

## ECOLOGICAL ASSESMENT OF BANDHAVGARH NATIONAL PARK

Rahul Rupesh Dwivedi, Skand Kumar Mishra & Sanjeev Dubey

Awdesh Pratap Singh University, Rewa, Government Model Science College Rewa,  
Government MS Golwalkar College, Rewa (M.P.)

rahulrupesh.dwivedi027@gmail.com

### Introduction:

National parks help to take care of places with natural or biological, social, economic and historical value. National parks preserve habitats for a wide range of native plants and wildlife. National parks maintain biodiversity and protect endangered species. These national parks are major tourist sites providing recreation to the tourists. They provide people with opportunities to learn about natural flora and fauna as well as to explore and admire the beauty of diverse environments.

Today these national parks are the most visited sites in India, to enjoy the unmatched wilderness at distinct regions. In some national parks the tourists or better to say, the wildlife lovers can find the best opportunities for a safari tour. sightseeing, bird-watching, fishing and angling, river crossing, camping and the best of all, the famous tiger tours at different paradises of the tigers in India. Same is the case with select hill stations of India which are attracting large number of tourists.

Tourisms is now being experienced as a growing industry with great economic potential in developing countries. It is now understood that the overall green growth goal can be achieved through minimizing tourism's environmental impacts with maximizing economic benefits and in turn poverty alleviation.

The experiences all through indicate that the government has the important role in setting a framework and guideline to maximize benefits, protects the interests of local communities to avoid "Green washing".

The concept of ecotourism is widely used even than there is no universal definition. The various descriptions of ecotourism conceptualize certain characteristics features of the concept. Environmental conservation minimizing environmental impacts, promoting interest of local communities and their economics are the main characteristic features of eco-tourism.

### Study Site:

Location of Bandhavgarh in Bandhavgarh Tiger Reserve lies between two protected Areas: Kanha Tiger Reserve on the southern side and Sanjay National Park on the north eastern side. Bandhavgarh Tiger Reserve is a major source of population to replenish wild animals in the corridor area in between these two Protected Areas. The forest cover which exists in the corridor area can be classified into closed and open forest, scrub and non-forest. The forest

area of this corridor is administered by various forest divisions: North Shahdol, South Shahdol, West Sidhi, Umaria, Dindauri, West Mandla, East Mandla and Katni.

The forests of these corridor areas though excellent from the commercial viewpoint, are not managed to enhance the habitat for wildlife. The major tree species of commercial interests found here are Teak and Sal. All the management in these forests is aimed towards timber production with little or no attention being paid towards the need of the wildlife in the area. Water is the major limiting factor throughout the area. In all reserve forest area cattle compete with wild animals for the limited resources.

### **Methodology:**

The present work entitled "Environmental Assessment of Tourism on Wildlife in Bandhavgarh National Park" has been aimed keeping following aspects in mind.

- Biodiversity Assessment
  - o Floral Diversity
  - o Faunal Diversity

### **A. Floral Diversity:**

Braun-Blanquet (1932) stated that the phytosociological study is actually a description and structural classification of the existing plant community. The study of species composition of a plant community is prerequisite for effective management of the vegetation as it represents the anatomical characters of the floral community.

A number of scientists have worked on the phytosociology of Indian forests. To mention a few significant contributions are Ralhan et. al., (1982), Tiwari and Singh (1985), Singh and Singh (1987), Adhikari et al (1991). Phytosociological studies of tropical forests have been done by Bhatnagar, (1959), Bhimay et al. (1962), Legris and Meher-Homiji (1982). Sharma et al. (1983), George and Varghese (1985), Manilal et. al., (1988), Singhal and Sharma (1989), Dani and Behera (1990), Joshi and Behera (1990), Rao et. al., (1990), Dani et. al., (1991), Gupta and Shukla (1991), Sharma and Shankar (1991).

