alessandro Asprea, 2006). The scat analysis done by separating the (undigested) food items present in it such as hairs, feathers, seeds, bone pieces, claw, nail & hoof pieces, plant material etc.

Precise knowledge of a carnivore's diet is crucial to assess the species' role in the ecosystem, potential competition with other carnivores and impact on prey populations. Results of diet analyses therefore might have extensive impact on the development of carnivore management plans, especially if economically important or endangered species are involved. But direct observations of feeding behaviour are often impossible under field conditions. This scat analysis techniques are noninvasive and effective method in which the hair identification of various prey species carried out by considering and comparing their morphometric features under microscope.

STUDY AREA:-

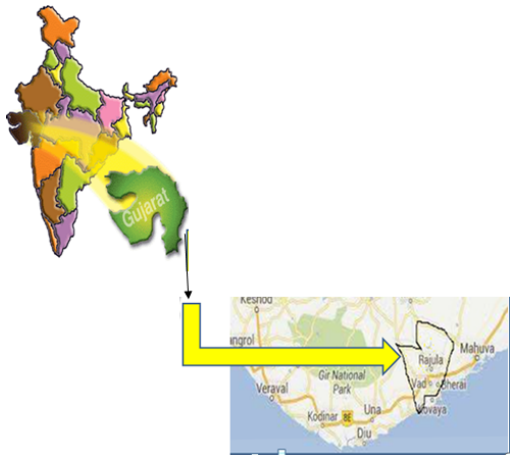

Fig. A: Map of the ® Image of Coastal forest-Rajula

The coastal forest of Rajula situated in the Amreli district of the Gujarat State, India. It is located in the eastern part of the Gir protected area and occupies the vast areas of the coastal habitats. It comprises around 120 Km^2 within the Rajula Tehsil of Amreli district. It lie between the parallels of latitude North 21° and meridians of longitude East 71°. It comprises around seventy two villages. The whole study area further divided into five different categories namely (1) Shrub forest (2) Saline pan (3) Mixed forest (4) Industrial areas (5) Rural & Agriculture land. There are very small patch of reserve forest found, and thus majority areas are revenue.

The area mainly comprises the scattered shrubs with different elevation and habitat ranges. It consist coastal areas of Arabian Sea with salty pan at several sites. The area is flat but little undulating at some villages. It occupies Gauchar lands, agro-pastoral lands, industrial zones and forest areas. The Agariya are one of the Scheduled Tribes of India. Agariyas also reside around, Chanch Bander, Pipavav and Devaka.

There are three seasons namely winter from November to February, summer from March to June and monsoon from July to October. The maximum temperature in summer ranges 30-37°c whereas minimum temperature around 20-25°c found. The annual rainfall ranges around 350 mm. Due to coastal land the temperature ranges intermediate in all around year neither too cool nor hot.

METHODS:

Asiatic Lion scats were collected regularly along roads and forest tracks. Lion scats were clearly distinguishable from leopard scats based on their much larger size. However, carnivore signs associated with scats were too recorded from the site of collection. All scats were stored in polythene bags with proper code and later washed using a sieve to separate undigested prey remains such as hair, bone fragments, hooves, feathers, quills and claws etc. All residues were oven-dried for further examination. For a reliable estimate of lion's diet, standard prescribed protocols – examination of a minimum of at least 20 prey hairs per scat and minimum 30 scats – were adopted (Mukherjee, Goyal & Chellam, 1994).

Carnivore scats were collected in and around Coastal forest of Rajula along with several details such as, recording location with GPS, date of collection. Total 36 scats collected from the Coastal forest – Rajula, all over nineteen months of extensive field study in all three seasons. All Scats were systematically analyzed to assess the diet composition of the lions.

Microscopic slides of at random picked hair from a sample were first washed in running water several times to get rid of dirt and then preserved in acetone for overnight. After that randomly picked thirty hairs/scat samples taken up for microscopic examination. Then the hairs were fixed in gelatin layered microscopic slide for obtaining casts of surface structure of hairs. Then the slide was observed under light microscope or Fluorescence light microscope with inbuilt measurement software and attached camera for capturing images in better scale. Photographs of surface structures were taken at first in 10 X magnifications and then in 40X magnification.

