

# Management of Forests in India for Biological Diversity and Forest Productivity A New Perspective

WII-USDA Forest Service Collaborative Project  
Grant No. FG-In-780 (In-FS-120)



Volume II

## Wildlife - Habitat Relationships (WHR) in Conservation Areas

*Technical Coordinators*

Pradeep K. Mathur  
John F. Lehmkuhl  
Vishwas B. Sawarkar



भारतीय वन्यजीव संस्थान  
Wildlife Institute of India



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Biological Diversity and Forest Productivity**  
**A New Perspective**

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**Wildlife Institute of India**



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*Wildlife Institute of India*

*Post Box # 18, Chandrabani, Dehra Dun - 248 001 (Uttaranchal), India.*

*Tel. : +91-135-2640111 - 2640115; Fax : +91-135-2640117*

*Email : wii@wii.gov.in; Website : www.wii.gov.in*

Cover Photos	S.K. Srivastava, Harish Kumar, A.K. Gupta
Report Design & Layout	Virendra Sharma
Image Processing	Abhimanyu Gahlot
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Harish Kumar & Ashish Kumar*

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*Sajeev T.K., Shivaji G. Chavan, Vishwas B. Sawarkar, Anjana Pant,  
Harish Kumar & Ashish Kumar*

---

---

## Final Research Report : 2002 (Technical)

1. Name & Address of the reporting Institution : **Wildlife Institute of India**  
P.O. Box 18, Chandrabani  
Dehra Dun – 248 001 (Uttaranchal), India
2. Name of the Principal Investigator : **Mr. V.B. Sawarkar**  
Director, Wildlife Institute of India
3. Project Title : **Management of Forests in India for Biological Diversity and Forest Productivity – A New Perspective**
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7. Dates of Research Period covered : 1 January, 1996 to 31 December, 2002
8. Co-operating Scientist : **Mr. Tom L. Darden**  
Coordinator,  
WII-USDA Forest Service Project and  
Director, Biological and Physical Resources,  
USDA Forest Service, Atlanta, USA  
  
**Dr. John F. Lehmkuhl**  
Associate Coordinator and  
Research Wildlife Biologist  
USDA Forest Service, Wenatchee, USA  
  
**Dr. Hal Salwasser**  
Consulting Advisor  
USDA Forest Service
9. Project Partners : Wildlife Institute of India (WII)  
  
USDA Forest Service (USFS)  
  
Indira Gandhi National Forest Academy  
(IGNFA)  
  
Forest Department(s) of concerned states:  
Madhya Pradesh, Maharashtra, Meghalaya,  
Tamil Nadu and Uttar Pradesh.

---

# Project Personnel

## Principal Investigator

Wildlife Institute of India

**V.B. Sawarkar**  
Director, Wildlife Institute of India  
[omega@wii.gov.in](mailto:omega@wii.gov.in)

USDA Forest Service

**Tom L. Darden**  
Director, Biological and Physical Resources,  
USDA Forest Service, Atlanta, USA  
[tldarden@fs.fed.us](mailto:tldarden@fs.fed.us)

## Nodal Officer

**B.C. Choudhury**  
Head  
Deptt. of Endangered Species Management  
Wildlife Institute of India  
(01.01.96 to 11.02.97)

**Dr. P.K. Mathur**  
Prof. & Head  
Deptt. of Landscape Level Planning  
& Management  
Wildlife Institute of India  
(12.02.97 to 31.12.02)  
[mathurpk@wii.gov.in](mailto:mathurpk@wii.gov.in)

## A. Project Sites

(i) *Anaimalai Conservation Area (ACA)*

Co-Investigators (CIs)

**Sugato Dutt, IFS**  
Scientist-SE  
Faculty of Wildlife Management  
Wildlife Institute of India  
(01.01.95 to 31.05.99)

**Sanjay K. Srivastava, IFS**  
Senior Reader  
Deptt. of Population Management,  
Capture and Rehabilitation  
Wildlife Institute of India  
(12.11.99 to 31.12.02)  
[sks@wii.gov.in](mailto:sks@wii.gov.in)

US Scientist

**Dr. Martin G. Raphael**  
Team Leader  
Pacific Northwest Research Station  
Ecosystem Processes Research Program  
Forestry Sciences Laboratory  
Olympia, WA 98502  
[mraphael@fs.fed.us](mailto:mraphael@fs.fed.us)

Researchers

**Dr. N. K. Ramachandran**  
Research Associate  
Wildlife Institute of India  
(09.04.96 to 21.01.98)

---

	<p><b>Sajeev, T.K.</b> Senior Research Fellow Wildlife Institute of India (17.12.97 to 29.11.01) <a href="mailto:sajeevtk@indiatimes.com">sajeevtk@indiatimes.com</a></p>
Field Managers	<p><b>Wildlife Warden</b> Indira Gandhi Wildlife Sanctuary and <b>Divisional Forest Officers</b> Dindigul/Kodaikanal Forest Division</p>
<i>(ii) Garo Hills Conservation Area (GCA)</i>	
Co-Investigators (CIs)	<p><b>Dr. S.P. Singh, IFS</b> Scientist-SE Faculty of Wildlife Management Wildlife Institute of India (01.01.96 to 19.06.98)</p> <p><b>Ajai Saxena, IFS</b> Scientist-SE Faculty of Wildlife Management Wildlife Institute of India (01.01.96 to 29.2.2000)</p> <p><b>Dr. Atul Kumar Gupta, IFS</b> Prof. &amp; Head Deptt. of Population Management, Capture and Rehabilitation Wildlife Institute of India (17.08.2000 to 31.12.02) <a href="mailto:akg@wii.gov.in">akg@wii.gov.in</a></p>
US Scientist	<p><b>Dr. Bruce G. Marcot</b> Research Wildlife Ecologist USDA Forest Service Pacific Northwest Research Station Portland Forestry Sciences Lab <b>Portland OR 97208-3890 USA</b> <a href="mailto:bmarcot@fs.fed.us">bmarcot@fs.fed.us</a></p>
Researcher	<p><b>Ashish Kumar</b> Senior Research Fellow Wildlife Institute of India <a href="mailto:ashishkmr@usa.net">ashishkmr@usa.net</a></p>
Field Managers	<p><b>Conservator of Forests, Tura</b> and <b>Divisional Forest Officer</b> Balpakaram National Park, Meghalaya</p>
<i>(iii) Satpura Conservation Area (SCA)</i>	
Co-Investigators (CIs)	<p><b>V.B. Sawarkar</b> Director Wildlife Institute of India</p> <p><b>Dr. P.K. Mathur</b> Wildlife Institute of India (01.01.96 to 31.08.99) <a href="mailto:mathurpk@wii.gov.in">mathurpk@wii.gov.in</a></p>

---

	<p><b>Sunil B. Banubakode</b> Senior Reader Deptt. of PA Network, Wildlife Management &amp; Conservation Education Wildlife Institute of India (17.08.01 to 31.12.02) <a href="mailto:subilbb@wii.gov.in">subilbb@wii.gov.in</a></p>
	<p><b>S.G. Chavan</b> Formerly A.E.O., WII and Asstt. Director Directorate of Forest Education Govt. of India</p>
US Scientist	<p><b>Richard Holthausen</b> National Wildlife Ecologist USDA Forest Service Flagstaff, AZ 86001, USA <a href="mailto:rholthausen@fs.fed.us">rholthausen@fs.fed.us</a></p>
Researchers	<p><b>Dr. Anjana Pant</b> Research Associate Wildlife Institute of India (18.01.96 to 07.09.01) <a href="mailto:anjana_pant@yahoo.com.uk">anjana_pant@yahoo.com.uk</a></p>
	<p><b>Geeta Sunal</b> Junior Research Fellow Wildlife Institute of India (01.02.96 to 01.10.97)</p>
Field Managers	<p><b>Conservator of Forests</b> (Hoshangabad/Betul/Amravati Circles)</p> <p><b>Director, Satpura National Park</b> Pachmarhi (Madhya Pradesh)</p> <p><b>Field Director</b> Melghat Tiger Reserve Amravati (Maharashtra)</p> <p><b>Dy. Conservator of Forests/ Divisional Forest Officers</b> Forest Divisions under (Hoshangabad/Betul/Amravati Circles)</p>
<i>(iv) Terai Conservation Area (TCA)</i>	
Co-Investigators (CIs)	<p><b>D.V.S. Khati, IFS</b> Scientist-SE Faculty of Wildlife Extension Wildlife Institute of India (01.01.96 to 31.08.99)</p> <p><b>Dr. P.K. Mathur</b> Wildlife Institute of India (01.09.99 to 31.12.02) <a href="mailto:mathurpk@wii.gov.in">mathurpk@wii.gov.in</a></p>

---

US Scientist

**Dr. John F. Lehmkuhl**  
Research Wildlife Biologist  
USDA Forest Service  
Pacific Northwest Research Station  
Wenatchee WA 98801, USA  
[jlehmkuhl@fs.fed.us](mailto:jlehmkuhl@fs.fed.us)

Researcher

**Harish Kumar**  
Senior Research Fellow  
Wildlife Institute of India  
(18.01.96 to 14.12.2001)

Field Managers

**Field Director**  
Dudwa Tiger Reserve, Kheri  
(Uttar Pradesh)

**Dy. Director**  
Dudwa Tiger Reserve, Palia  
(Uttar Pradesh)

**Conservator of Forests**  
Oudh Circle

**Divisional Forest Officers**  
North/South Kheri Forest Divisions

## **B. Collaborating Institution**

IGNFA

**Dr. V.N. Pandey, IFS**  
Joint Director  
Indira Gandhi National Forest Academy

**P.C. Tyagi, IFS**  
Joint Director  
Indira Gandhi National Forest Academy

**Dhananjai Mohan, IFS**  
Associate Professor  
Indira Gandhi National Forest Academy

## **Project Administrative Staff**

**Beena Raikawar**  
Office Manager  
(Upto 06.04.2000)

**S.B. Singh Sajwan**  
Accountant

**Rajiv Kumar Gupta**  
Assistant Accountant

**Lalit Kumar Paswan**  
Attendant

**Pappu Kumar**  
Driver  
(20.12.01 to 31.12.02)

---

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### **USDA Forest Service, Washington, D.C., USA**

Dr. Val Mezanis, Dr. Jack Ward Thomas, Dr. Hal Salwasser, Mr. G. Elton Thomas, Dr. Martin Prather

### **Ministry of Environment and Forests, Government of India**

Hon'ble Mr. Kamal Nath, Hon'ble Mr. Suresh Prabhu, Hon'ble Mr. T.R. Baalu, Mr. R. Rajamani, Mr. N.R. Krishnan, Mr. V. Anand, Mr. P.V. Jayakrishnan, Mr. K.C. Mishra, Mr. A.K. Mukerji, Mr. M.F. Ahmed, Mr. C.P. Oberoi, Mr. S.K. Pande, Mr. S.C. Dey, Mr. M.K. Sharma, Mr. S.C. Sharma, Mr. P.K. Sen, Mr.N.K. Joshi, Mr. Kishore Rao, Mr. S.S. Bist, Dr. Rajesh Gopal, Dr. Anmol Kumar, Mr. Aseem Srivastava and Mr. Jagmohan Sharma

### **State Forest Department, Tamil Nadu**

Mr. V.R. Chitrapu, Mr. J.C. Kala, Mr. R.P.S. Katwal, Dr. Sukhdev, Mr. N. Krishna Kumar, Mr. S.M. Abbas, Mr. M.K. Sarkar, Mr. A. Udyan, Mr. S.R. Reddy, Mr. A. Venkatesh and Mr. V. Ganesan

### **State Forest Department, Meghalaya**

Mr. Balvinder Singh, Mr. S.B. Singh, Mr. R. Shullai, Mr. C.Thangliana, Mr. T.T.C. Marak, Mr. Sunil Kumar, Mr. T. Kharlukhi, Mr. D. Challam, Mr. J.M. Pohsngap, Mr. R.L. Thick, Mr. G.F. Shullai, Mr. B.K. Lyngwa, Mr. A.K. Srivastava, Mr. S.N. Sangma, and Mr. J. Dutta

### **State Forest Department, Madhya Pradesh**

Mr. D.P. Singh, Mr. R.D. Sharma, Mr. S.B. Lowlekar, Mr. R.C. Sharma, Mr. P.K. Mishra, Dr. Ram Prasad, Mr. A.P. Dwivedi, Mr. H.S. Pabla, Mr. Dharendra Sharma, Mr. Suhas Kumar, Mr. A.K. Sonakiya, Mr. A.S. Ahlawat, Mr. A.S. Joshi, Mr. Narendra Kumar, Mr. S. Mukhariya, Mr. Y. Satyam, Mr. S. Sen, Mr. A.K. Srivastava, Mr. S. Tyagi, Mr. R.K. Srivastava, Mr. S.P. Rayal, Mr. R.P. Singh and Mr. A.L. Nagar.

### **State Forest Department, Maharashtra**

Mr. Jagir Singh, Mr. A.N. Ballal, Mr. R.B. Sule, Mr. S.K. Bali, Mr. M.K. Sharma, Mr. M.G. Gogate, Mr. B. Majumdar, Mr. P.J. Thosre, Mr. Ramanuj Chaudhary, Mr. V.T. Patki and Mr. Ravi Wankhade

### **State Forest Department, Uttar Pradesh**

Mr. K.N. Singh, Mr. R.P. Singh, Dr. Ashok Singh, Dr. R.L. Singh, Dr. A.S. Negi, Mr. Anil Berry, Mr. G.C. Mishra, Mr. R.B.S. Rawat, Mr. Rupak De, Mr. D.S. Tomar, Mr. S.K. Upadhyay, Mr. A.K.