The vegetation of Bandhavgarh Reserve is tropical moist deciduous type. For the general management purposes, the forest of Bandhavgarh Tiger Reserve may be divided into following categories:

- (i) Sal forests
- (ii) Mixed forest
- (iii) Grass lands

The two forest sites have been identified for phytosociological description are:

- (A) Bandhavgarh National Park

**(B) Tala Forest**

For the purpose of phytosociological description at two sites following phytosociological characters have been considered:

- (1) General species composition
- (2) Importance value Index (IVI)
- (3) Similarity Index
- (4) Regeneration status

**BANDHAVGARH NATIONAL PARK:**

Qualitative species composition in peripheral, middle and intra forest zone of Bandhavgarh forest site is presented in table 1 and fig 1.

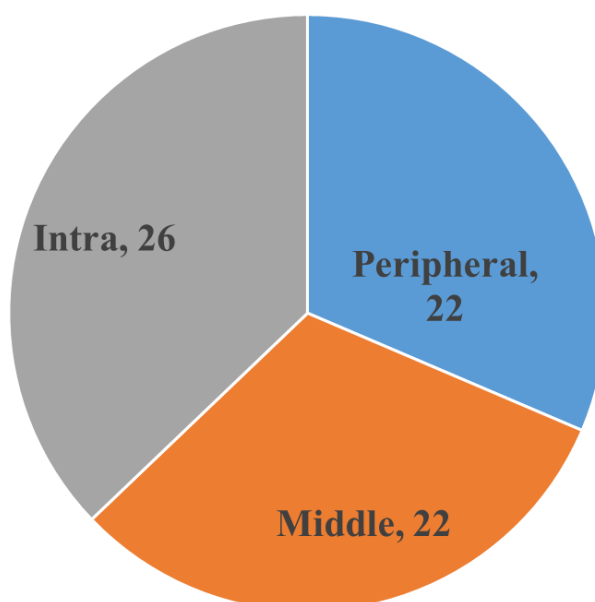
**Table 1:** Presents qualitative species composition in the Peripheral, Middle and Intra Forest of Bandhavgarh National Park.

S.No.	Botanical Name of species	Family	Peripheral	Middle	Intra
1.	<i>Dendrocalamus Strictus</i>	Poaceae	-	+	+
2.	<i>Diospyros melanoxylon</i>	Ebenaceae	+	-	-
3.	<i>Emblica officinalis</i>	Phyllanthaceae	-	+	+
4.	<i>Shorea robusta</i>	Dipterocarpaceae	-	+	+
5.	<i>Buchanania lanzan</i>	Anacardiaceae	+	-	-
6.	<i>Bridelia retusa</i>	Phyllanthaceae	-	+	-
7.	<i>Madhuca indica</i>	Sapotaceae	-	+	+
8.	<i>Careya arborea</i>	Lecythidaceae	+	-	+
9.	<i>Lannea grandis</i>	Anacardiaceae	-	+	-
10.	<i>Lagerstroemia parviflora</i>	Lythraceae	-	+	-
11.	<i>Anogeissus latifolia</i>	Combretaceae	+	-	+
12.	<i>Butea monosperma</i>	Fabaceae	-	+	+
13.	<i>Terminalia bellirica</i>	Combretaceae	+	-	+
14.	<i>Cassia fistula</i>	Fabaceae	-	+	-
15.	<i>Casearia tomentosa</i>	Salicaceae	-	-	+

S.No.	Botanical Name of species	Family	Peripheral	Middle	Intra
16.	<i>Albizia odoratissima</i>	Fabaceae	+	-	-
17.	<i>Helicteres isora</i>	Malvaceae	-	-	+
18.	<i>Syzygium cumuni</i>	Myrtaceae	+	-	+
19.	<i>Terminalia chebula</i>	Combretaceae	+	+	-
20.	<i>Miliusa tomentosa</i>	Annonaceae	-	+	-
21.	<i>Schleichera oleosa</i>	Sapindaceae	+	-	-
22.	<i>Mitragyna parvifolia</i>	Rubiaceae	-	-	+
23.	<i>Semecarpus anacardium</i>	Anacardiaceae	+	-	-
24.	<i>Adina cordifolia</i>	Rubiaceae	+	-	-
25.	<i>Dalbergia paniculata</i>	Fabaceae	-	+	+
26.	<i>Pterocarpus marsupium</i>	Fabaceae	+	-	-
27.	<i>Albizia procera</i>	Fabaceae	+	-	+
28.	<i>Gardenia turgida</i>	Rubiaceae	-	+	-
29.	<i>Flacourtia indica</i>	Salicaceae	+	-	+
30.	<i>Ziziphus mauritiana</i>	Rhamnaceae	-	+	+
31.	<i>Alangium salviifolium</i>	Cornaceae	+	-	-
32.	<i>Cordia dichotoma</i>	Boraginaceae	-	+	-
33.	<i>Aegle marmelos</i>	Rutaceae	+	+	+
34.	<i>Ziziphus xylopyrus</i>	Rhamnaceae	-	-	+
35.	<i>Woodfordia floribunda</i>	Lythraceae	-	+	+
36.	<i>Gardenia lucida</i>	Rubiaceae	-	+	-
37.	<i>Garuga pinnata</i>	Burseraceae	+	-	-
38.	<i>Terminalia tomentosa</i>	Combretaceae	-	-	+
39.	<i>Terminalia arjuna</i>	Combretaceae	+	+	+
40.	<i>Cochlospermum religiosum</i>	Bixaceae	-	-	+

