

Thesis: **FLORISTIC DIVERSITY OF KODERMA WILDLIFE  
SANCTUARY, JHARKHAND**

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Project: **FLORA OF KODERMA WILDLIFE SANCTUARY,  
JHARKHAND**

**DR. P. LAKSHMINARASIMHAN AND SHYAM BISWA**

# PROJECT 1: FLORA OF KODERMA WILDLIFE SANCTUARY, JHARKHAND (2010 -2014): SUBMITTED

**Koderma Wildlife Sanctuary** is one among the Protected Areas of Jharkhand State. It was established as a wildlife sanctuary in the year 1981.

The Sanctuary lies between 24°25'–24°38' N and 85°25'–85°40' E, and spreads over an area of 150.62 km<sup>2</sup>.

- ❖ The Wildlife Sanctuary supports two major types of forests
  - Northern Tropical Dry Deciduous Forest or Dry Peninsular Sal Forest and
  - Northern Dry Mixed Deciduous Forest

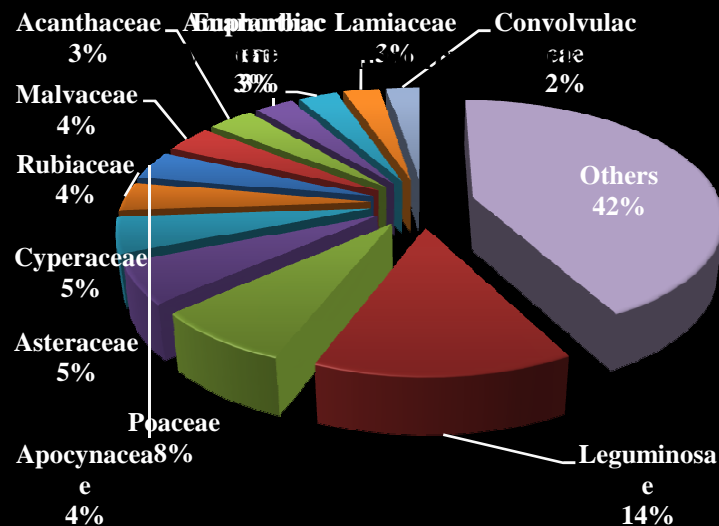
(Champion & Seth, 1968)

## FLORA ANALYSIS

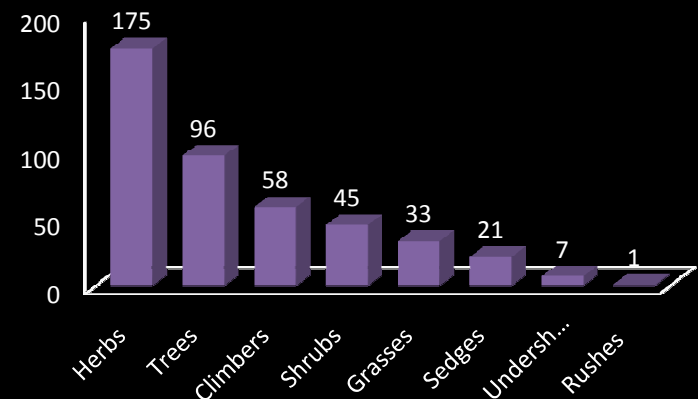
- ❖ Botanical explorations covering all seasons (7 Botanical tours) were made in the Wildlife Sanctuary during 2010–2013
- ❖ A total of **634 field numbers** comprising **c. 1600 specimens** have been collected and the voucher specimens are deposited at CAL.
- ❖ The analysis of flora of the Koderma Wildlife Sanctuary reveals that it comprises **436 taxa** (including 433 species, and 3 varieties) of 328 genera belonging to 100 angiospermous families as per APG IV system of classification of angiosperms (2016).