Other characteristics such as Cuticular structure, medullary configuration, scale pattern and cross-sectional details were studied after (Brunner & Coman, 1974). Trichological features of the hair were thoroughly studied by using advance microscopic techniques. Preys were identified by comparing medullary & cuticular characteristics of prey hair with known standard reference hair (Karanth & Sunquist, 1995, Vibhuti et al., 2018).

RESULT AND DISCUSSION:-

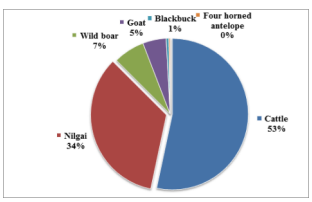

Fig.1 Food Composition of Asiatic Lion in Scat study of Coastal forest-Rajula

In coastal forest 36 scats analyzed and out of which, 6 scats comprised single prey species evidences. On other hand 10 scats comprised two different prey species evidences, while remaining 20 scats contained more than two different prey species evidences. Totally seven wild prey species and five domesticated species identified from the scat analysis in the study area (Fig. 1).

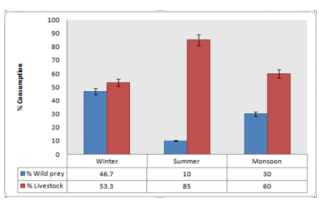

Fig.2 Seasonal variation in food composition by Asiatic Lion in Coastal Forest-Rajula

On the basis of availability of different prey species along with its population within the study area and the scat analysis in Coastal forest-Rajula revealed that the cattle consumption contributed maximally almost 53%, followed by Bluebull (34%), followed by wild boar (7%), and followed by Goat (5%). On other hand blackbuck consumed less comparatively (1%) by lions (Fig. 2) in the areas. Dharaiya in the year 1998, reported that the coastal lion depends mainly on livestock (67.23%) and 33% depends on the wild prey comparatively.

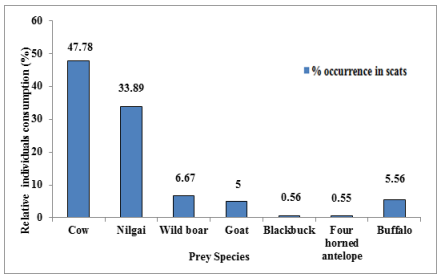

Fig. 3 Frequency of occurrences of prey species & diet composition of Asiatic Lion from Scat analysis in Coastal forest –Rajula

The seasonal variation in food composition by Asiatic Lion in and around coastal forest-Rajula revealed that the livestock consumed the most throughout the year almost 57.22% and higher in summer (85%), followed by monsoon (60%), and followed by very less in winter (53.3%). Whereas Wild prey consumption found around 42% throughout year and increased in winter (47%), followed by monsoon (30%) and decreased in summer (10%) comparatively (Fig. 3).

The seasonal food consumption by lions in both the study area found similar. Earlier study by Dharaiya revealed that the maximum wild prey consumed in winter season (31.75%) while livestock consumption increased in summer season (69.01%) inside Coastal forest area.

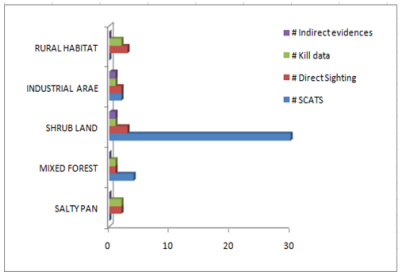

Fig. 4 Habitat use by Asiatic Lions in Coastal forest-Rajula on the basis of direct and indirect evidence.

The habitat use pattern by Asiatic lion in Coastal forest-Rajula, on the basis of direct and indirect evidences found in the study area revealed that the lion frequently use and preferred the scattered shrub land areas (35), followed by mixed forest area as well as industrial areas visited occasionally by lions (6), followed by rural/ revenue area (5). The area of Salty pan preferred very rarely by lions (04). The direct sighting found maximally in shrub land and rural areas as well (3) followed by industrial areas and salty pan (2). Simultaneously direct sighting in mixed forest areas occurred once. Total 11 events occurred for direct sighting in GWLS. Although the kill data, vocalization and fresh pugmark trails found only in only some occasion (Fig. 4).