S.No.	Botanical Name of species	Family	Peripheral	Middle	Intra
41.	<i>Wrightia tomentosa</i>	Apocynaceae	+	-	+
42.	<i>Boswellia serrata</i>	Burseraceae	-	-	+
43.	<i>Nyctanthes arbor tristis</i>	Oleaceae	-	+	-
44.	<i>Dillenia pentagyna</i>	Dilleniaceae	+	-	+
45.	<i>Gmelina arborea</i>	Lamiaceae.	-	+	-
46.	<i>Ficus racemosa</i>	Moraceae	+	-	-
47.	<i>Ficus infectoria</i>	Moraceae	+	+	+
+ Represents : Presence					
- Represents : Absence					

**Fig. 1: Presents qualitative species composition in the Peripheral, Middle and Intra Forest of Bandhavgarh National Park.**



#### Peripheral Forest Zone:

A total number of 22 tree species belonging to 16 families have been recorded to be present in peripheral forest Zone. These species are *Diospyros melanoxylon*, *Buchanania lanzan*,

Careya arborea, Anogeissus latifolia, Terminalia bellirica, Albizia odoratissima, Syzygium cumuni, Terminalia chebula, Schleicheria oleosa, Semecarpus anacardium, Adina cordifolia, Pterocarpus marsupium, Albizia procera, Flacourtia indica, Alangium salviifolium, Aegle marmelos, Garuga pinnata, Terminalia arjuna, Wrightia tomentosa, Dillenia pentagyna, Ficus racemosa, Ficus infectoria.

### Middle Forest Zone:

This zone also records a total number of 22 tree species belonging to 19 families. The species observed and recorded are Dendrocalamus Strictus, Emblica officinalis, Shorea robusta, Bridelia retusa, Madhuca indica, Lannea grandis, Lagerstroemia parviflora, Butea monosperma, Cassia fistula, Terminalia chebula, Miliusa tomentosa, Dalbergia paniculata, Gardenia turgida, Ziziphus mauritiana, Cordia dichotoma, Aegle marmelos, Woodfordia floribunda, Gardenia lucida, Terminalia arjuna, Nyctanthes arbor tristis, Gmelina arborea, Ficus infectoria

### Intra forest Zone:

This zone is closer to core zone and in this zone a total number of 26 tree species have been recorded which belong to total number of 22 families are Dendrocalamus Strictus, Emblica officinalis, Shorea robusta, Madhuca indica, Careya arborea, Anogeissus latifolia, Butea monosperma, Terminalia bellirica, Casearia tomentosa, Helicteres isora, Syzygium cumuni, Mitragyna parvifolia, Dalbergia paniculata, Albizia procera, Flacourtia indica, Ziziphus mauritiana, Aegle marmelos, Ziziphus xylopyrus, Woodfordia, floribunda, Terminalia tomentosa, Terminalia arjuna, Cochlospermum religiosum, Wrightia tomentosa, Boswellia serrata, Dillenia pentagyna, Ficus infectoria.

### TALA FOREST RANGE SITE:

The qualitative species composition in peripheral, middle and Intra forest zone of Tala Forest site have been presented in table 2 and fig 2.