❖ **3 Endemic species**

- ❖ Also have done Ecological studies via Quadrat method. Studied the plants used by the ethnic and the local communities

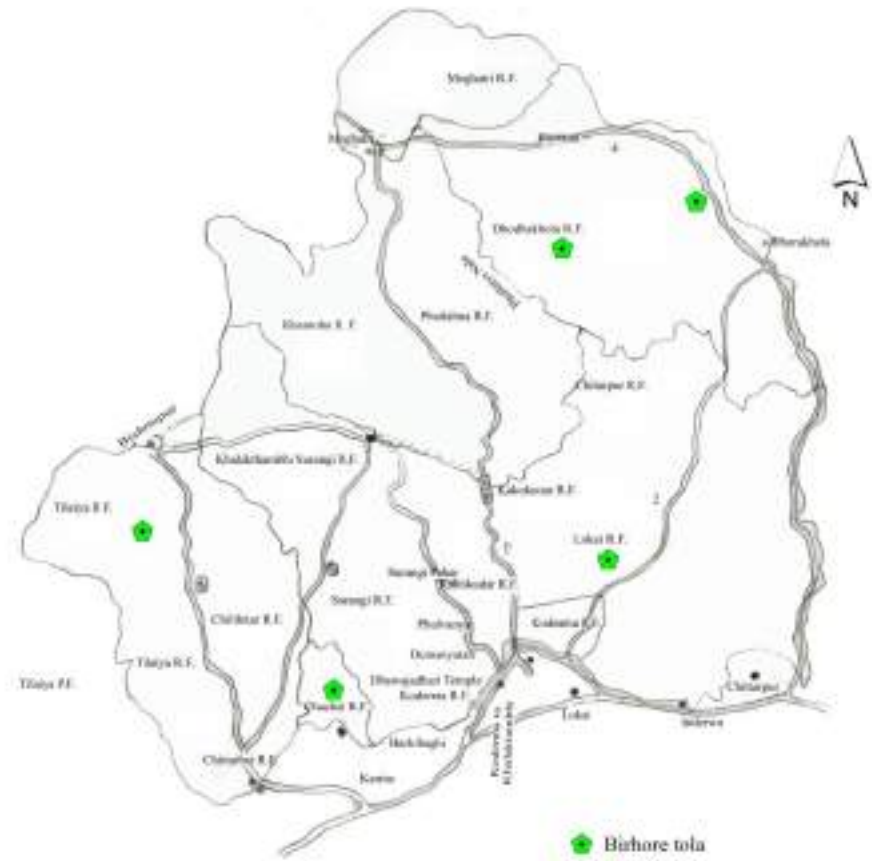


Diversity of Dominant Families in Koderma Wildlife Sanctuary



Life-form composition of Flora of Koderma Wildlife Sanctuary

**LOCATION MAP OF KODERMA WILDLIFE SANCTUARY**



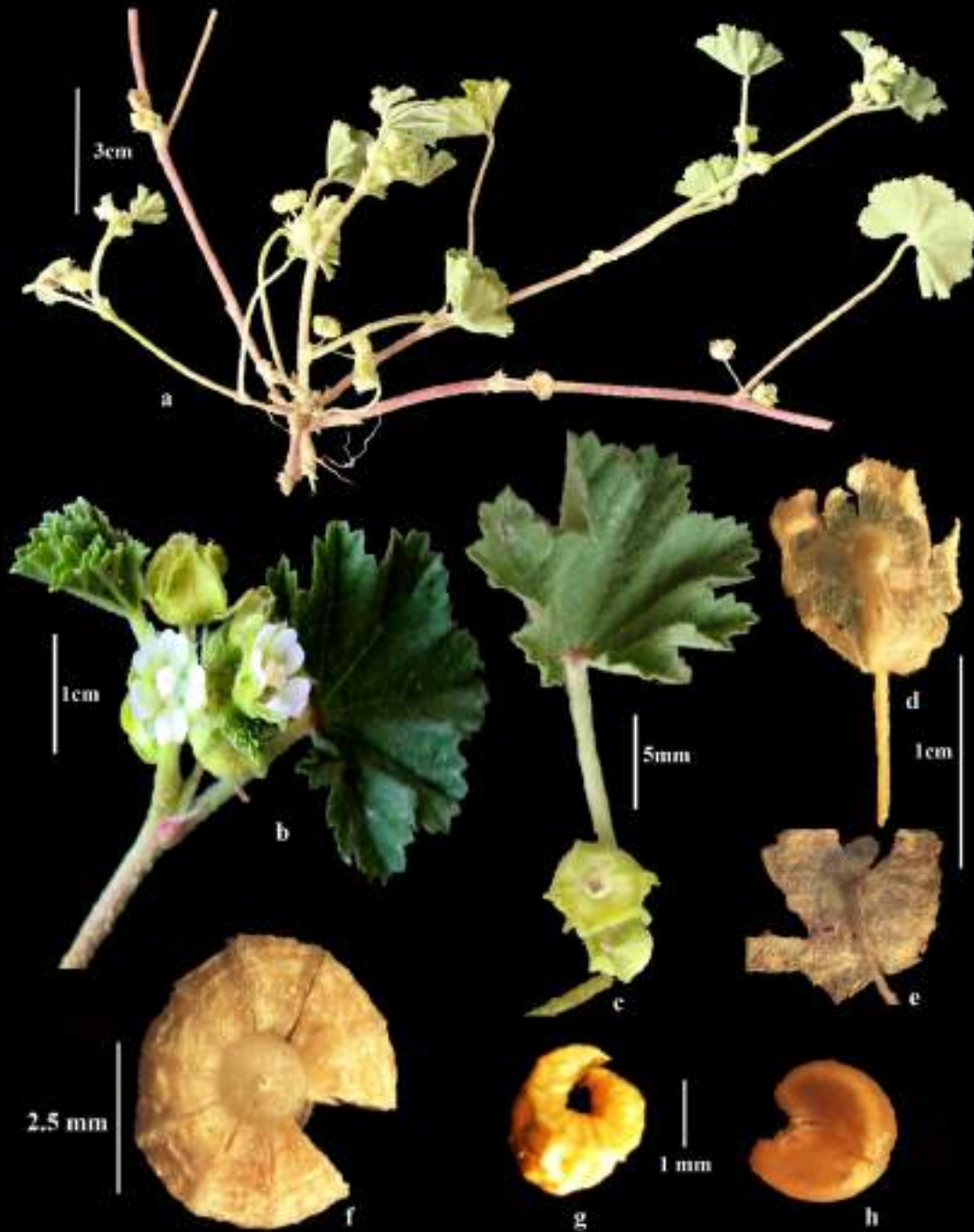
Map: Koderma Wildlife Sanctuary, showing the Birhore tola / settlements