---

Singh, Mr. J.V. Sharma, Mr. Manoj Sinha, Mr. Sanjai Singh, Mr. R.L. Singh, Mr. V.K. Singhal, Mr. Atibal Singh, Mr. W. Longwah and Mr. Ashish Tiwari

**Indira Gandhi National Forest Academy (IGNFA), Dehra Dun**

Dr. P.N. Ray, Dr. P.B. Gangopadhyay, Mr. Vinod Rishi, Mr. R.D. Jakati, Dr. V.N. Pandey, Mr. P.C. Tyagi, and Mr. Dhananjai Mohan

**Indian Council for Forestry Research & Education (ICFRE), Dehra Dun**

Dr. B.N. Gupta, Mr. R.P.S. Katwal and Mr. S. Singsit

**Forest Survey of India (FSI), Dehra Dun**

Dr. Devendra Pandey, Dr. J.K. Rawat and Mr. Alok Saxena

**Directorate of Forest Education, Govt. of India**

Mr. Jarnail Singh, Mr. Suresh Chandra and Mr. Onkar Singh

**Indian Institute of Remote Sensing (IIRS), Dehra Dun**

Dr. P.S. Roy and Dr. Sarnam Singh

**Wildlife Institute of India (WII), Dehra Dun**

Mr. H.S. Panwar, Mr. S.K. Mukherjee, Dr. A.J.T. Johnsingh, Dr. V.B. Mathur, Dr. G.S. Rawat, Dr. S.P. Goyal, Dr. K. Sankar, Dr. Ravi Chellam, Mrs. Bitapi C. Sinha, Mr. Qamar Qureshi, Dr. V.P. Uniyal, Ms. Prachi Mehta, Ms. Azra Musavi, Mr. M.S. Rana, Mr. Rajesh Thapa, Dr. Navneet Gupta, Mr. Panna Lal, Mr. V. Sukumar, Mr. Lekh Nath, Mr. Virendra Sharma, Mr. Dinesh Pundir, Dr. Manoj Agarwal, Mr. M. Veerappan, Mr. S.S. Oberoi, Mrs. Manju Bishnoi, Mr. P.K. Agarwal, Mr. H.C.S. Rajwar, Mr. Madan Uniyal, Mrs. S. Uniyal, Mr. Y.S. Verma, Mr. M. Babu, Mr. P. L. Saklani, Mr. Rajeev, Mr. Narendra Bisht, Mr. Mukesh Arora, Mr. Narendra Agarwal, Mrs. Sunita Agarwal, Mr. S. Wilson, Mr. Vinod Verma, Mr. Ravindra Nath, Mr. Yogesh Bhatt, Mr. S. Ismail, Mr. Dhyan Singh, Mr. Krishan Kumar, Mr. Bhuvan Chand, Mr. Birender Kumar, Mr. Vijay Prasad

**Project Auditors**

M/s Anurag Sangal & Co., Consulting Chartered Accountants

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# Project Overview

## Background

The Wildlife Institute of India-U.S. Forest Service Collaborative Project entitled “Management of Forests for Biological Diversity and Forest Productivity – A New Perspective” was conceived in 1992 and formally approved by the Government of India in 1995. An Memorandum of Understanding was signed between the parties for this project under the Indo-US Scientific Collaboration on Science and Technology on November 24, 1995 with a sanctioned grant of Rs. 13,455,000 (USIF). The project evolved from the earlier collaboration of the US Forest Service (USFS) and the Wildlife Institute of India (WII) on a project in the Satpura Hills of Central India.

The project is first of its kind in India to address the primary mandate of forest managers in the country to sustain forest biodiversity. The National Forest Policy (NFP) of 1988 by recognizing the maintenance of biological diversity in forests as the principle mandate was materially different than the previous NFP passed in 1952. It is obvious that the traditional forest management approach had to undergo a major shift in emphasis and strategies. The shift in traditional training for budding foresters needed to be inseparable from changes that must happen in the field. Both were under review in India at the time of project initiation. This project was, thus, expected to play a significant role in demonstrating the integration of science and management in a planning process that establishes the complementary roles of protected areas and the large surrounding landscapes of managed forests in maintaining forest-based biological activity.

In view of the above, the principal aim of the project was to demonstrate an approach to achieving integration of concerns in India for biological diversity, forest based products, and their sustained flow in support of technological, economic and social benefits to urban and rural sector lifestyles. To accomplish this, the project set forth the following six objectives that addressed ecological assessment in “conservation areas” that included relatively undisturbed forest ecosystems, managed forests with current forestry interventions under a variety of harvest systems, and intervening matrix landscapes that support subsistence and related market based rural economies.

## Project Objectives

- Assess, document, and map the kinds, extent and distribution of plant and animal diversity in selected “conservation areas” through rapid survey methods.
- Use existing status and habitat relationships information to set up baseline habitat relationships information system.
- From stand-to landscape-level perspectives, evaluate the impact of existing forestry practices and use of forest-based resources by local people, including methods of harvests and collection, fires, operation of varied concessions and rights on micro habitat elements, key habitats, species, communities, the overall forest productivity and diversity.
- Rapidly assess the social and economic systems of surrounding villages in terms of varied land use and forest resource dependency, including raising and grazing of domestic livestock, other vocations, skills, economy, and markets. These will be seen in relationship to forest systems. Threats to ecological harmony and economical status of people will be documented.
- Use modern ecological concepts to develop practical management tools and practices for bringing about harmony within and between forest and village systems through sustainable land use practices that make social and economic sense. Document problems and threat mitigation prescriptions, and develop site specific field guides to management.
- Conduct workshops and seminars to share experiences, disseminate knowledge, and begin the process of training scientists and managers.

## Project Sites

The project was field based at four conservation areas (CA) that covered some 15,500 sq km of forested and nonforested matrix areas representing a variety of biogeographic patterns in wild plant and animal

communities, forestry practices, ethnic human societies and their forest based cultures, economics and tradition, and the range of administrative realities. Each of the CAs included select Protected Areas (PAs) – National Parks or Wildlife Sanctuaries; Managed Forests (MFs), and the intervening matrix of other Government, community or private lands so as to constitute a larger delineated landscape. The four CAs were the Anaimalai Conservation Area (ACA) in south India; Garo Hills Conservation Area in the north east India (GCA); Satpura Conservation Area (SCA) in Central India; and Terai Conservation Area (TCA) in the foothills of Himalaya and on the India-Nepal border.

### **Project Partners**

The Project engaged in early 1996 five field researchers with varied backgrounds in Forestry and Life Sciences. They were given orientation training, then posted at the chosen CA with full logistical support from field line personnel at established field stations and camps. In addition, a Co-Investigator (CI) among the participating WII faculty and a counterpart USFS scientist were assigned to each CA. Besides the scientists and managers from WII and the USFS, senior decision-makers from the respective forest departments supported the team of personnel to conduct the work envisaged under the project. Accordingly, the Principal Chief Conservator of Forests and Chief Wildlife Wardens of the five States (Tamil Nadu, Meghalaya, Madhya Pradesh, Maharashtra, and Uttar Pradesh) fully supported the project. Further, the collaborating Institution i.e. the Indira Gandhi National Forest Academy (IGNFA) identified and pledged the services of two senior faculty members for the cause of the project, each of whom has been a line forest officer prior to their assignment at the IGNFA. In all, nearly 40 people from the WII, USFS, collaborating institutes, and the state forest departments were involved in project.

### **Project Planning Workshop**

A Planning Workshop for the project was conducted at WII, Dehra Dun on June 10-12, 1996. The workshop objectives were to increase understanding of the overall project and to gain the support of the key stakeholders. The individual CA descriptions and the critical issues to be addressed were written for each CA. A specific action plan was to be developed for each CA along with the programme of work to accomplish the identified tasks over the project period.

Appropriate coordination structure, monitoring and evaluation efforts were identified. Mr. Tom Darden, Dr. Martin Prather and Mr. Elton Thomas representing the US Forest Service, Mr. G.K. Gupta and Mrs. Usha Kapur representing FERRO, New Delhi, participated in the workshop. The other participants included faculty from WII (17) and IGNEA (3), and managers from the field representing ACA (1), GCA (4), SCA (4) and TCA (1). The proceedings were prepared and provided to the participants and circulated to others separately. The Planning Workshop facilitated the development of a framework of actions during the project period and coordination mechanisms.

### **Project Approach**

The work programme for the project was charted in the Planning Workshop, attended by representatives of all the partners in the project. It is worth mentioning that the wildlife science is of recent origin in India. There is excellent scientific information on plant and animal taxonomy but weak information on species-habitat relationships or species biology. There are no central databases, and retrieval of local information is not easy as automation in data bases is just beginning. One of the most important steps to be taken at the outset was to ascertain, collate, and review the kind and spread of information - maps, unpublished data, research publications, and working plans of agencies. Indents for maps and imageries were decided on the basis of what was available. The ACA, SCA, and TCA had the advantage of a few researchers having worked on some endangered vertebrates, plant communities, and human social systems. Except for GCA, the rest of the three sites had excellent documented forest management histories and current plans.

The project aimed at incorporating modern ecological concepts into a framework applied to CA-specific guides for managers that synthesized technical information and provided strategies for achieving synergy between ecology and forest based economies. Further, the project planned to incorporate project principles, guide books, and management strategies into a managerial training.

### **Field Work – The Data Realms**

Broadly four data realms – ecological, socio-economic, management, and administrative (mechanism of programme delivery through multi-agencies) - were

visualized as critical components for each of the project sites. Sampling strategies were challenging since the project dealt with large landscapes. Established techniques were used to investigate the components under each of the realm appropriately:

- The **ecological** realm considered the status and distribution patterns of plants and animals. Those under special focus included plant species of economic and cultural importance, animals that are culturally important, and those plants and animals that are endangered, threatened, endemic and rare. Elements under threat of illegal exploitation were integral to the foregoing. Besides the species, plant communities of conservation importance, sensitive and key sites and systems were included.

Past and current forestry practices, including silvicultural systems and marking rules, were evaluated for their impact on forest composition and structure, including impacts on special and unique micro-habitats such as snags and logs. Fuel wood collection was integral. There was a much better understanding of silvicultural treatments and their broad impacts on vegetation dynamics than for the species, locations, ecology, productivity, sustainability, and harvest systems of non-timber forest produce. Medicinal plants were of special concern.

- The **socio-economic** realm investigated the relationships between the people and forest based resources. Local people were considered as key players in mitigation and sustainability. This realm has a fluid interface with the ecological data realm as people's interest and activities meld ecological and economic concerns. People's lifestyles and their influences both on the people themselves and on forest systems were also investigated through standard techniques *viz.*, questionnaires, household surveys, rapid assessment and micro planning.

Livestock rearing, grazing and the articulating influences, likewise fuel wood collection constitute very long-term pressures on the forests. Agricultural practices within enclave villages and among peripheral villages are directly related to the nature of pressures on the forests. For example, cropping pattern, crop-depredation by wild herbivores, livestock predation by wild carnivores,

injuries and death of humans as a result of encounters with wild animals were major issues of study. Poaching is another activity that has complex linkages. Mining, quarrying, collection of sand, use of water from streams and water holes were also included as a part of the information base development.

- The **management** realm included understanding and interpreting the impacts of infrastructure development (e.g. roads, fire lines, water holes, hides, etc) and current management practices.
- The **administrative** realm of information includes all management processes for conservation or human development of the region, thus includes multiple agencies and their programmes. The programme targets and dimensions can be varied – from local rural interest through activities of national interest. Information was collected on objectives, mechanisms of delivery, and the outputs of these socio-economic programmes of the Government and private sectors especially evolved for the inhabitants of villages in the forest.

## Project Accomplishments

Generating ecological and land use maps to fit the project objectives was a necessity for all sites. Each CA stratified the area based on significant forest/vegetation/habitat types, and established a system of randomly placed transects to assess vegetation structure, composition, distribution, and frequencies of plants of conservation and economic importance. While tree and shrub communities were addressed in detail, the grass and herb communities were addressed in terms of key assemblages and sensitive sites, except in the TCA where tall riverine grasslands and upland dry grasslands constituted significant ecosystems.

Assessments were made on plots of varying sizes placed at regular intervals on the transects. Along with plants, distribution and abundance of larger vertebrates were recorded by indirect evidences with the plots and sightings along the transects. TCA also used a modified experimental design to assess grassland by testing established intervention practices of prescribed burning, harrowing, and grass cutting in different combinations across grass communities. GCA adopted a system of existing natural and man-made trails in an extremely challenging field situation.