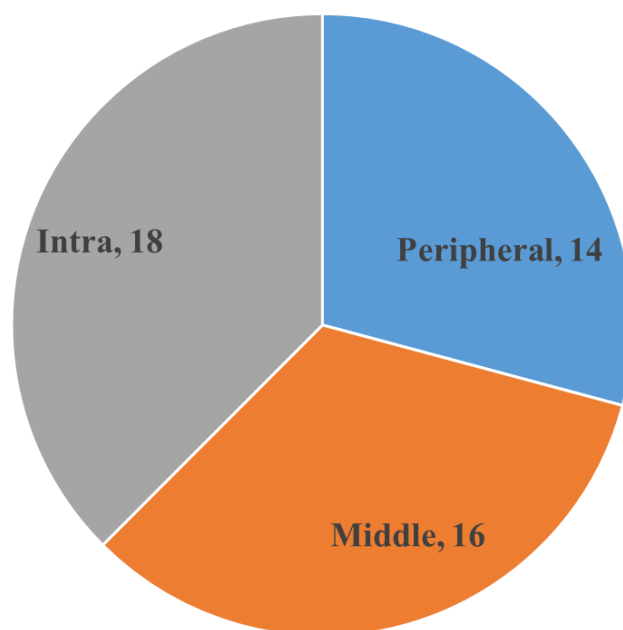
**Table 2:** Qualitative species composition in the Peripheral, Middle and Intra Forests of Tala Forest Site

S.No.	Botanical Name of species	Family	Peripheral	Middle	Intra
1.	<i>Dendrocalamus Strictus</i>	Poaceae	-	+	+
2.	<i>Diospyros melanoxylon</i>	Ebenaceae	+	-	+
3.	<i>Shorea robusta</i>	Dipterocarpaceae	-	+	+
4.	<i>Buchanania lanzan</i>	Anacardiaceae	-	+	-
5.	<i>Lagerstroemia parviflora</i>	Lythraceae	-	-	+

S.No.	Botanical species	Name of Family	Peripheral	Middle	Intra
6.	<i>Emblica officinalis</i>	Phyllanthaceae	-	+	+
7.	<i>Madhuca indica</i>	Sapotaceae	+	-	+
8.	<i>Ougeinia dalbergioides</i>	Fabaceae	-	+	-
9.	<i>Anogeissus latifolia</i>	Combretaceae	-	+	-
10.	<i>Butea monosperma</i>	Fabaceae	-	+	+
11.	<i>Ziziphus xylopyrus</i>	Rhamnaceae	+	+	-
12.	<i>Casearia tomentosa</i>	Salicaceae	-	+	-
13.	<i>Mitragyna parvifolia</i>	Rubiaceae	+	-	+
14.	<i>Lannea grandis</i>	Anacardiaceae	+	-	+
15.	<i>Flacourtia indica</i>	Salicaceae	-	+	-
16.	<i>Syzygium cumuni</i>	Myrtaceae	-	-	-
17.	<i>Cassia fistula</i>	Fabaceae	+	+	+
18.	<i>Terminalia tomentosa</i>	Combretaceae	-	-	-
19.	<i>Careya arborea</i>	Lecythidaceae	+	-	+
20.	<i>Gardenia turgida</i>	Rubiaceae	-	+	-
21.	<i>Bridelia retusa</i>	Phyllanthaceae	-	-	-
22.	<i>Terminalia chebula</i>	Combretaceae	+	-	+
23.	<i>Terminalia bellirica</i>	Combretaceae	-	-	-
24.	<i>Pterocarpus marsupium</i>	Fabaceae	+	-	+
25.	<i>Miliusa tomentosa</i>	Annonaceae	-	+	-
26.	<i>Woodfordia floribunda</i>	Lythraceae	+	-	+
27.	<i>Acacia catechu</i>	Fabaceae	-	-	-
28.	<i>Terminalia arjuna</i>	Combretaceae	+	+	+
29.	<i>Aegle marmelos</i>	Rutaceae	-	-	-
30.	<i>Ziziphus mauritiana</i>	Rhamnaceae	+	-	+
31.	<i>Albizia odoratissima</i>	Fabaceae	-	+	-