*Bombax ceiba* L.





**Malva parviflora**  
var. **microcarpa**  
(Pers.) Loscos  
a: habit, b: flowering  
twig, c: fruiting  
twig, d & e: calyx  
mericarps removed;  
f: fruit, g: a single  
mericarp, h: seed.

Biswa, S., Lakshminarasimhan, P. & Lokho, A. 2016. A new locality for *Malva parviflora* var. *microcarpa* (Pers.) Loscos (Malvaceae). *Indian J. Forest.* 39: 197–199.



# THREATS



## PROJECT 2 & 3 : FLORA OF BIHAR & FLORA OF JHARKHAND

Studies the herbarium specimens of Bihar and Jharkhand in CAL and NBRI, Lucknow, Ranchi university and made description of the species of the families

1. Flora Of Bihar & Flora Of Jharkhand (2013-2014) : **Elatinaceae 2 Species** and **Hypericaceae 6 Species. Submitted**
2. Flora Of Bihar & Flora Of Jharkhand (2014-2015) : **Olacaceae 2 Species; Opliacae 2; Icacinaceae 1; Aquifoliaceae 1 and Sapindaceae, 11. Completed**
3. Flora Of Bihar & Flora Of Jharkhand (2015-2017) : **Droseraceae 3 Completed; Combretaceae 17, 5 species Completed; Vahliaceae 2; Crassulaceae 6; Haloragidaceae 3; Callitrichaceae 3; Rhizophoraceae 1.**



1. Botanical exploration tour was conducted for Flora of Bihar Project from **17<sup>th</sup> December 2012 to 28<sup>th</sup> December 2014** in the two districts- **Aurangabad and Nawada.**



2. Botanical exploration tour was conducted for Flora of Bihar Project from **16<sup>th</sup> September 2015 to 2nd October 2015** in the three districts- **Kaimur, Rohatas and Nalanda.**