Following were the major outputs:

- **Resource Maps** - The project has been able to generate resource maps for all the four sites using the remote sensing and GIS technologies. A spatial data base has been, thus, created for each CA incorporating different layers viz., drainage, administrative/management units, land use/land cover, vegetation, animal distribution, villages, and infrastructure.
- **Baseline Information** – The project has significantly contributed in providing a baseline information on the floral and faunal diversity, land use, historic development, socio-economic condition, wildlife – people conflict, etc. The project has also addressed different biotic pressure in each of the sites.
- **Wildlife Habitat Relationships (WHR)** – A large number of vertebrate species representing the four sites and those unique to each CA based on a species selection criteria were short-listed. The project provided a detailed description on each in each CA and in the overall WHR database.
- **Capacity Building** – The capacity building of the frontline staff was an integral component of the project. New training curricula in the training module for the Post-Graduate Diploma Course in Wildlife Management were formulated for the frontline staff of the forest departments, especially related to habitat assessment and habitat management. A new approach to planning integrated disparate management units (e.g., PAs, MFs, matrix) at hierarchical spatial scales ranging from the CA to the region. These approaches have also been appropriately incorporated in the continuing education courses for middle and senior level forest managers and planners. Changes are also brought about in the training module for wildlife management at the IGNFA. A new course is being developed for forest working plan officers that will be built upon the learning from the project. The chapters on assessment of biodiversity, wildlife and habitat management planning in the draft National Working Plan Code, 1999, were largely based on the learning emerging from this project.
- **Study Tour for the Indian Delegation** - A 13-member Indian delegation visited USA on a study tour from July 24, 1999 to August 7, 1999. The

delegation included five faculty members from the Institute and eight field managers representing the four project sites across five Indian States. The program was jointly prepared and coordinated by Mr. Tom L. Darden and Dr. Hal Salwasser of the USFS, with support by Dr. James R. Stevenson, US Foreign Agricultural Service. The group visited two important regions – the Southern Appalachian Region on the east coast and the Sierra Nevada Region in the State of California and Nevada on the west coast. Visits to different National Forests, wilderness areas and conservation areas were organized. The counterpart US scientists also joined the visiting group during their field visits to different areas and participated in the workshop and project review. In addition to the field visits to different demonstration areas, workshops were also organized at Asheville, NC and the Institute of Forest Genetics (IFG), Placerville, CA. Several resource persons from the USFS, US National Park Service, and the University of California, Davis were invited during the workshops/field visits to provide their technical inputs. The delegates also visited the Department of Forestry Science in University of California, Davis.

Making large-scale ecological assessments on hierarchical scales to address management were central to the study tour. The experience gained in the process was ploughed into the presentations and field demonstrations. The entire experience was extremely relevant to the emerging situation of planning in India and addressed the vital areas of training, research, monitoring, planning and management. Apart from the field visits, the visiting group was paced through different approaches to integrated forest management using the concept of large landscape/conservation areas. Emphasis was laid on different tools and methods for forest and wildlife inventories, habitat assessment, timber management, endangered species management, management of forest insects epidemics, wildlife habitat relationships, fires, recreations, visitor management, ecological monitoring and some significant research especially on the spotted owls in the Pacific Northwest. Several opportunities were also provided for cultural exchange. The visiting delegations also made presentations based on their field/research works on respective Indian sites and related the experience to the element of the study tour conducted.

- **Management Guide** - The project has ultimately provided a new way of thinking about managing for biodiversity at the landscape scale, by taking into account all types of lands, across multiple spatial scales for multiple wildlife species and resource management needs. The project has provided an insight for the conceptual framework, the scientific basis, specific procedures for analysis and operations, and evaluation of select demonstration areas, about how to integrate resource assessment and management for biodiversity at the landscape level.
- **Information Dissemination** – Right from the beginning the project has yielded a substantial information in the form of technical annual reports or specific compilations. The project has significantly contributed in developing a spatial database. The field managers have extensively used the information generated in the preparation/revision of management plans or planning other strategies/proposals. It is evident in the first management plan written for the Dudwa Tiger Reserve (De, 2001) and proposal for the establishment of an Elephant Reserve in the State of Meghalaya. Three Ph.D. dissertations are expected from the project. Researchers of the project have been making research presentations during the Annual Research Seminar organized by the Institute wherein a large number of field managers, scientists, decision-makers participate. The project plans to provide an electronic version of the report for its wider use by the scientific community as well as the field practitioners.

### Organization of the Report

The final products of the project include a six volume management guide. The volumes have been produced in collaboration and intense interactions among four full time researchers, the US team of scientists, participating WII faculty, field managers of four project field sites and representative faculty from collaborating institution – IGNEA.

The Volume I addresses the conceptual and scientific basis of the approach, and would be of use to any manager or researcher entrusted with such an approach anywhere. Volume II is on wildlife habitat relationships and includes a framework for how to evaluate multiple wildlife species simultaneously, and

narrative summaries of life histories of 184 wildlife species selected to represent various criteria of rarity, endemism, management focus, habitat associations and others. Volumes III to VI are intensive case studies of four “Conservation Areas” selected across India to represent a great diversity of ecological conditions, CA histories, cultural situations, and management challenges.

### Lessons Learned

The four conservation areas studied in this project differed markedly in ecological conditions, socio-economic situation, and management issues. Equally diverse were the arrays of key stressors on the native flora and fauna, and in the management opportunities for improving conditions for native plant and animal diversity and human communities. Many useful lessons have been learnt from the project, principally the need to think broadly across major landscape areas when managing for native species and communities. This includes the need to coordinate data, analyses and management across different land ownerships and allocations. Cumulative effects in buffer areas or zones of influence outside existing protected areas, or even along international borders, are also to be taken into account when developing site-specific management plans. Also, an integrated resource management approach at all spatial scales is seen as the best way to avoid conflicts in resource use and to plan for appropriate ways to conserve biodiversity in managed forests.

Specifically, following is a gist of overall guiding principles and lessons learned from this project :

- *Think* broadly across major landscape areas
- *Integrate* management plans across administrative boundaries and between forest and wildlife resource areas
- *Consider* cumulative effects of all activities
- *Think* in hierarchical spatial scales
- *Use* local knowledge and needs in the conservation strategy
- *Consider* a fuller array of flora and fauna
- *Consider* ecosystem and anthropogenic processes and the ecological roles of organisms

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The study categorised stressors into five main groups: (1) stressors associated with resource consumption, (2) stressors associated with use of non-consumptive resource amenities, (3) stressors associated with transportation and habitation infrastructures, (4) stressors associated with effluents, and (5) stressors associated with other human activities having impact on the resources.

Specific management opportunities related to reducing or eliminating the occurrence and adverse effects of the various stressors listed above can be summarized across the four conservation areas as follows:

- Management opportunities and recommendations in managed forests
- Management opportunities and recommendations for identifying natural conditions and native biodiversity
- Management opportunities and recommendations in riparian areas
- Management opportunities and recommendations for roads and transportation systems
- Management opportunities and recommendations for tourism

- Management opportunities and recommendations for protecting rare and locally-distributed species and ecological communities
- Management opportunities and recommendations for conservation of wide-ranging species
- Management opportunities and recommendations on collection and poaching of species
- Management opportunities and recommendations on participation by local people
- Management opportunities and recommendations on research and monitoring

Further, basic ecological understanding also is necessary to modernise silvicultural systems by moving them from a focus simply on the production of wood and other human goods and services, to the production of both human and ecological goods and services by restoring or maintaining diversity and viable forest ecosystems. The transition from old to “new forestry” will be critical for integrating PAs and MFs to meet ecological goals described for conservation areas. The transition likely will require a period of adjustment of attitudes and experimentation with new methods, such as use of adaptive management approaches.

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# Chapter 1

## Introduction to Wildlife Habitat Relationships

*Bruce G. Marcot & Martin G. Raphael*

### 1.1 What is a Wildlife Habitat Database?

At its simplest, a wildlife habitat relationships database is a set of facts depicting vegetation, habitat elements, and environmental conditions used by specific wildlife species. These depictions can be provided in simple narratives, tables of habitat types and components, prediction models, or by other formats.

The purposes of building a WHR database include:

- to structure our thinking and understanding of key vegetation conditions, habitat components, and environmental factors that contribute to viable wildlife populations
- to integrate, into one source, diverse and often disparate sources of information on wildlife requirements
- to provide a rigorous and scientific foundation for developing impact assessment models and procedures
- to develop habitat management guidelines for conserving wildlife species, especially in forest settings used by humans.

A WHR database can be characterized by the following components:

- a habitat classification
- listing of wildlife species of management interest
- species-specific information on life history and ecological attributes

- the distribution of each species in narrative or map forms
- information on the legal and administrative status, and ecological status (degree of rarity) of each species

Maps of distribution of habitats and populations are indispensable tools. They can be used to identify potential areas of occurrence of a species. They can also be used as a foundation for more sophisticated analyses of how spatial arrangements of habitats and human activities affect the viability of populations and the composition of wildlife communities.

WHR databases and models are expected to aid in:

- assessment of present, and prediction of future, habitat conditions, showing distribution and abundance of habitats by habitat class and by habitats described specifically for individual species or species groups
- assessment of current potential, and prediction of future, distributions of wildlife populations by species or species group
- prediction of wildlife community patterns, specifically number of species and their ecological roles, by species groups within specified habitats or circumscribed areas
- assessment of environmental impacts from various forest management and disturbance activities as affecting specific habitat components

Overall, there may be three stages to developing a WHR information base and prediction system. Our current work (illustrated in Volumes III - VI) has completed stage 1, leaving stages 2 and 3 for future efforts.

### **Stage 1. Develop the species and habitat information base**

The first stage consists of developing the basic information on habitats and wildlife species. This includes habitat and wildlife classification systems, basic wildlife species lists by habitat type and management unit, maps of vegetation and habitat distribution, and annotated summaries of species' life histories and population status. This information can be used to produce lists of species that occur in various habitat conditions and changes in those conditions, as a first simple step in developing models that predict wildlife response.

Developing the information base for the first stage typically entails tapping into experts' knowledge of species and habitat conditions, reviewing the ecological literature, and beginning field inventories and monitoring studies to fill in critical knowledge gaps.

### **Stage 2. Develop and test species and habitat response models**

The second stage entails building and testing more sophisticated procedures, which can include models, to evaluate how individual species respond to habitat and environmental conditions (Lehmkuhl *et al.* 1997, Raphael *et al.* 2002). These wildlife models address how population rates of change, population structure, spatial patterns of habitats, and land use activities affect wildlife population distribution, abundance, and trends. Species chosen for these more detailed models can be based on their rarity, social value, key ecological roles in the forest ecosystem, or vulnerability to human activities or habitat changes.

Also developed during this stage are more advanced models of how the habitat itself responds to natural

and human-caused disturbances (Hann *et al.* 1997). Habitat responses include effects on vegetation composition and structure from systematic and catastrophic, and both natural and anthropogenic, disturbances. Such disturbances include secondary succession, fire, insects, and various kinds of human use such as grazing, burning, and collection of various forest products.

### **Stage 3. Integrate the wildlife information base and habitat response models with spatial models**

The third stage consists of more advanced models designed to project future habitat conditions and to integrate assessments of spatial and temporal cumulative effects of human activities (Raphael and Holthausen, 2002). Tools such as geographic information systems and use of remote imagery information on habitat conditions and changes can be integrated with models of wildlife species-habitat relationships to display current and potential future effects on population distribution and abundance.

#### **1.2 Building the Information Base**

The first step in building the information base for the first stage is to describe the categories of information desired. In brief, a wildlife-habitat relationships database can include the following kinds of information for each wildlife species:

- Common (vernacular) name, scientific name, and other taxonomic information
- Legal status or management significance
- Distribution (occurrence by geographic location, and possibly range maps)
- General habitat requirements (vegetation communities)
- Special habitat requirements (specific habitat elements and substrates)
- Breeding information
- Territory and home range information
- Movement within the area of interest (e.g.,

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residency and migration)

- Key literature references

Such information on wildlife species can be further integrated into a habitat classification based on major vegetation types and structural or successional stages of each vegetation type. A table that cross-indexes wildlife species with their habitats is a species-habitat relationships matrix (such as shown in Volumes III - VI of this report). For each cross-index, the specific type of use (for breeding, feeding, or other use) and level of use (e.g., closely associated, occurs, or absent) can be denoted. Some WHR matrices also denote season of occurrence.

Some of these are discussed in greater detail below.

### **1.2.1 Kinds and Characteristics of Information Used in WHR**

Four kinds of information are needed for making resource planning and decision-making: scientific data, ecological theory, professional judgment, and personal experience.

Scientific data on species and habitats are derived from direct field observations and thus apply to specific situations. Scientific data are collected in a repeatable and rigorous manner. They are statistically reliable. That is, such parameters as population size are estimated with known levels of accuracy, bias, and precision. Scientific data presented in publications are peer reviewed and thus are more credible than anecdotal observations. Scientific knowledge in the field of wildlife management is best gathered by an hypothesis-testing approach.

The most applicable kinds of scientific data for the first stage of a WHR Program include field inventories of habitat and wildlife species, general assessments of relative abundances and trends of wildlife populations, and correlations of presence and abundance of wildlife species with habitats and specific habitat components. Ecological theory differs from base scientific data by being mostly conceptual. Ecological theory applies to

the first stage of WHR by helping establish the general framework for developing the habitat and wildlife species classifications. It also applies in helping develop the structure of the species-habitat relationships matrix.

Professional judgment consists of an expert understanding of species requirements, habitat conditions, and consequences to both species and habitat conditions from a variety of forest management activities and disturbances. Professional judgment is a deep comprehension of concepts, ecological theory, and environmental effects, especially in the context of local conditions. As heuristic knowledge, professional judgment enables the expert to draw from personal experience when scientific inventories and studies are lacking; to make informed and educated guesses when necessary, as to species abundance, distribution, and responses to habitat conditions and changes; to recognize promising approaches to problems; and to deal effectively with errors and uncertain or incomplete data. When applied appropriately, professional judgment can be a legitimate and valuable source of knowledge and understanding.