S.No.	Botanical Name of species	Family	Peripheral	Middle	Intra
32.	<i>Ficus infectoria</i>	Moraceae	+	-	+
33.	<i>Chloroxylon swietenia</i>	Rutaceae	-	+	-
34.	<i>Gardenia lucida</i>	Rubiaceae	-	-	-
35.	<i>Ixora arborea</i>	Rubiaceae	+	-	+
+	<b>Represents</b>	<b>:</b>	<b>Presence</b>		
-	<b>Represents</b>	<b>:</b>	<b>Absence</b>		

**Fig. 2: Qualitative species composition in the Peripheral, Middle and Intra Forests of Tala Forest Site**



### Peripheral Forest Zone:

This zone of Tala Forest site is represented by a total number of 14 tree species belonging to 11 families. The species recorded are *Diospyros melanoxylon*, *Madhuca indica*, *Ziziphus xylopyrus*, *Mitragyna parvifolia*, *Lannea grandis*, *Cassia fistula*, *Careya arborea*, *Terminalia chebula*, *Pterocarpus marsupium*, *Woodfordia floribunda*, *Terminalia arjuna*, *Ziziphus mauritiana*, *Ficus infectoria*, *Ixora arborea*.



### **Middle Forest Zone:**

This zone records a total number of 16 tree species belonging to 15 number of families. The species recorded are *Dendrocalamus Strictus*, *Shorea robusta*, *Buchanania lanzan*, *Emblica officinalis*, *Ougeinia dalbergioides*, *Anogeissus latifolia*, *Butea monosperma*, *Ziziphus xylopyrus*, *Casearia tomentosa*, *Flacourtia indica*, *Cassia fistula*, *Gardenia turgida*, *Pterocarpus marsupium*, *Miliusa tomentosa*, *Terminalia arjuna*, *Albizia odoratissima*, *Chloroxylon swietenia*.

### **Intra Forest Zone:**

This zone again is closer to core forest area and is represented by a total number of 18 tree species belonging to a total number of 16 families. The species are *Dendrocalamus Strictus*, *Diospyros melanoxylon*, *Shorea robusta*, *Lagerstroemia parviflora*, *Emblica officinalis*, *Madhuca indica*, *Butea monosperma*, *Mitragyna parvifolia*, *Lannea grandis*, *Cassia fistula*, *Careya arborea*, *Terminalia chebula*, *Pterocarpus marsupium*, *Woodfordia floribunda*, *Terminalia arjuna*, *Ziziphus mauritiana*, *Ficus infectoria*, *Ixora arborea*.

### **B. Faunal Diversity:**

Bandhavgarh was declared in National Park in 1968 with an area of 105 sq. km. in the year 1982, three more ranges khitauli, Magdhi, kallawah were added to expand the area to 448 sq. km. of Bandhavgarh nation park. In the year 1993 Bandhavgarh Tiger Reserve came in to being having a cove area of 694 including Panpatha sanctuary along with a buffer area of 437 sq. km. enlarging the total area of the Reserve to 1161.47 sq. km.

The vibrant and luxuriant jungle of the reserve is composed of tropical moist deciduous forests. The dominant species is sal (*shorea robusta*), interspersed with dense clumps of bamboo throughout the reserve. Large grassy patches are plenty in the Reserve. More than twenty streams flow through the reserve which ultimately flow into Son River an important tributary of Ganges.

The main fauna of the park is discussed here below:

### **Mammals:**

Some of the significant mammals of reserve are spotted deer or chital (*Axis axis*), Sambar (*Cervus unicolor*), Barking deer (*Muntiacus muntjak*) Chousingha or four horned antelope (*Teracerus gradicornis*), Nilgai or blue bull (*Bosellaphus-trangocamelus*), Chinkara (*Gazella gazella*), Tiger (*Panthera tigris tigris*), Leopard (*Pantheon pardus*), wild dog (*Cuon alpinus*), Kaikal (*Canis aureus*), wild boar (*Sus scrofa*), sloth bear (*Metursus ursinus*), common Langoor (*Presbytis entellus*) and Rhesus monkey (*Macaque malata*).