## HERBARIUM MAINTAINANCE

1. Rearranged Hall 1 as per Bentham And Hooker 'Bentham & Hooker' Genera Plantarum .
2. Rearranged specimens species wise according to Flora of British India.
3. Changed genus cover & species cover written information from Ranunculaceae to Capparaceae and Dipterocarpaceae .
4. Sorted out specimens for remounting.
5. Assisted **fumigation** of Hall 1, 3 and 4.
6. **Incorporated specimens** and sorted out herbarium specimens of Hall 2, 3 4 and 5. Also sorted out type herbarium from hall 1.
7. **Listed Original Paintings** drawn during 1800-1900A.D. after fumigation 5 bundles were cleaned and shifted to Monocot Type Section.
8. Conserved in special archival boxes receives from Natural History Museum, London the valuable 32 vols. Of **Wallich's Correspondances** and 5 other rare books in Monocot type section, CAL in association with Ms. Ranee Prakash, **Natural History Museum, London.**
9. Rearranging the Student Herbarium according to **APG system of classification.**
10. Old Books containing paintings and drawings after fumigation were listed and assisted in keeping them in the Library CNH and in monocot type herbarium.
11. **Digitization of monocot type herbarium** (Annual Action Plan ) In the Monocot Type section barcodes were assigned systematically on the type sheets. And data sheets are prepared of these type sheets. Also changed genus cover and species cover and incorporated them in the Monocot type herbarium.



## TECHNICAL

**Tech II: Identification of plant specimens:** Prepared / drafted letters of identification / authentication of plant samples and also identified specimens sent or brought from different institutes /organization Revenues were generated. Maintenance and recording of files and register of Tech. II. Also assisted in poisoning the plant specimens which came for identification. Made correspondence regarding Tech II via email and phone. (From 2008 to 2015 along with **Mr. K.L. Maity**); Dr. A. Garg, Dr. K. Karthigeyan, Dr. V.P. Prasad and at Present Dr. R. Gogoi, Dr. Arisdason, Dr. Subir Bandopadhyay, Dr. Sampath Kumar, Dr. Abhishek Bhattacharjee, Dr. Sangita Dey, Dr. Somyashree Patak, Dr. G. Krishna, Mr. Anant Kumar, Mr. Vijay Mastakar and BSI staffs)

Sl	Year	Specimens Identified	Revenue Earned
1.	1st APRIL 2008 - 31st MARCH 2009	c. 450	Rs. 42,700/-
2.	1st APRIL 2009 - 31st MARCH 2010	c. 200	Rs. 19,250/-
3.	1st APRIL 2010 - 31st MARCH 2011	c. 500	Rs. 52,850
4.	1st APRIL 2011 - 31st MARCH 2012	c. 300	Rs. 15,100
5.	1st APRIL L 2012 - 31st MARCH 2013	c. 230	Rs. 11,500
6.	1st APRIL 2013 - 31st MARCH 2014	c. 250	Rs. 12,600
7.	1st APRIL 2014 - 31st MARCH 2015	c. 250	Rs. 12,500
8.	1st APRIL 2015 - 31st MARCH 2016	c. 400	Rs. 17,600

#### **Tech IV: Repository representative plant samples: January 2012 onwards**

**Herbarium specimens and bottle museum specimens received regarding deposition of biological resource material in CAL and in the museum section of CBL as repository representative samples as per guidelines of National Biodiversity Authority. Maintained a separate herbarium and, register and files for the Repository representative plant samples. Drafted certificate to the concerned person.**

#### **MISCELLANOUS WORK**

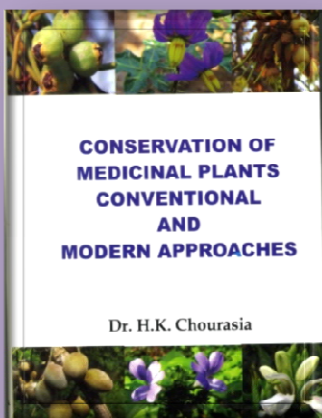
- Assisted and participated in the exhibition and programmes in the celebration of 125<sup>th</sup> year of Botanical Survey of India from 12 to 14<sup>th</sup> February 2015.
- Listed plant species of Aurangabad and Nawada District for Wildlife Forest Division Bihar.
- Submitted a list of 21 Rare Endangered and Threatened plant specimen to The Director, Institute of Forest Productivity, ICFRE, Ranchi, Jharkhand, concern with ex-situ conservation.
- Prepared 5 Roxburgh's painting posters (with stand), for the BSI exhibition cum Flower show from 25<sup>th</sup> –28<sup>th</sup> February 2016, held at BGIR, Noida.
- Assisted and attended International and National delegates research persons for Herbarium consultation and visit.
- Attended and given demonstration to students of school, colleges and university.