Professional judgment and expert knowledge may be one of the more readily available sources of information. Professional judgment can be formalized for filling in many gaps of scientific data, such as in devising (1) wildlife species lists by habitat types and habitat components, and geographic location (administrative unit); and (2) descriptions of relative use levels of various habitats and components by individual wildlife species. This is what has been done for the current WHR matrices presented in later chapters.

Finally, personal experience differs from scientific data in being based on anecdotal type observations. Thus, it may not be repeatable and is often unarticulated. Personal experience, along with scientific data and theory, forms the foundation for professional judgment, although it varies greatly among individuals. Personal experience is not subject to a repeatable, statistical framework or to peer review. It is a diverse

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and eclectic bank of knowledge, subject to individual biases and predilections, but it still may yield some reliable and useful information, but it can also be biased and misleading so it must be used with caution.

However, it is important to recognize the value that personal experience plays in building an information base for the first stage of a WHR project. Field workers in different geographic locations, especially those who have engaged in writing and implementing management plans and conducting monitoring and research studies, can be valuable sources of knowledge of wildlife species and habitats.

### **1.2.2 Literature as an Information Source**

Initial sources of information include published ecological literature. Specifically, an intensive, and, as far as possible, exhaustive, literature review can be conducted on each habitat and species. For constructing the habitat and wildlife information base for the first stage of this project, literature from many sources in India had been compiled. The categories of studies that can be referenced from the literature include inventories, monitoring studies, case studies of specific wildlife populations in particular areas, and descriptive studies of wildlife community composition. However, it should be emphasized that simple and initial forms of WHR tables, matrices, and databases can also be compiled from no more than local expert knowledge.

Some categories of information to annotate when recording literature include: conditions and context of the studies, habitats in which the studies were conducted, geographic locations in reference to distributions of species, spatial scale of study (stand, landscape, regional or state scales), type of study (inventory, monitoring, case study, statistical study, autecological population study, etc.), sample size (such as number of sites included in the study), degree of precision of estimates (reported level of uncertainty or probability values of statistical results), and the full reference citation.

The wildlife literature contains much information on habitats and species. However, the information typically needs synthesis and interpretation for local use. Literature review is thus best conducted by ecologists or biologists who are knowledgeable in specific taxa or habitats and who can best apply their professional judgment, that is, interpret, render, and combine the information in the most usable and meaningful ways.

Further steps in developing, testing, and using WHR information and tools include using field studies to document wildlife-habitat relationships; conducting habitat inventories; conducting wildlife inventories; and conducting and integrating correlation studies of species-habitat relationships. Although the current project did not proceed to these steps, they are discussed next as potential future activities that would help strengthen the scientific basis for the WHR information base.

### **1.2.3 Gathering Wildlife Habitat Relationships Data**

Data on wildlife habitat relationships can include information from habitat inventories, wildlife inventories, correlation studies of species-habitat relationships, and other sources. Information from expert judgment and experience of individual biologists is also a valuable source of knowledge that can be included in WHR databases.

#### **1.2.3.1 Habitat inventories**

The most fundamental and necessary empirical information is that of presence and distribution of habitats and wildlife species in the area of concern. Habitat inventories should take place at least at two scales: (1) general habitat cover classes and (2) within-stand vegetation conditions. General habitat cover classes can be inventoried from classifications of remote sensing images, such as from interpreting forest cover condition from mid-altitude aerial photographs.

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Within-stand vegetation conditions can be inventoried by on-the-ground survey methods as well as by some remote sensing. Remote sensing typically is useful for detecting and classing vegetation areas by attributes that can be determined from above the vegetation canopy. Such attributes often include dominant tree or shrub species, general classes of tree crown diameters (if in leaf-out), degree of evenness of the upper canopy, and presence of understory vegetation layers but only in stands with sparse overstory canopy foliage. Attributes requiring within-stand surveys include: type and amount of down wood and snags, type and density of understory layers of trees and shrubs, type and extent of grass and forb ground cover, and presence and abundance of specific habitat elements such as fruiting trees and shrubs, springs and seeps, and rock outcrops. Such within-stand habitat attributes are important for detecting and predicting presence of many wildlife species. Methods for inventorying many of these within-stand features are available.

Inventories of habitat conditions would best be done as an integrated, multiple resource survey (Chalk *et al.* 1984). For example, vegetation inventories can be conducted at both levels of general habitat cover classes (using vegetation resource surveys based on remote sensing and field verification) and within-stand structure (using a vegetation stand exam procedure). Such an integrated habitat inventory can use techniques that providing information on multiple resource management needs, including those of timber and wildlife habitat. Integrated habitat inventories can be conducted in a cost-effective manner yet still ensuring quality and rigor of the information (Grue *et al.* 1981).

When conducting a habitat inventory, it is better to record specific vegetation structure and composition, than to use pre-set categories of habitat. For example, it is better to record that a dry deciduous teak forest has a specific tree composition, age class, and physical structure such as height or canopy closure, than to simply record it as habitat for sambar or some other species. This is because the basic vegetation

information can later be re-interpreted for a variety of other species, and it become much more clear what the stand contains.

### **1.2.3.2 Wildlife inventories**

Inventories of wildlife species would be necessary should literature and professional expertise not provide sufficient and complete coverage of all species of interest. Methods to inventory wildlife are available for use with each major taxonomic class of vertebrates.

Much work has been done on developing and testing bird survey techniques. For example, Bart and Klosiewski (1989) explored the use of presence-absence data to index bird densities. Unfortunately, tests of various bird survey methods do not leave substantial optimism for being able to accurately calculate bird population densities from simple field counts. However, for the first stage of developing WHR information, measures of relative rather than absolute abundance among species and habitats would suffice, and existing field survey methods are up to this task.

Conducting simultaneous inventories of multiple taxa would result in substantial savings of cost and effort (Raphael and Rosenberg 1983, Raphael and Barrett 1981). Also, inventories conducted in all seasons may provide vital information (Brewer 1972, Kohler and Schnebel 1975, Oelke 1977, Webster 1966), as many wildlife species shift habitats and resources, and their dependencies, among seasons.

### **1.2.3.3 Correlational studies of species-habitat relationships**

One of the more important basic kinds of empirical information needed on species and habitats is how presence and abundance of wildlife species correlate with kinds and amounts of habitat conditions. Broad-based inventories of species in a carefully selected sample of habitats can provide data for calculating such correlations. Simple correlation coefficients would provide valuable insights into potential associations of

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wildlife species and species groups with various habitat conditions. Partial correlation coefficients would disclose the degree to which a particular habitat type or component accounts for variation in a presence or abundance of a wildlife species, given that the effects of other habitat components have first been accounted for. Correlation models such as linear regressions, multiple linear regressions, logistic regressions, and other multivariate models (e.g., principle components analysis and discriminant function analysis) provide further insight into how combinations of habitat conditions account for presence and abundance of wildlife species.

### **1.3 Habitat Classification and Evaluation**

Habitat management is the art and science of creating, maintaining, or enhancing conditions on the landscape to meet specified objectives for populations of wildlife. This requires an understanding of the types, amounts, conditions, and distributions of landscape features that meet the life requisites of species of interest. Habitat definition and evaluation best occur as separate activities. First, landscapes are classified into units of habitats, and pertinent features of terrain and vegetation are described. In a separate step, interpretations are made about the habitat function or value of a particular set of conditions relative to known requirements of individual species and species groups of interest. This is the approach assumed here. In the WHR database for this project, wildlife habitats are denoted by use of (1) standard Champion and Seth vegetation types at subgroup or type levels, and (2) other habitat types when the Champion and Seth types were inadequate to describe observed conditions. In general, WHR projects can develop and use habitat classifications based on vegetation, lithic, hydric, and other attributes. Habitat classification systems may be based either on existing vegetation or on potential (“climax”) vegetation.

For classification systems to be useful in wildlife habitat management, the plant community and structural stage classes must be further characterized by specific attributes that influence their value as wildlife habitat.

By way of example, consider two areas of the same type (same plant community and structural stage). In one area, there remains an abundance of habitat features such as snags, fruit-bearing trees, and down wood. This area has high habitat value for a diversity of wildlife species such as cavity-nesting birds, fruit-eating animals (frugivores), and small mammals and amphibians, because these attributes are present and well distributed. In the other area these features are absent, perhaps having been removed by humans in their exploitation of resources. As a result, habitat values for wildlife are significantly lower. Thus, it is not enough for habitat managers to know what general vegetation conditions occur on, and distributed across, a landscape. They must also know what special features of terrain and vegetation are important to wildlife, so that this information can be collected in habitat inventories for consideration in the habitat evaluation process.

### **1.4 Use of WHR Species-Habitat Relationships Information**

The types of WHR information described above have proven useful for general land management planning at the scale of a national forest (approximately 100,000 to 250,000 ha). As validation studies have revealed (e.g., Raphael and Marcot 1986), at finer scales, especially within single vegetation stands, accuracy of predicting species occurrences falls off markedly. WHR matrices tend to over-predict presence and use of habitats at the stand level, that is, they error by commission rather than omission, at finer and more localized scales.

Thus, some caution is indicated when using WHR matrix information to predict species presence and the value of habitats for wildlife. WHR information is most useful in the following ways: (1) It provides a systematic means of synthesizing and presenting information on vertebrate species. If all or a representative cross-section of species within the plan area are used to evaluate general habitat allocation decisions, there is no bias in emphasizing one taxonomic group over another or in ignoring some

groups. (2) It is useful for helping make general habitat allocation decisions at a broad scale of land resource planning.

On the other hand, the information base should not be used to predict wildlife species presence at scales much finer than perhaps several thousand hectares, especially to make specific management decisions on single stands. Rather, the information is useful for helping develop general standards and guidelines to help ensure well-distributed habitats, habitat stages, and special habitat elements across a broad planning area.

As well, the information base can be used to predict changes in wildlife species composition or use levels, given changes in habitat stages, habitat features, and vegetation composition and structure. However, Raphael and Marcot (1986) reported that accuracy of such predictions, as compared with extensive field studies, varied markedly among species in the same habitats and areas. Again, the best use of the information base for this purpose is at a general watershed or area scale rather than for single vegetation stands. Also, field validation studies have confirmed that the information base should not be used to quantify levels of or trends in population sizes. These are important caveats, as the U.S. experience has revealed a tendency for managers to extoll belief in numbers generated from this mostly qualitative information base, especially as the information was accessed from computers.

### **1.5 Establishing an Integrated WHR Inventory, Monitoring, and Research Program**

Providing for wildlife in managed forests requires a basic inventory of habitats and wildlife species; a set of management standards and tools for guiding and scheduling human activities; and a monitoring program to validate the guidelines and to test the key underlying assumptions. This triad of activities — inventory, setting and implementing management standards, and monitoring results — is best done as an integrated program that also incorporates research

studies to provide new information on little-known habitats or species. More was discussed on monitoring in Chapter 5 of Volume 1 of this series.

An integrated program of inventory, management, monitoring, and research entails establishing a set of research priorities. Priorities can be based on key species and habitats for which management is needed but for which, after the initial WHR information base is developed and evaluated, information is deemed inadequate. Research priorities can also be set based on the key management guidelines to test and key assumptions and other major weaknesses in the WHR information base to test or develop. Monitoring provides information on how habitats or wildlife species respond to conditions affected by management; research helps disclose the mechanism behind those responses. By closely integrating monitoring and research studies, a wealth of information on species occurrence and responses can be developed.

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# Chapter 2

## Methods for Wildlife-Habitat Relationships (WHR)

*Vishwas B. Sawarkar & Bruce G. Marcot*

### 2.1 Methods

#### 2.1.1 Selection of Species

Each of the Conservation Areas typically support 300 or more species of vertebrates. For most of these species, available information is scarce or nonexistent. Because this is the first time that planners and managers in India have attempted to develop a WHR database and considering the lack of information for most species, we elected to focus on a subset of high-priority species for development of WHR data in each Conservation Area. Criteria we used to select species included:

- Classified as endangered, threatened, or rare
- Habitat specialists, obligates or being largely dependent on specific habitat types and conditions
- Endemic within the Conservation Area
- Known for some important ecological functions
- Geographically restricted in distribution
- Uses geographically separated seasonal habitats
- Wide ranging
- Important prey of the tiger
- Closely associated with specific micro habitats of biological or geomorphic origin
- Charismatic or flagship
- Culturally respected
- Keystone

During the course of this project, each team of researchers and investigators developed a list of all vertebrate species known to occur within their respective Conservation Areas (these full lists can be

found in appendices associated with Volumes III – VI of this report). Investigators then applied the above criteria to select species for inclusion in the WHR database. Using this process, we identified a total of 141 species, including 6 amphibian, 10 reptilian, 79 avian, and 26 mammalian species. Many of these species (especially the larger, wider-ranging species) occurred in more than one Conservation Area; in such cases application of the WHR process was tailored to the characteristics or any unique aspects of each area.

### 2.2 Sources of Information

Given the large extent of the Conservation Areas, field challenges, and presence of only one researcher per site it was not possible to conduct comprehensive field sampling to document species occurrences and habitat associations. Instead, we relied on a variety of published and unpublished information from available sources. As a starting point, we consulted field guides (e.g., Ali and Ripley 1983, Grimmett et al. 1999 for birds; Prater 1980 for mammals; and Daniel (1983) for Reptiles) and searched available primary ecological literature via library and internet sources. We also consulted more general writings of authors who shaped the early natural history of India. Field observations and literature citations found in forest working plans and previous wildlife management plans where available were also useful. We contacted local experts and solicited advice on the distribution of particular species and their habitat associations. When available, we used site-specific information generated by WII research projects and Masters dissertations that were carried out within each CA.