## Birds:

Around 250 species of birds have been identified in the reserve. A few predominant of them are Peafowl, Red Jungle Flow, Grey Hornbill, Common Teat, Red - Wattle Laurant, Crested serpent Eagle, While Breasted kingfisher, Lesser Adjutant stork, long billed Vulture, Black or king Vulture, white-backed Vulture, and Egyptian Vulture etc.

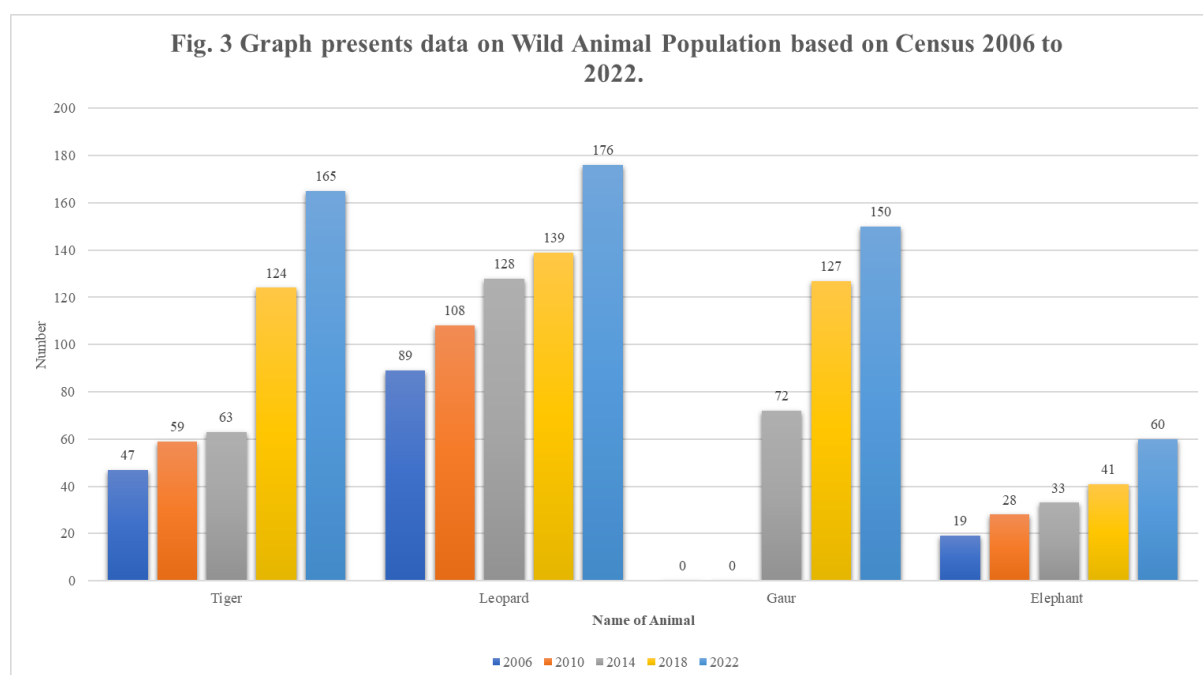
## Reptiles:

The reptile species common in the park are cobra, Krait, Viper and Python etc.

## Butter files:

These are the most beautiful and colourful tiny creatures on earth. Around 70 species of butterflies have been identified in the reserve.

Present data on wild animal population as per census 2022 which also presents significant increase in the population of wild animals of attractions in the park as depicted in fig. 3. Tiger population shows a rise in number to 165, Leopard 176, Gaur 150 and Elephant to 60 in number. Figure 6.15 depicts an overall picture of census from 2006 to 2022.



## Result:

To conclude that the Bandhavgarh forest site is presented by a total number 47 tree species belonging to 30 families and hence is more diversified than Tala Forest site which represents 35 species belonging to 21 families.

Looking to familial contribution Bandhavgarh forest site is represented by a total number of 30 families of which 16, 19 and 22 families showed their presence in peripheral, middle and

intra forest zone while Tala forest is represented by a total number of 21 families of which 11, 15 and 16 families contribute to the vegetation of peripheral, middle and intra forest site.

On the basis of familial contribution conclusion can again be drawn that the Bandhavgarh forest site is more diversified than Tala Forest site.