## Workshop / Coursework / Seminar/Conference/Workshop/Training/Exhibition Participated

Total : 17

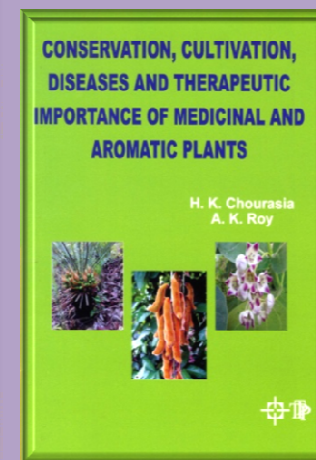
1. Four-day National **Workshop on Scanning Electron Microscopy from 24th to 27th March, 2009** at Burdwan University, Burdwan, West Bengal.
2. Three days **coursework on “Botanical Nomenclature Course”** organized by Botanical Survey of India and ENVIS Centre on Floral Diversity from 11-01-2013 to 13-01-2013 in Kolkata.
3. Attended 02 days **exhibition in connection with The RAKSHA** textile exhibition being organized by Sutra in collaboration with BSI at ICCR, Kolkata. Also the 04 volumes of Roxburgh’s Icones were exhibited Feb-March 2010.
4. Participated and assisted in in the program in connection with the **International Day for Biological Diversity** on 22<sup>nd</sup> May 2013 and also presented **poster** on - ‘**Angiosperm diversity of Koderma Wildlife Sanctuary**’
5. Attended “**Workshop on Conservation of Archival Material**” 9<sup>th</sup> – 10<sup>th</sup> **January 2014** organized by Sutra in collaboration with Industrial Section Indian Museum, Kolkata
6. Participated in ‘**Hindi Karyashala**’ (**hindi workshop**) on 19<sup>th</sup> August 2013 which was given by Dr. Pandey and Mr. N. Choudhury.
7. As a resource person done **training programme** on processing of plant specimens for the workshop on “**Preservation methods along with the practical techniques in botany**” organized by Department of botany, Burdwan University and BSI on 6<sup>th</sup> March 2014.
8. Participated in the **training programme** on “**Administration & Data Uploading on eFlora & eArchive Portals**” on 29<sup>th</sup> and 30<sup>th</sup> **September 2014** organized by Centre for Development of Advanced Computing (CDAC), Kolkata.
9. Attended and demonstrated the herbarium specimens, botanical specimens, Posters and the Roxburgh’s Icones in the **Flower show cum BSI exhibition from 25<sup>th</sup> –28<sup>th</sup> February 2016**, held at BGIR, Noida.
10. As a resource person done **training programme on Field collection and Herbarium techniques and methodology for plant material** for ENVIS programme on Taxonomic Training Programme on Saturday the 2<sup>nd</sup> of April 2016.
11. Attended and participated in the **Seminar on World Environment Day, 5<sup>th</sup> June 2015** organized by organized by the **Foundation for Science and Environment, Kolkata at Rajabazar Science College.**
12. Exhibited and participated in **exhibition on Joseph Hooker: Botanical, Trailblazer and the Botanical Heritage of India and (2) Empire and the Environmental Heritage, of India** (Hooker bicentenary year celebration) at Indian Museum, ISIM, Kolkata.
13. The International Biodiversity Day on 22<sup>nd</sup> May 2015 participated and given an oral presentation on “**Phytodiversity of Koderma Wildlife Sanctuary, Jharkhand and The Forest Utilization**”.





### Chapter in Books

1. Biswa, S., Lakshminarasimhan, P. & Lokho, A. (2016). Ethno-Medicinal plants of Birhore and the native community of Koderma Wildlife Sanctuary, Jharkhand, India. In: Chourasia, H.K. (ed.), Conservation of Medicinal Plants – Conventional and Modern Approaches. Omega Publications, New Delhi, pp. 118–130.
2. Krishna G., Kumar A., Kumar A., Biswa, S., & Lakshminarasimhan, P. (2016). Diversity of ethnomedicinal plants and their conservation in Aurangabad district, Bihar. In: Chourasia, H.K. & Roy, A. K. (eds.), Conservation, Cultivation, Diseases and Therapeutic Importance of Medicinal and Aromatic Plants : 195-205