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Finally, we used our own professional judgment and personal knowledge when appropriate.

## 2.3 Design of Species Accounts and WHR Matrices

### 2.3.1 Species Accounts

Our objective in writing species accounts was to provide a concise description of the status of each species and a summary of its essential habitat associations within the CA. Species accounts have been kept simple and practical for ready access by interested managers and other readers and are thus not meant as exhaustive reviews. Our focus has been to convey key information on habitats that contribute to survival of the species; that is, on those features of the environment that contribute to population size, distribution and persistence.

Each species account begins with the Latin and vernacular name of the species, and the species' residency status within the CA. This is followed by a short paragraph describing the species' geographic distribution, both regionally and within the CA, and when relevant, its elevational range. The remaining sections of the species accounts are organized as follows:

- **Ecosystems Used** - lists the major plant communities (based on the classification of Champion and Seth 1968) known or suspected to be used by the species.
- **Habitat Requirements** - documents specific life history information, especially the use of specific habitat elements and the degree of association or importance of these elements in providing life requisites for the species. Information is organized into subsections to show how these more specific habitat elements are used for rearing (breeding or nesting), feeding, and cover (shelter, protection from predators). The final subsection describes the extent to which a species uses specific structural stages, such as early-seral

managed forest or old unmanaged forest.

- Rearing
- Feeding
- Cover
- Structural Stages

- **References** - Primary source(s) of literature used in compiling the account.

A full set of species accounts, one for each of the selected species, is presented in Chapter 3. Each species is represented once, even if that species occurred in more than one CA. For those selected species that did occur in more than one CA, we displayed the account for the CA that was most typical of the species range or on which the species was most broadly distributed. Individual accounts are also included within the CA volumes, so species that occur and were selected in more than one CA are represented in each volume for each respective CA.

### 2.3.2 WHR Matrices

As described in Chapter 1 above, we developed a Wildlife Habitat Relationships (WHR) Matrix to summarize information from the species profiles into an accessible database. We started with a general template used consistently for each Conservation Area. The template (Table 2.3.2.1) has rows for each type of WHR information and each selected species is represented a column. Habitat relationships information was coded for each species according to the conventions listed in Table 2.3.2.2.

Investigators, led by the researcher in each CA, filled out the template for each of the species that had been selected using the criteria described above. The same sources of information used to compile the species profiles were used to fill out the WHR Matrix for each species. The resulting WHR matrix for each of the 141 species is represented in Chapter 4, and is also available in database form upon request to the Technical Coordinators.

Table 2.3.2.1. Wildlife Habitat Relationships Matrix format. Categories of habitat information are listed in column 1; each additional column is used to code Information for each species following the conventions in Table 2.3.2.2.

Information Type	Species
Scientific name	<i>Subgroup 3C North Indian Moist Deciduous Forests</i>
Vernacular name	Type 3C/c2b-2d Moist Bhabar and Plains Sal Forest
Taxonomic class	Type 3C/c2d1 Chander Sal
Legal Status - Wildlife Protection Act	Type 3C/c2DS1 Moist Sal savannah
Legal Status - CITES	Type 3C/IS1 Low Alluvial Savanah woodlands
Conservation status - IUCN	Type 3C/c3 West Gangetic Moist Mixed Deciduous Forests
Endemism status	<b>Group 4 Littoral and Swamp Forests</b>
Residency status	<i>Subgroup 4D Tropical Seasonal Swamp Forests</i>
Conservation area	<i>Subgroup 4E Tropical Riparian Fringing Forests</i>
Abundance / distribution status	<b>Group 5 Tropical Dry Deciduous Forests</b>
Conflict with humans	<i>Subgroup 5A Southern Tropical Dry Deciduous Forests</i>
<b>CHAMPION AND SETH CLASSES</b>	Type 5A/c1 Dry Teak bearing Forest
<i>Subgroup 1A Southern Tropical Wet Evergreen Forests</i>	Type 5A/c3 Southern Dry Mixed Deciduous Forests
<i>Subgroup 1B Northern Tropical Wet Evergreen Forests</i>	<i>Subgroup 5B Northern Tropical Dry Deciduous Forests</i>
<b>Group 2 Tropical semi-evergreen forests</b>	Type 5B/c1c Dry peninsular sal forests
<i>Subgroup 2A Southern Tropical Semi-evergreen forests</i>	Type 5 DS2 Dry Deciduous Scrub
<i>Subgroup 2B Northern Tropical Semi-evergreen Forests</i>	Type 5/Is2 Khair and Sissoo Forests
<b>Group 3 Tropical Moist Deciduous Forests</b>	Type 5/Is3 Babul forests
<i>Subgroup 3B South Indian Moist Deciduous Forests</i>	Type 5E2 Boswellia Forests
Type 3B/c1 Moist teak bearing forest	Type 5/E4 Hardwickia forest
Type 3B/c2 Southern moist mixed deciduous forests	Type 5/Is1 Dry Tropical riverain forest

Group 6 Tropical Thorn Forests  
*Subgroup 6A Southern Tropical Thorn Forests*

Group 7 Tropical Dry Evergreen Forests

Group 8 Subtropical Broad-leaved Hill Forests  
*Subgroup 8B Northern Tropical broad-leaved wet Hill Forests*

Type 8A/c3 Central Indian subtropical hill forests

Group 11 Montane Wet Temperate Forests  
*Subgroup 11A Southern Montane Wet Temperate Forests*

Type 11A/c1 Southern Montane Wet Temperate Forests

Type 11CS2 Southern Montane Wet Grasslands

**NON-CHAMPION AND SETH CLASSES**

Extensive Bamboo Areas

Grasslands on Hill Plateaus

Rivers

Reservoir

Swamps (tals)

Teak Plantations

Sal Plantations

Coffee and cardamum

Tea

Wattle and Pinus

Young jhum (<10 years)

Middle jhum (10-20 years)

Old jhum (>20 years)

Riparian Forests

Mesic Groves

Eucalyptus Plantations

Trophic category

Habitat elements/substrates

Habitat elements of biotic origin (special habitats)

Snags

Snag recruits (dying trees, live trees with dead portions)

Hollow trees, chimney trees (living or dead)

Tree cavities (natural or created)

Large old trees (living)

Trees with fluting boles and buttresses

Down wood

Litter and duff layers on the ground

Litter in streams

Lianas

Fruit-bearing shrubs

Fruit-bearing trees

Epiphyte patches

Habitat elements of geomorphic origin

Cliffs, talus, and ledges

Caves

Overhangs

Dens (existing burrows dug by animals)

Sheet rocks

Large bouldery aggregates

Rock outcrops

Sandy banks and sand spits

Salt licks (exposed mineral soils)

Earth cuttings - exposed banks

Man-made (anthropogenic) structures

Additional / other (specify)

Structural stage

Early stage - managed

Mid stage - managed

Late stage - managed

Old-growth stage - unmanaged

Other - unmanaged

Key ecological functions

Sensitivity to anthropogenic disturbance

**Table 2.3.2.2. Wildlife Habitat Relationships data dictionary.**

<p>Scientific name (cite source)</p> <p>Vernacular name</p> <p>Taxonomic class</p> <p style="padding-left: 20px;">A – amphibian</p> <p style="padding-left: 20px;">R – reptile</p> <p style="padding-left: 20px;">B – bird</p> <p style="padding-left: 20px;">M - mammal</p> <p>Legal status</p> <p style="padding-left: 20px;">As denoted in Wildlife Protection Act: SI, SII, SIII, SIV, SV</p> <p style="padding-left: 20px;">As denoted in CITES: AI, AII, AIII</p> <p>Conservation status (IUCN categories)</p> <p style="padding-left: 20px;">CE – critically endangered</p> <p style="padding-left: 20px;">EN – endangered</p> <p style="padding-left: 20px;">VU – vulnerable</p> <p style="padding-left: 20px;">LR – lower risk</p> <p style="padding-left: 20px;">DD – data deficient, might be one of above</p> <p style="padding-left: 20px;">[blank] – none of above</p> <p>Endemism status (endemism = species found nowhere else for at least a portion of the year)</p> <p style="padding-left: 20px;">ER - Endemic to region</p> <p style="padding-left: 20px;">EC - Endemic to CA</p> <p style="padding-left: 20px;">No - neither of the above</p> <p>Residency status (pertinent to the region in which the CA occurs)</p> <p style="padding-left: 20px;">P – Permanent (year-round) resident</p> <p style="padding-left: 20px;">S – Seasonal resident (occurs only seasonally)</p> <p style="padding-left: 20px;">M – Seasonal migrant or movement only</p> <p style="padding-left: 20px;">V – Vagrant / incidental</p> <p>Conservation area</p> <p style="padding-left: 20px;">A – ACA</p> <p style="padding-left: 20px;">G – GCA</p> <p style="padding-left: 20px;">S – SCA</p> <p style="padding-left: 20px;">T - TCA</p> <p>Abundance / distribution status within the CA</p> <p style="padding-left: 20px;">A – abundant and well-distributed</p> <p style="padding-left: 20px;">B – uncommon but widely distributed</p> <p style="padding-left: 20px;">C – fairly abundant but more patchily distributed with gaps</p> <p style="padding-left: 20px;">D – disjunct population patches</p> <p style="padding-left: 20px;">E – disjunct patches of small local populations at risk of local extirpation</p> <p style="padding-left: 20px;">F – extremely patchy with high risk of overall extirpation</p> <p>Conflict with humans (more frequent than just incidental occurrences)</p> <p style="padding-left: 20px;">K – Human killing</p> <p style="padding-left: 20px;">H - Human injuries</p> <p style="padding-left: 20px;">C - Crop depredation</p> <p style="padding-left: 20px;">P - Destruction of property</p>	<p style="padding-left: 20px;">L - Livestock depredation</p> <p>Ecosystem types</p> <p style="padding-left: 20px;">Each species is coded for each ecosystem type as follows:</p> <p style="padding-left: 40px;">2 = Closely associated (provides critical resources for survival and reproduction)</p> <p style="padding-left: 40px;">1 = Associated (occurs but not critical)</p> <p style="padding-left: 40px;">0 = Absent</p> <p style="padding-left: 40px;">blank = does not occur in conservation area</p> <p>Ecosystem types listed in the WHR matrix include (see attached specific listing):</p> <p style="padding-left: 20px;">Champion and Seth Forest Types of India (to the group level)</p> <p style="padding-left: 20px;">Other, non-CS types including plantations</p> <p>Trophic category</p> <p style="padding-left: 20px;">He- Herbivore (plant-eating)</p> <p style="padding-left: 20px;">Fr – Frugivore (fleshy fruit-eating)</p> <p style="padding-left: 20px;">Gr – Granivore (seed-eating)</p> <p style="padding-left: 20px;">Ca - Carnivore (consumes animals other than insects)</p> <p style="padding-left: 20px;">Ov – Ovivore (egg-eating)</p> <p style="padding-left: 20px;">In – Insectivore (insect-eating)</p> <p style="padding-left: 20px;">Pi – Piscivore (fish-eating)</p> <p style="padding-left: 20px;">Cn – Carrion (dead animal-eating)</p> <p>Habitat elements/substrates, B,E,Oth</p> <p style="padding-left: 20px;">Habitat elements of biotic origin</p> <p style="padding-left: 40px;">A. Snags</p> <p style="padding-left: 40px;">B. Snag recruits (dying trees, live trees with dead portions)</p> <p style="padding-left: 40px;">C. Hollow trees, chimney trees (living or dead)</p> <p style="padding-left: 40px;">D. Tree cavities (natural or created)</p> <p style="padding-left: 40px;">E. Large old trees (living)</p> <p style="padding-left: 40px;">F. Trees with fluting boles and buttresses</p> <p style="padding-left: 40px;">G. Down wood</p> <p style="padding-left: 40px;">H. Litter and duff layers on the ground</p> <p style="padding-left: 40px;">I. Litter in streams</p> <p style="padding-left: 40px;">J. Lianas</p> <p style="padding-left: 40px;">K. Fruit-bearing shrubs</p> <p style="padding-left: 40px;">L. Fruit-bearing trees</p> <p style="padding-left: 40px;">M. Epiphyte patches</p> <p>Habitat elements of geomorphic or anthropogenic origin</p> <p style="padding-left: 40px;">N. Cliffs, talus, and ledges</p> <p style="padding-left: 40px;">O. Caves</p> <p style="padding-left: 40px;">P. Overhangs</p> <p style="padding-left: 40px;">Q. Dens (existing burrows dug by animals)</p> <p style="padding-left: 40px;">R. Sheet rocks</p> <p style="padding-left: 40px;">S. Large bouldery aggregates</p> <p style="padding-left: 40px;">T. Rock outcrops</p>
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- U. Sandy banks and sand spits
  - V. Salt licks (exposed mineral soils)
  - W. Earth cuttings – exposed banks
  - X. Man-made (anthropogenic) structures (e.g., culverts, causeways, buildings, bridges)
  - Y. Additional / other (specify)
- Structural stage
- Early stage - managed
  - Mid stage - managed
  - Late stage - managed
  - Old-growth stage – unmanaged
  - Other - unmanaged
- Key ecological functions
- A. Pollination vector
  - B. Disperser of plant propagules, fruits, seeds, etc.
  - C. Primary tree cavity excavator
  - D. Primary ground burrow excavator
  - E. Creator of paths or runways (terrestrial or arboreal)
  - F. Soil digging
  - G. Soil compaction, trampling
  - H. Primary (staple) prey for carnivores
  - I. Other (specify)
- Sensitivity to anthropogenic disturbance
- A. Cannabis growing
  - B. Clearing of undergrowth
  - C. Construction activities in general
  - D. Cutting of climbers
  - E. Draining of wetlands
  - F. Extraction of flowers NTFPs
  - G. Extraction of fruit NTFPs
  - H. Extraction of honey NTFPs
  - I. Fire (human-set ground fires)
  - J. Fishing
  - K. Fuelwood gathering
  - L. Harrowing of wild grasslands
  - M. Illicit timber and bamboo harvest / extraction
  - N. Impoundments

- O. Introducing exotic vegetation
- P. Jhum
- Q. Legal hunting
- R. Livestock grazing
- S. Lopping
- T. Loss of snags, hollow trees
- U. Marking, thinning of immature trees, and legal felling of mature trees or bamboo harvesting
- V. Pesticides and chemicals
- W. Plantations in grassy blanks
- X. Poaching (illegal hunting or capture)
- Y. Railroads
- Z. Religious visits / pilgrimages
- AA. Removing of riparian vegetation
- BB. Roads and vehicle traffic
- CC. Rock climbing
- DD. Sand mining
- EE. Tourism and recreation

**2.4 References**

Ali, S., and S.D.Ripley. 1983. A pictorial guide to the Birds of the Indian Sub-Continent. Bombay Natural history Society, Bombay. 177pp.