CONCLUSION:-

In the study area it was found that lions mainly chosen the livestock as it's found easily available throughout year and also easy to catch. Whereas, seasonal food composition study revealed that the livestock depredated most in summer season as it lead to human dominated areas which provide

continuous source of water as well as food. On other hand wild prey base preferred more during winter season because during this season leaf fall occurs which increases the visibility of prey in the study areas. The dependency on livestock by lions was also found to increase in recent years in Coastal forest area Compare to previous studies carried out by N. Dharaiya. So, it was concluded that the lions inhabiting outside the Gir protected areas found more dependable on livestock, one possible reason was less wild prey populations in that satellitic areas and more availability of easy prey base of livestock.

The lions preferred the large sized prey base like domesticated cow and bluebull more compare to other prey base as livestock readily available in revenue areas of villages (Bagchi et al., 2003) and bluebull also preferred the open habitat mostly the agriculture field (D. Mehta and V. C. Soni., 2014).

REFERENCES:-

1. Bagchi, S.P., Goyal, P. & Sankar, K. (2003) Prey abundance and prey selection by tigers *(Panthera tigris)* in a semi-arid, dry deciduous forest in western India. J. Zool. (Lond.) 260, Pages 285–290.
2. Brunner & Coman (1974) A Key For The Identification Of Guard Hairs Of Some Ontario Mammals, Canadian Journal Of Zoology, Volume 71(3), Pages 587-591.
3. Chellam, Ravi (1993) Ecology of the Asiatic lion (*Panthera leo persica*), Ph.D. Thesis, Saurashtra University, Rajkot. Pages170.
4. Dharaiya, N. & Soni, V.C., (2000) Study on the satellitic population of lion around Gir PA, Final Project Report submitted to Department of Forest, Wildlife Division, Sasan Gir.
5. Dhawal Mehta and V. C. Soni (2014). Study On The Ecology Of Nilgai (*Boselaphus Tragocamelus*) In Saurashtra, Ph.D. Thesis, Saurashtra University, Rajkot.
6. Eunok Lee, Tae-Young Choi, Donggul Woo, Mi-Sook Min, Shoei Sugita and Hang Lee (2014) Species Identification Key Of Korean Mammal Hair, Journal of veterinary, medical science, Vollume 76, Issue 5, Pages 667-675.
7. Fuller, T.K., Kat, P.W., Bulger, J. B., Maddock, A.H., Ginsberg, J.R., Burrows, R., McNutt, J.W. & Mills, M.G.L. (1992) Population dynamics of African wild dogs In: Wildlife 2001: Populations (Eds D. R. McCullough and H. Barrett). Elsevier Science Publishers, London
8. Henschel, J.R. & Skinner, J.D. (1990) The diet of the spotted hyaena (*Crocuta crocuta*) in Kruger National Park, Afr. J. Ecol. 28, Pages 69–82
9. Joslin, P. (1973) The Asiatic lion – A study of the ecology and behaviour, Ph. D. Thesis, University of Edinburgh. Pages 249
10. Karanth, K. U., Sunquist, M. E. (1995) Prey selection by tiger, leopard and dhole in tropical forests. – Journal of Animal Ecology 64, Pages 439-450.
11. Laura E. Farrell, Joseph romanand melvin E. Sunquist (2000) Dietary separation of sympatric carnivores identified by molecular analysis of scats, molecular ecology, Pages 1583–1590
12. Mukherjee. S., Goyal S. P. and Chellam, R. (1994) Refined techniques for the analysis of Asiatic Lion scats, Acta Theriologica, Volume 39(4), Pages 425-430
13. Nikunj Gajera, S. M. Dave, and Nishith Dharaiya (2009) Feeding patterns and Den ecology of Striped Hyena (*Haeyena haeyena*) in North Gujarat, India, Tiger Paper, Volume 36, Issue 1, Pages 13-17
14. Vibhuti B. Raval, Bhupat B. Radadiya, Arun Kumar Roy Mahato and A. P. Singh (2018) Tricho-Taxonomic Study Of Guard Hairs Of Three Species Of Bovidae Of Saurashtra Region Of Gujarat, India, International Journal of Zoology and Applied Biosciences, Volume 3, Issue 3, Pages 393-398.
15. Unn Klare, Jan F. Kamler, David W. Macdonald (2011) A comparison and critique of different scat-analysis methods for determining carnivore diet, Mammal Review. 2011, Volume 41, No. 4, Pages 294–312.
16. Anna maria De Marinis and Alessandro Asprea, (2006) Hair identification key of wild and domestic ungulates from southern Europe, Wildlife Biology, Volume 12, Issue 3, Pages 305-320.