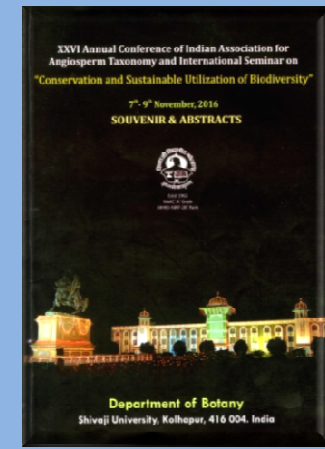


### PAPERS

1. Maity K.L., Biswa S. & Bandyopadhyay S. 2011. Trees of *Samanea saman* (Leguminosae: Mimosoideae) dying in and around Kolkata and Howrah. ENVIS Newsletter 16(2) 2011.
2. Maity K.L. & Biswa S. 2011. *Piscidia piscipula* (Leguminosae: Papilionoideae) in AJC Bose Indian Botanic Garden, Howrah. Newsletter 16(2) 2011.
3. Maity K.L. & Biswa S. 2014. A traditional use of *Saccharum bengalense* (Poaceae) in Hoogly district, West Bengal. Newsletter 19(1) 2014.
4. P. Lakshminarasimhan, Biswa S., Magesh C.R., Maity K.L., & Bandyopadhyay S. A guide to the persons from outside Botanical Survey of India intending to identify their plant specimens at Central National Herbarium or to get a certificate regarding their identity or authenticity. ENVIS website (<http://www.bsienvi.nic.in>)
5. Biswa, S., P. Lakshminarasimhan & A. Lokho (2015 publ. 2016). Phytodiversity of Koderma Wildlife Sanctuary, Jharkhand – An overview. Phytotaxonomy 15: 22–27.
6. Biswa, Shyam, A. Lokho and P. Lakshminarasimhan (2016). Biodiversity of Koderma wildlife sanctuary, Jharkhand – Its threats and conservation. The Global Journal of Life Science and Research 2(1): 213–219.
7. Biswa, S., P. Lakshminarasimhan & A. Lokho (2016). A new locality for *Malva parviflora* var. *microcarpa* (Pers.) Loscos (Malvaceae) Indian Journal of Forestry.

## Abstracts participated in oral and poster presentation

- Biswa, S., Lakshminarasimhan P. and Lokho, A. (2014). Floristic Diversity in Koerma Wildlife Sanctuary, Jharkhand. In: National Conference on Biodiversity : Issues, Concern and Future Strategies NCB 2014, 16– 18 January, 2014 (Programme & Abstracts). West Bengal Biodiversity Board and Zoological Survey of India, Kolkata, p.170.
- Biswa, S., Lakshminarasimhan P. and Lokho, A. (2015). Biodiversity of Koderma Wildlife Sanctuary, Jharkhand- Its Threats and Conservation. In: International Conference on Environment and Ecology (ICEE 2015) 2-3-4 March, 2015 (Souvenir & Abstracts). Foundation for Science & Environment Kolkata, Scientific & Environmental Research Institute Kolkata and Indian Institute of Ecology and Environment, New Delhi, Kolkata p.10.
- Biswa, S., Lokho, A. & Lakshminarasimhan, P. (2016). Plant diversity of Koderma Wildlife Sanctuary, Jharkhand and its utilization. In: National Seminar on Plant and Microbe: Diversity and Utilization (Abstracts). Department of Botany, Siksha Bhavana Visva-Bharati, Santiniketan, West Bengal, p.104.
- Biswa, S., Lakshminarasimhan P., & Lokho, A. (2016). Flowering plants of Koderma Wildlife Sanctuary, Jharkhand, with special emphasize on interesting plants and ethnic knowledge. In: *XXVI Annual Conference of Indian Association for Angiosperm Taxonomy and International Seminar on Conservation and Sustainable Utilization of Biodiversity 7– 9 November, 2016* (Souvenir & Abstracts). Department of Botany, Shivaji University, Kolhapur, p.42.







Neel-gai



Birds



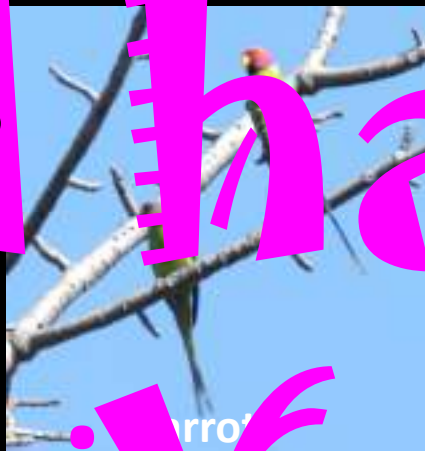
Monkey



Pug mark of Jackal/fox.



Peacock



Parrot



Blind Snake



Skink



Crab



Termite mound



Red ant nest



Bee hives

Thank You