Daniel, J.C. 1983. The Book of Indian Reptiles. Bombay Natural History Society, Bombay. 141pp.

Grimmett, R., C.Inskipp, and T. Inskipp. 1999. Pocket Guide to the Birds of the Indian Sub-Continent. Oxford University Press, 384pp.

Prater, S.H. 1980. The Book of Indian Animals. Bombay Natural History Society, Bombay. 324pp.

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# Chapter 3

## Species Profiles

*Sajeev T.K., Shivaji G. Chavan, Vishwas B. Sawarkar,  
Anjana Pant, Harish Kumar & Ashish Kumar*

### Lion Tailed Macaque *Macaca silenus* (Linnaeus)

**Status: Resident**

Distributed all over the Western Ghats of Southwestern India, patchily and in old growth forest.

#### **ECOSYSTEM USED**

They are seen in Evergreen vegetation types between 2000 and 3000 ft.

#### **HABITAT REQUIREMENTS**

They normally about in troops 12 to 20 animals foraging through the canopy of evergreen forest trees. They seldom descend to the ground, that too when thirst forces them or to cross a gap in the canopy of the forest.

**REARING:** New born young ones are seen regularly in September month . The call is a peculiar cooing which is made often to keep contact of the other individuals of the group.

**FEEDING:** They are primarily frugivorous and the food mainly consists of young leaves and fruits of different tree species that produce simple sugars. They also feed on insects year round.

**COVER:** They are animals of the canopy and require contiguous forest canopy to travel and forage.

**STRUCTURAL STAGE:** All the Successional stages with tall trees are preferred. Depend to a very great extent on old growth forest.

#### **REFERENCES:**

Prater, S.H. 1980. The Book of Indian Animals. Bombay Natural History Society, Bombay, 324.pp..

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**White-bellied Treepie *Dendrocitta leucogatra* (Gould)**  
**Status: Resident**

Endemic distributed from 10° N Latitude, southward through Western Ghats Mysore, Western Tamil Nadu, and Kerala, also reported from certain parts of the eastern Andhra Pradesh.

**ECOSYSTEM USED**

Moist Deciduous and Evergreen Forests

**HABITAT REQUIREMENTS**

**REARING:** Breeds normally in February to April and occasionally in August as well. Nest is a deepish cup of thorny twigs lined with small rootlets and climbers. On tall trees, in Evergreen forests and 2-4 eggs are laid in a clutch. Details of the breeding biology need to be studied.

**FEEDING:** Fruits seeds and nectar (*Bombax ceiba*) insects, small animals like lizards, young rodents, also eggs and nestlings of smaller birds. They were seen feeding on the termites from a termite mount broken by some other animals.

**COVER:** Exclusively depended on dense forest cover for breeding and are seen filtering into the Dry deciduous Forests and Teak Plantation for feeding.

**STRUCTURAL STAGE:** Old Successional stages are preferred for breeding and rearing, are seen even in monoculture plantations for feeding.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi, Oxford, New York.

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## **Grizzled Giant Squirrel *Ratufa macroura*** **Status: Resident & Endemic**

*Ratufa* genus is called the living fossil from its similarity of its structure to the earliest known squirrel *Prosciurus* from the Oligocene, 35 million years ago (Emry & Thoringhton 1985). *R. macroura* spread to the Indian peninsula first and traveled to Sri Lanka. Now distributed only in the southern part of the country in Western Tamil Nadu and Kerala. *R. macroura* has three subspecies *R. m. macroura*, *R. m. dandolena*, *R. m. melanochra*.

### **ECOSYSTEM USED**

Riverine patches i.e. riparian forests within the Dry deciduous and Southern Thorn forests.

### **HABITAT REQUIREMENTS**

**REARING:** Breeding starts in mid October, with the flowering of the *Tamarindus indica*. November to January is the birth and nursing season. They gave birth to young only once in a year. The gestation period is four weeks and the young remain in the nest for 2-3 months. The young are weaned after 4 months, they stay with the mother for six months and then disperse.

**FEEDING:** Food mainly consists of fruits, seeds, leaves and bark etc. of a variety of plants. 37 plant species belonging to 26 families including 24 tree and three climber species are noted as food species for the taxa. (Justus & Johnsingh 1994). Feeding varies with sex and age in the animal. Different plant species include *Tamarindus indica*, *Santalum album*, *Pyreantha volubilis*, *Strychnos potatorum*, *Albizia lebeck*, *Celtis wightii*, *Bridelia retusa*, *Syzygium cumini*, *Terminalia arjuna*, *Terminalia bellerica*, *Holoptelia integrifolia*, etc. were most used species.

**COVER:** They are seen using the Dry deciduous scrub and southern Thorn forests and riparian forests for feeding purposes and breeding purposes.

**STRUCTURAL STAGE:** Middle and Old Successional stages are preferred.

### **REFERENCES:**

- Emry and Thorington, R. W. Jr. 1985. The tree squirrel *Prociurus* (Sciuridae, Rodentia), as a living fossil In case of "Book on the Living Fossils" (eds.), N. Eldredge, Plenum Press, NY.
- Justus Joshua and Johnsingh A. J. T. 1994. Ecology of the endangered Grizzled Giant Squirrel (*Ratufa macroura*) in Tamil Nadu, South India, Report. Wildlife Institute of India.

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**Bourdillon's Great Eared Nightjar *Eurystomus macrotus bourdillonii* (Humes)**  
**Status: Resident**

Discontinuously distributed along Kerala and Western Tamil Nadu.

**ECOSYSTEM USED**

Evergreen and Moist deciduous forest types are preferred

**HABITAT REQUIREMENTS**

**REARING:** January to May are found to be the season for the breeding with a peak breeding activity in the February to March. The eggs are laid in the mud and no nest is made. Nothing is known about the breeding biology.

**FEEDING:** Moths, bugs, beetles, flying termites, flying ants and other insects are caught in air and are eaten.

**COVER:** Seen in the rocky areas and clearings within evergreen and moist deciduous forest types and the same areas are used for the breeding and foraging activities.

**STRUCTURAL STAGES:** Old Successional stages are preferred in both managed and natural forest types.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi. Oxford, New York.

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**Nilgiri Tahr *Hemitragus hylocrius***  
**Status: Resident**

Endemic inhabitant of the high mountain ranges of Southern India, including the Nilgiris, Anaimalais, at elevations of 4000ft to 6000 ft in general. Occasionally they are found in the lower elevations as well. Earlier records show that they were distributed all over the forested tracts but due to poaching and other pressures reduced to the present status.

**ECOSYSTEMS USED**

Open grasslands with steep cliffs, ravines and rocky areas, along the high wavy mountains.

**HABITAT REQUIREMENTS**

**BREEDING:** Nilgiri Tahr breeds throughout the year with the peak parturition time being the July. Most of the young are born during the cool season of the year, i.e. from December to February. The gestation period is six months. Mostly the females of two-year age are ready for the child bearing.

**FEEDING:** Feeds on the fresh flush of grasses, large herds are seen when the new flushes come after a fire.

**COVER:** Open Grass lands and cliffs are prefers and are seldom seen in the Forested areas.

**STRUCTURAL STAGES:** They are animals of the open grasslands, which are considered as the old successional stage by a group of people and as the early by other group.

**REFERENCES:**

Prater, S.H. 1980. The Book of Indian Animals. Bombay Natural History Society, Bombay, 324.pp.

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**Shaheen Falcon *Falco peregrinus peregrinator***  
**Status: Migratory**

Distributed throughout the Peninsula with an exception of the semiarid and the arid regions up to about 2400-meter altitude of the Himalayas.

**ECOSYSTEM USED**

Found in all the ecosystems in general within its distribution range. Generally open type of vegetation types is preferred more.

**HABITAT REQUIREMENTS**

**REARING:** Breeding season varies according to the local climatic factors. In Himalayas it is March to April where as in South India, where the winter is very high. Nest is a large compact platform of twigs sometimes lined with grass placed at an inaccessible place in a cliff face. They often make no nest and eggs are laid directly on scanty grass growing on the ledge. 3-4 eggs are laid in one clutch and both the sexes take part in the parental duties and nest making.

**FEEDING:** The food consists of Partridges, quails, pheasants etc. They can be easily trained to strike much larger prey items like Mallard, Florican and Jungle fowl.

**COVER:** They use the high canopy cover of trees to hide and hunt for the prey.

**STRUCTURAL STAGES:** A bird of open coastal areas and water bodies bordered with tall trees.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983. "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka. (Compact Edition), Oxford University Press, Delhi. Oxford, New York.

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**The Nilgiri Marten *Martes gwatkinsi***  
**Status: Resident**

Endemic, scarcely distributed, along the higher reaches of the Western Ghats, south of Coorg, Nilgiris, Anaimalais, and Travancore.

**ECOSYSTEM USED**

Montane Shola, Evergreen and Bamboo brakes along the streams, in the Dry deciduous and Moist deciduous Forest types.

**HABITAT REQUIREMENTS**

**REARING:** Young mother and young cub are seen hunting together once no details of the breeding biology is not available.

**FEEDING:** They hunt birds, squirrels, raiding nests for young and eggs. On ground they virtually eat anything they can defeat or are harmless. They are bold hunters and seen eating, lizards, snakes, fowls, partridges, young deer, and carrion. They were also seen feeding on the nectar of flowers of trees like Silk Cotton tree.

**COVER:** They are extremely shy and prefer very dense thickets of the undergrowth.

**STRUCTURAL STAGES:** Old growth stages of the unmanaged forests are preferred.

**REFERENCES:**

Prater, S.H. 1980. The Book of Indian Animals. Bombay Natural History Society, Bombay, 324.pp.

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## Spotted/ Wood Sandpiper *Tringa glariola* Status

Migratory winter visitor throughout the country, commonly seen during the season along the shores of Jheels and Lakes and Paddy fields, around irrigation tanks etc. Ring recovery records show that most of the wintering population is coming for the old USSR 4200-6200km distances.

### ECOSYSTEM USED

Aquatic, semi-aquatic habitats throughout the country.

### HABITAT REQUIREMENTS

**REARING:** There are no breeding records from India. Interestingly the large sized females in the flock do most of the courting.

**FEEDING:** Chiefly tiny molluscs crustaceans, insects, worms and small fishes.

**COVER:** A bird of the open wetlands.

### REFERENCES:

Salim Ali and Sidney Dillon Ripley 1983. "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi. Oxford, New York.

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**Indian Pangolin *Manis crassicaudata***  
**Status: Resident**

Throughout the Indian Subcontinent. Both in plains and foothills south of the Himalayas.

**ECOSYSTEM USED**

A generalist, seen all through different vegetation types except the very high altitudes.

**HABITAT REQUIREMENTS**

**REARING:** No particular season is noted; they were seen with young in different seasons. The young, usually single are carried around on the tail of the mother, who curls in two a tight ball on the slight hint of trouble. These curls are extremely difficult to open by the enemies. They are having a prehensile tail and are armed with powerful scales along the ventral side of the body and acts as shield for both mother and the young. Young are born with very soft scales and they grow very fast.

**FEEDING:** Food mainly consists mainly of ants, ant's eggs, termites, in the wild conditions. The captive animals are seen to feed on the boiled eggs fruits, milk, etc.

**COVER:** Breeding and feeding activities are carried out in the open and dense forest or agricultural land with equal enthusiasm and are seen making dens in comparatively open forest under trees and rocks.

**STRUCTURAL STAGES:** Seen in almost all the vegetation types and even in the agricultural land.

**REFERENCES:**

Prater, S.H. 1980. The Book of Indian Animals. Bombay Natural History Society, Bombay, 324.pp.

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**Nilgiri Langur *Presbytis johnii* (Fischer)**  
**Status: Resident**

Distributed all over the Western Ghats of Southwestern India.