The status of wild animal population of some significant wild animal species has been discussed on the basis of census records obtained from the office of Bandhavgarh Tiger Reserve.

The census recorded important wild animals like Tiger, Leopard, Gaur and Elephant. The census is conducted in every four years.

The census data received for the years 2006, 2010, 2014, 2018 and 2022 has been analysed here below.

The census records for the year 2006 reveal that there were 47 Tigers, 89 Leopard and 19 Elephant. This is important to note that Gaur became locality extinct before 1995 due to loss of Corridor.

As per the data presented in for the census 2010 tiger population increased to 59, Leopard to 108 and Elephant to 28 when compared to 2006 records.

As per official records Gaur was introduced in the park in the year 2011-12 and hence were recorded in the census year 2014, 72 in number, Tiger population increased to 63 and an increase was also noticed for Leopard and Elephant as well and recorded 128 and 33 in number respectively.

The census picture for 2022. The Tiger population show an increase to 165 in number Leopard to 176, Gaur to 150 and Elephant increased to 60.

## References:

- Adhikari, B.S., Rawat, Y.S., Singh, S.P. (1991). High altitude forest composition, diversity and profile structure in a part of Kumaon Himalaya.
- Bhatnagar, H.P. 1965. Soils from different quality Sal forest of UP India. Trop. Ecol. 6: 56 -62.
- BHIMAYA C P, BOSE A B, MALHOTRA S P : The human factor in relation to trees and shrubs in a village in arid part of Rajasthan. Indian Forester, 1962, 87; 10.
- Braun-Blanquet J (1932) Plant sociology: the study of plant communities. McGraw-Hill, New York
- Dani, H. P., Patil, D. P., Basu, S. and Behera, N. (1991) Phyto-sociological analysis of forest vegetation of Kantamal region, Phulbani, Orissa. J. Tropical Forestry 7(11): 151-158.
- GEORGE M. & VARGHESE G. (1985): Dominance and structural variation in deciduous forest. Indian Forester July 1985, S. 495-501

- Gupta, O.P. and Shukla, R.P. 1991. The composition and dynamics of associated plant communities of sal plantation. *Tropical Ecology* 32: 296-309.
- Joshi, S.K., D.P. Pati & N. Behera. 1990. Primary production of herbaceous layer in a tropical deciduous forest in Orissa, India. *Tropical Ecology* 31: 73-83.
- Legris, P. & Meher-Homji, V.M.. (1982). History of India's Flora and Vegetation. *Sci. Rev. Arid Zone Res.* 1.
- Manilal KS, Kandya AK, Sabu T, 1988. A phytosociological study on Silent Valley forests, Kerala. *Journal of Tropical Forestry*, 4(4):362-379.
- Ralhan P.K., Saxena A.K., Singh J.S. (1982). Analysis of forest vegetation at and around Nainital in Kumaun Himalaya. *Proc. Indian Natl. Sci. Acad.*, 348 pp. 121-137
- Rao P., Barik S.K., Pandey H.N., Tripathi R.S. (1990). Community composition and tree population structure in a sub-tropical broad-leaved forest along a disturbance gradient. *Vegetatio*, 88:151-162.
- Sharma BM, Kachroo P. (1983) Flora of Jammu and plants of neighborhood. India: Bishen Singh Mahendra Pal Singh.
- Sharma, S.K., Shankar, V., 1990. Gradient analysis of the vegetation of Kailana in the Thar Desert, India. *Tropical Ecology* 31, 104–111.
- Singh, J.S. and S.P. Singh (1987). Forest vegetation of Himalaya. *Bot. Rev.*, 52: 80-192.
- Singhal RM, Sharma SD. Phytosociological Analysis of tropical forest in Doon Valley of Uttar Pradesh. *J. of Tropical forestry*. 1989;5(1):57-65.
- Tiwari, J.C. and S.P. Singh (1985). Vegetation analysis of a forest lying in transition zone between lower and upper Himalayan moist temperate forest. *The Vegetational Wealth of Himalayas* (G.S. Paliwal, ed.). Puja Publishers, New Delhi. pp. 104-119.
- Wu J and David JL (2002) A spatially explicit hierarchical approach to modeling complex ecological systems: theory and applications. *Ecological Modelling* 153: 7–26.