**ECOSYSTEM USED**

They are seen in all the Deciduous and Evergreen vegetation types, including monoculture plantations and mixed orchards except for the highly degraded stages of the Deciduous Forests. They are also well adapted to the high altitudinal vegetation types and are commonly seen in the Motane Sholas as well. They are not seen in the lower plain Thorn forests.

**HABITAT REQUIREMENTS**

**REARING:** The peak breeding season is the beginning of the rainy season. Usually one infant at a time and are taken care of by the mother.

**FEEDING:** Exclusive Leaf-eater and the food mainly consist of young leaves and fruits of different tree species.

**COVER:** They are animals of the canopy and require contiguous forest canopy to travel and forage.

**STRUCTURAL STAGE:** All the Successional stages with tall trees are preferred irrespective of managed or unmanaged Forests.

**REFERENCES:**

Prater, S.H. 1980. The Book of Indian Animals. Bombay Natural History Society, Bombay, 324.pp.

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**Slender Loris *Loris tradigradus* Linn.**  
**Status: Resident**

Resident endemic of hills and plains of Southern India. It is seen commonly in the Southern Thorn forests and the neighbouring agricultural lands in the Dindigul Division, and the Bamboo tracts of the Topslip Range of the Anaimalai WLS in ACA.

**ECOSYSTEM USED**

Seen in the Evergreen, Moist Deciduous, Dry Deciduous and Thorn Forests and agricultural land or human habitation near by where ever suitable habitats are left out.

**HABITAT REQUIREMENTS**

**REARING:** Nothing much is known about the species and the newborn babies are seen throughout the year. Young are nursed for a long time even after they are half grown.

**FEEDING:** Insects, Lizards, small birds, frogs virtually any thing they can cease, defeat are seen eaten by them.

**COVER:** They prefer thick canopy cover for hiding in the daytime and breeding activities.

**STRUCTURAL STAGE:** Old and middle successional stages are preferred in both managed and unmanaged Forests.

**REFERENCES:**

Prater, S.H. 1980. The Book of Indian Animals. Bombay Natural History Society, Bombay, 324.pp.

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**Nilgiri Pipit *Anthus Nilghiriensis* (Sharpe 1885)**  
**Status: Resident**

A common resident, endemic of the hill stations of Western Tamil Nadu and Kerala and are seen breeding above the 1000-2500m altitude.

**ECOSYSTEM USED**

High Montane Shola and grass land system, Coffee, Cardamom plantations of similar altitudes.

**HABITAT REQUIREMENTS**

**REARING:** Breeding takes place between April to July. Nest is coarse grass and grass blades lined with fine grass and rootlets occasional feathers and fibers, grass stem etc. Usually placed among the roots of short grass, where the grass blades arching above gives a kind of cave like appearance or a socket pits in the mud walls well covered by grass and bushes along the roads and depressions, which are common in the high mountains. 2-3 eggs are laid in a clutch and it is seen both the parents taking care of the young.

**FEEDING:** Food mainly grass seeds, other small seeds, insects etc. collected from the grass or the ground rarely are seen chasing the flying insects with a lot of flight maneuvers and thus catching them in the flight.

**COVER:** Birds of open country with bushes and inter mingling forest.

**STRUCTURAL STAGES:** Early successional stages are preferred.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983. "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi. Oxford, New York.

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**Pompadour Green Pigeon *Treron pompadora affinis* (Jerdon)**  
**Status: Resident**

Resident, subject to local movement purely on the basis of the food availability in Western and south western India, including Nilgiris, Palnis, and associated hill ranges, from about 20° N latitude southward through western Mysore, Kerala and Western Tamil Nadu.

**ECOSYSTEM USED**

Evergreen and Moist Deciduous Forests are used.

**HABITAT REQUIREMENTS**

**REARING:** Breeding season mainly December to March, nest as in other pigeons is flimsy platform of twigs in a moderate sized tree within the dense forest, normally at height of 5-10m. Two eggs are laid in single clutch and both the parents share the nest building and caring the young ones.

**FEEDING:** Fruits and berries mainly figs of various *Ficus* sp. And drupes of *Zizyphus* sp.

**COVER:** Dense forest cover is preferred for breeding where as it is seen using the edges and even agricultural land with good tree cover and fruiting trees for the feeding purposes.

**STRUCTURAL STAGES:** Old and middle successional stages are preferred.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 “ Handbook of the Birds of India and Pakistan” together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition). Oxford University Press, Delhi. Oxford, New York.

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**Whitebellied Shortwing *Brachypteryx major albivenris* (Blanford)**  
**Status: Resident**

Distributed along the Western Tamil Nadu and Kerala from c.900m to the highest point in the Western Ghats.

**ECOSYSTEM USED**

Montane shola and Evergreen forests of the higher elevations.

**HABITAT REQUIREMENTS**

**REARING:** Breeding season mainly March to June chiefly May after the rains started Nest is a large green mass of mosses, with a shallow cup lined with rootlets, placed in mud holes along roadside banks or in Sholas and I tree hollows, usually within a meter from the ground. Eggs are almost invariably two. Other details of the breeding biology are not available.

**FEEDING:** Food consists of insects of various kinds usually caught from the ground and usually they are seen mulching around on the ground with thick undergrowth, in the Sholas.

**COVER:** They Prefer thick forest cover for the feeding purposes, rarely seen outside the Sholas while crossing from one Shola to another in quick and short flights.

**STRUCTURAL STAGES:** They prefer Old growth stages in the unmanaged forests.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 “ Handbook of the Birds of India and Pakistan” together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition). Oxford University Press, Delhi. Oxford, New York.

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**Sri Lanka Frogmouth *Batrachostomus monilinger* Blyth.**  
**Status: Resident**

Distributed along the Western Ghats, in the western Tamil Nadu, Karnataka and Kerala apparently from 15°N latitude to the southern most tip of the country and Sri Lanka.

**ECOSYSTEM USED**

Evergreen and Moist Deciduous forests

**HABITAT REQUIREMENTS**

**REARING:** Breeding chiefly from January to April varies with the localities, like Ceylon they breed in the September. Nest usually a pad of c. 6cm in diameter, made of mosses, leaves and lined with down from the bird's underplumage, and camouflaged on the outer side with bits of Lichen and Bark of the tree. Placed in the fork of a small tree or on a horizontal branch c. 2-5m height from the ground. Single egg is laid other details of breeding biology is not known.

**FEEDING:** Food mainly consists of moths, beetles, grasshoppers and winged termites caught in the flight. The bird usually perches on some tree stumps and keeps watch on the insects and catches them as soon as located by sallying through the air.

**COVER:** Chiefly Evergreen and moist deciduous Forest cover is preferred for feeding and breeding activities.

**STRUCTURAL STAGES:** the bird prefers old successional stages.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi. Oxford, New York.

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**Indian Little Ringed Plover *Charadrius dubius jerdoni* (Legge)**  
**Status: Resident**

Resident throughout the subcontinent from Himalayan Foot hills to the Kanyakumari at the extreme south, from Sind to Assam, Nepal Ceylon moves about locally with weather conditions.

**HABITAT REQUIREMENTS**

**REARING:** Chiefly from March to May in Continental and Peninsular India and December to June in South India. Nest a shallow unlined depression or cup usually in the open, sometimes near a bush or boulder. Eggs are very typical of the peg-top type of the Plover's egg and are usually four in number. Both the sexes share the incubation and tending the chicks, brooding them against rain and performing the broken winged display to distract the enemies and the intruders in to the area. Incubation period is 22 days.

**FEEDING:** They mainly feed on insects (Weevils, Beetles, and dipterous larvae), worms, tiny crabs, etc. collected by wading along the shores and coastal areas.

**COVER:** As in feeding and breeding.

**STRUCTURAL STAGES:**

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition). Oxford University Press, Delhi. Oxford, New York.

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**Peregrine Falcon *Falco perigrinus japonensis* (Gmelin)**  
**Status: Migrant**

Winter visitor (September to April) throughout the country affecting the rivers, lakes, lagoons and marshes up to 4000m altitude.

**ECOSYSTEM USED**

Largely aquatic ecosystems are preferred.

**HABITAT REQUIREMENTS**

**REARING:** They do not breed in India, Nest is a large compact platform of twigs sometimes lined with grass placed at an inaccessible place in a cliff face. They often make no nest and eggs are laid directly on scanty grass growing on the ledge.

3-4 eggs are laid in one clutch and both the sexes take part in the parental duties and nest making.

**FEEDING:** Food chiefly water birds like ducks, geese, coots, moorhens, lapwings and other waders. They also predate on other birds like partridges, pigeons, other birds etc. Kaleej Pheasant (*Lophura melanocephala*), Imperial Pigeons, Chough, Caspian Tern and early flying bats are said to be the favourite of the food items. Robust female is said to attack much larger prey items than itself quiet often.

**COVER:**

**STRUCTURAL SATGES:**

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 “ Handbook of the Birds of India and Pakistan” together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition). Oxford University Press Delhi. Oxford, New York.

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**Red Spur fowl *Galloperdix spadicea spadicea* (Gmelin)**  
**Status: Resident**

Distributed all along the Peninsular India south of the Gangetic Plain and also in west Nepal Terai and Uttar Pradesh up to 1000m altitude in general seen commonly even up to 1800m altitude in ACA.

**ECOSYSTEM USED**

Open Moist Deciduous Forest types with Bamboo thickets and rocky slopes or plain. Montane shola and grass land systems and Coffee Plantations in the ACA.

**HABITAT REQUIREMENTS**

**REARING:** Overall January to June varying with local conditions, eggs are found practically throughout the year. Nest is a shallow depression scrapped in the mud well hidden from the view in the thickets of Bamboo or other bushes, very rarely sparsely lined with leaves and other litter. Eggs commonly 3-5 and incubation period is not known. Cocks normally won't help in brooding the eggs but assist in tending the young and are monogynous.

**FEEDING:** Food consists of seeds, tubers, grains, berries, drupes, and insects like termites, molluscs normally with equal quantity of dirt are consumed.

**COVER:** A great skulker and keeps deep in the bushes and scrub for both breeding and feeding activities. Seen in the openings or clearings during dusk and dawn foraging.

**STRUCTURAL STAGES:** Seen in early, mid and old successional stages

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983. "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition). Oxford University Press, Delhi. Oxford, New York.

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**Nilgiri Laughing Thrush *Garrulax cachinnans* Jerdon**  
**Status: Resident**

Locally common, but disjunctly distributed, along the Nigiris, Anaimalais and other adjacent hills of the Western Ghats from 1200m to the summit.

**ECOSYSTEM USED**

Evergreen, moist deciduous forests are used generally, but they are seen in dry deciduous forests, interspersed with riparian patches, which are their favourite haunts.

**HABITAT REQUIREMENTS**

**REARING:** The breeding season is overall February to July. Nest, cup shaped, made of roots, dead leaves, grass, small twigs, moss, and lichen lined with fine grass or with a few feathers and scraps of wool, usually placed at a height of 2-3 meters from the ground. The details of clutch size, incubation period etc. is not available for the species. It is noted that Pied Crested Cuckoo (*Clamator jacobinus*) brood parasitise this species.

**FEEDING:** Food consists of insects, and berries especially wild raspberry (*Rubus* Sp.) and hill guava (*Rhodomyrtus tomentosa*).

**COVER:** Even though very vocal in the distribution range they are highly evasive and prefer thickets for feeding and breeding purposes.

**STRUCTURAL STAGES:** They prefer the old successional stages only.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983. "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition). Oxford University Press, Delhi. Oxford, New York.

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**Vernal Hanging Parrot *Loriculus vernalis* (Sparrman)**  
**Status: Resident**

Distributed widely but disjunctly along the forested tracts of whole Indian subcontinent including the coastal and Island systems (Andaman and Nicobar Is.).

**ECOSYSTEM USED**

Evergreen and Moist Deciduous Forests

**HABITAT REQUIREMENTS**

**REARING:** In general the breeding season is from January till April, but is subjected to the local variations with the climatic conditions. Nest is a vertical or oblique natural hole of sometimes 1 meter length, in a rotten tree trunk or branch, normally at a height of 2-10m from the ground. These holes are enlarged at suitable points to make egg chamber, and the usually there is a lateral entrance to this at the starting point of the hole. 3-4 eggs are laid in one clutch and the parental duties are shared with lion share of the job being done by the female.

**FEEDING:** Feeds on the soft pulp of fruits and berries, chiefly wild figs (*Ficus sp.*) largely supplemented by the flower nectar. They are least destructive in feeding methods and are thus acting as pollinators and dispersers. They are also fond of *Casuarina* seeds, bamboo grains and Teak.

**COVER:** They prefer Evergreen and Moist Deciduous Forests for the breeding cover, and are seen using the coffee and cardamom plantations and neighbouring agricultural land also for the feeding purpose.

**STRUCTURAL STAGES:** Old and middle successional stages are preferred.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983. "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition). Oxford University Press, Delhi. Oxford, New York.

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## Indian Peafowl *Pavo cristatus* Linnaeus

### Status: Resident

Resident locally up to 200m altitude in the outer Himalayas and Peninsular Hills, practically throughout the subcontinent south and east of the Indus river, including Jammu and southern Kashmir. Eastward to about the Lakimpur district in Assam thence south through Nagaland, Manipur, Mizo and Chittagong west and south to the extreme tip of the Peninsula. It is well protected in several areas like Rajasthan, Gujarat, and Tamil Nadu etc. due to the religious sentiments. It is introduced to the Andaman and Nicobar Is.

#### ECOSYSTEM USED

In wild state it affects the Mist and Dry deciduous forest in the neighbourhood of the rivers and streams. It is otherwise seen in all the vegetation types within its distribution range in close association with man.

#### HABITAT REQUIREMENTS

**REARING:** Breeding season is chiefly after the rains had begun, that is from June, and lasts till the September last. The peak breeding period in southern India is from April to May. Nest usually is a scrap in the ground usually not lined or if lined, crudely with twigs and litter. Nests are usually well concealed in the thickets and thorny bushes. Semi-feral birds are seen nesting in the old forts and flat rooftops in villages. 4-6 eggs are laid in one clutch and female alone does the incubation. The incubation period is c. 28 days.

**FEEDING:** They are omnivorous in food habits. Food consists of seeds, grains, lentils, groundnuts, and tender shoots of crops, flower buds, berries and drupes (eg *Carrissa*, *Lantana*, *Zizyphus*). Wild figs (*Ficus glomerata*, *F. microcarpa* etc.), centipeds, scorpions, lizards, small snakes, Insects (eg. grass hoppers, beetles, caterpillars), grubs and worms are regularly found in the crops and stomachs and also the human excreta near the human habitations.

**COVER:** Dense scrub cover is preferred for the breeding activities.

**STRUCTURAL STAGES:** Middle and early successional stages are preferred.

#### REFERENCES:

Salim Ali and Sidney Dillon Ripley 1983. "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition). Oxford University Press, Delhi. Oxford, New York.

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**Manipur Bush quail *Perdicula manipurensis manipurensis* (Hume)**  
**Status: Resident**

Distributed in Manipur and Assam hill ranges south of Brahmaputra River. Cachar Ghasi, and Naga hills up to 100 meter altitude ranges. They are also seen in the ACA.

**ECOSYSTEM USED**

Affects moist Grassland and Scrub jungle.

**HABITAT REQUIREMENTS**

**REARING:** Little is known about the breeding biology of the taxa.

**FEEDING:** Feeds on the lentils, grains, ants and other insects.

**STRUCTURAL STAGES:** Seemingly prefers the early successional stages.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983. "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition). Oxford University Press, Delhi. Oxford, New York.

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**Broadtailed Grassbird *Schoenicola platyura* (Jerdon)**  
**Status: Resident**

Resident of the Western Ghats complex from the Belgaum to south up to the Ashambu hills and east to the Madurai district, from 900-2000m altitudes.

**ECOSYSTEM USED**

Coarse grass lands and rocky hill sides.

**HABITAT REQUIREMENTS**

**REARING:** No actual field records of the breeding season (s) are lacking and the nest with chicks and eggs are seen in the July and September and the males with highly developed gonads were caught in the month of March and April, this suggests a probability of two broods in a year. Nest is a good sized ball of coarse grass blades with an entrance on its side, built in the tussocks of large tussock forming tall grasses up to a height of one meter. Clutch size and the period of incubation are not determined. Seemingly the female makes nest and male guards the territory.

**FEEDING:** Food consists of various insects and worms(caterpillars) caught from the bushes and grasses while foraging.

**COVER:** Grassy and rocky areas are preferred for both feeding and breeding cover.

**STRUCTURAL STAGES:** Early successional stages are preferred.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983. "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition). Oxford University Press, Delhi. Oxford, New York.

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**Indian Emerald Dove *Chalcophaps indica indica* (Linn)**  
**Status: Resident**

Resident patchily distributed through out Indian subcontinent up to 1800m in lower Himalayas.

**ECOSYSTEM USED**

Moist deciduous, Dry deciduous, & Evergreen forests, Orchards & plantations also of frequented.

**HABITAT REQUIREMENTS**

**BREEDING:** Practically through out the year but shows an increase in March to May in Northern States and April to May & November December in Kerala and Tamil Nadu, where winter is not severe. Nest is a typical pigeon nest but more compactly built and some what more camouflaged, 2-3m height on a bamboo brake or sapling thickets two eggs are laid in a clutch and both sexes share the chores. Incubation period is 12 days need and confirmation.

**FOOD:** Grain, seeds, berries are eaten normally. Occasionally small insects & termites are caught from ground and are eaten.

**COVER:** Prefer shady areas

**STRUCTURAL STAGES :**

**REFERENCES :**

Salim Ali and Sidney Dillon Ripley 1983 “ Handbook of the Birds of India and Pakistan” together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition). Oxford University Press, Delhi, Oxford, New York.

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**Indian Swiftlet *Collocalia unicolor* (Jerdon)**  
**Status : Resident**

The coastal & Western Ghats strip from about Ratnagiri, S. Konkan, through Goa, Western Tamil Nadu, Kerala up to Kanyakumari up to 2200m altitude range, only echo locating bird of Asia.

**ECOSYSTEM USED**

Found in all the Ecosystems where there is an availability of suitable microhabitats like large natural caves & grottoes, found up to 2200m altitudes.

**HABITAT REQUIREMENT**

**BREEDING:** Chiefly March to June Nest a cup of hardened saliva, strengthened by the grass, moss & feathers, attached to the vertical wall of the cave. The attachment and cementing material is of pure coagulated saliva, which is of high market value. Usually 2 eggs are laid in a clutch. The incubation period and other details need s to be studied.

**FOOD:** Insects, which are caught in air.

**COVER:** They are birds of the open sky and even while resting they are on the wings, resting, Needed shady caves for making nests.

**STRUCTURAL STAGES:**

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 “ Handbook of the Birds of India and Pakistan” together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition). Oxford University Press, Delhi, Oxford, New York.

Novick A. 1959. Acoustic orientation in cave swiftlet” *Biol. Bull. Mar. Inst. Lab.* Woods Hole 117:497-503.

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**Large Green Barbet - *Megalaima zeylanica* (Gmelin)**  
**Status: Resident**

Kerala, Southern Tamil Nadu, Mostly in low country & foot hills up to 1500m.

**ECOSYSTEM USED**

Moist Deciduous' Dry Deciduous Evergreen Forests

**HABITAT REQUIREMENT**

**BREEDING:** Chiefly February to April. Nest a hole in rotten vertical tree stem or branches, excavated by themselves eggs are laid simply in the bed of chips of wood fell down while excavating both sexes share parental care. Incubation period XXXXXXXX.....

**FOOD:** Wild figs, large variety of drupes & berries flower petals e.g. *Bauhinia*, Nectar, (Semal, *Erythrina* sp.) Occasionally insects, beetles, flying ants etc. are also taken.

**COVER:**

**STRUCTURAL STAGES:** Large Old growth stands are preferred.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition). Oxford University Press, Delhi, Oxford, New York.

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**Southern Green Imperial Pigeon - *Ducula aenea pusilla* (Blyth)**  
**Status: Resident**

Common in peninsular India, chiefly in Eastern & Western Ghats up to Mumbai in appropriate Ecosystems.

**ECOSYSTEM USED**

Affects Moist Deciduous, Evergreen forests, Plains & foothills equally affected.

**HABITAT REQUIREMENT:**

**BREEDING:** Principally Feb-June Nest a flimsy platform of twigs made at the bifurcation of branches eggs usually one. Details of courtship and breeding not available.

**FOOD:** Figs nutmegs, berries in general & specifically the berries of marking nut (*Semecarpus anacardium*) and buds of Mangrove *Avicinnia* sp. are notable.

**COVER:** Prefers Evergreen tall trees for breeding and feeding purposes.

**STRUCTURAL STAGES:** Old growths with snags & dry poles.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 “ Handbook of the Birds of India and Pakistan” together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition). Oxford University Press, Delhi, Oxford, New York.

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**Nilgiri Wood Pigeon : *Columba ilphinstoni* (Sykes)**  
**Status: Resident**

Resident, endemic, distributed along western ghats from Kerala Northwards to Mumbai including Mimbai & slightly beyond up to 19° N latitude.

**ECOSYSTEM USED**

Moist Evergreen forests in foothills and up to 2000 m altitude.

**HABITAT REQUIREMENT**

**BREEDING:** Seen breeding at the end of summers beginning of rains i.e. April-June. Nest is a small platform of trees placed on a moderate sized tree in Shola. A single egg is laid, details of the breeding biology yet to be studied.

**FEEDING:** Various fruits, berries, and buds, small snails (Jerdon) and are seen eating wattle seeds in Kodaikkanal.

**COVER:** Prefers Montane Shola exclusively for the breeding.

**STRUCTURAL STAGES:** Old growths and dense trees.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 “ Handbook of the Birds of India and Pakistan” together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition). Oxford University Press Delhi. Oxford, New York.

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**Malabar Parakeet *Psittacula columboides* (Virgo)**  
**Status: Resident**

Common Endemic of the Forested tracts of the Western Ghats up to c. 19° N Latitude, North of Mumbai, including Nilgiri, Palni and associated hills of Tamil Nadu, Kerala, Karnataka and Maharashtra, chiefly up to 500-1500m altitudinal ranges.

**ECOSYSTEM USED**

Evergreen and semi-evergreen forest types, cultivation within the forest and Coffee plantations

**HABITAT REQUIREMENTS**

**REARING:** Breeding mainly from January to March. Nest usually a hole made on the tree trunk in forest or natural cavities or woodpecker nests, which are altered to suit the needs, in similar situations, between 6-30 m height. Lofty Iron Wood trees (*Mesua ferrea*) are preferred irrespective of the extra effort needed in making the nest. Normally 4 eggs are laid in one clutch and both the parents share the chore of the nest building and rearing of the chicks. Incubation period and other details of the taxa are not available.

**FEEDING:** Food consists of different grains, seeds, figs (*Ficus* sp.), flower petals and nectar of *Erythrina*, *Grevillea*, *Bambax ceiba*. The first two species of trees along with *Ficus glomerata* are commonly grown in the Coffee plantations neighbouring Evergreen Forests and are frequented for fruits and flowers. They were seen feeding on the Jowar (*Sorghum*) and Cereals and Peas cultivated by the Tribal communities and are highly destructive in the feeding.

**COVER:** Evergreen Forests are used as breeding cover, and also to escape from predation where as the neighbouring vegetation types including the Semi-evergreen, Moist Deciduous Forests and cultivated lands are used for feeding.

**STRUCTURAL STAGES:** Old Successional stages and Plantations

**REFERENCE:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition). Oxford University Press Delhi. Oxford, New York.

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**Blackcrested Bulbul (Rubythroated Sub sp.) *Pycnonotus melanicterus gularis***  
**Status: Resident & Endemic**

Distributed along the Western Ghats from Western Mysore through Kerala and Western Tamil Nadu, in the lower plains and foothills up to 1200m altitude.

**ECOSYSTEM USED**

Affects edges of the Evergreen forests, Bamboo brakes, thickets in the forest clearings, Dry evergreen patches along the slopes and thorny *Mimosa* and *Lantana* covered secondary jungle and avoids the cultivated areas.

**HABITAT REQUIREMENTS**

**REARING:** Breeding Chiefly April to June. Nest is a Flimsy cup of yellow dried or old leaves bound lightly with cobwebs and grass stalks with a light lining of grass, which looks like windblown rubbish/ dead leaves on the bush normally at a height of 1-3 m from the ground. Nothing much is known about the breeding biology of the species.

**FEEDING:** Food mainly consists of different berries, wild figs and insects. The bird was commonly seen on the *Ficus microcarpa* during the fruiting season.

**COVER:** Extremely secretive and are seen flying in to the thickets far off at the slightest disturbance.

**REFERENCE:**

Salim Ali and Sidney Dillon Ripley 1983 “ Handbook of the Birds of India and Pakistan” together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition). Oxford University Press Delhi. Oxford, New York.

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**Yellow-throated Bulbul *Pycnonotus xantholaemus* (Jerdon)**  
**Status Resident**

Distributed patchily Tamil Nadu, Southern Andhra Pradesh, Karnataka and Kerala along the rugged hilly tracts and dry areas.

**ECOSYSTEM USED**

Southern Thorn Forests, Dry Deciduous Scrub, and open Dry deciduous Forests.

**HABITAT REQUIREMENTS**

**BREEDING:** Mainly breeding occurs with the beginning of the rains i.e. May to July. Nest is cup of coarse twigs bound together by cobwebs as in the *P. melanicterus*, lined with fine fibers, rootlets and grass blades. Sometimes the nests are even made between the boulders along the steep slopes. 2-3 eggs are laid in a clutch. Nothing much is known about the breeding biology of the species.

**FEEDING:** Feeds on the wild berries, insects, figs.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 “ Handbook of the Birds of India and Pakistan” together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition). Oxford University Press, Delhi, Oxford, New York.

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**White-browed Bulbul *Pycnonotus luteolus luteolus* (Lesson)**  
**Status: Resident**

Distributed widely in the Southern part of the country roughly south of the 23° N latitude. A line from Ahmedabad through Southern Madhya Pradesh to the east up to the Hooghly River in West Bengal along the Eastern Ghats up to c. 1200m altitudinal range.

**ECOSYSTEM USED**

Dry Open Scrub, Thorn Forests, open Dry Deciduous forests, scattered Lantana Brakes and gardens.

**HABITAT REQUIREMENTS**

**REARING:** Breeding season mainly all through the year from January to December, defining a season for breeding to the taxa is difficult. Nest is usually made of twigs alone with lesser cobwebs and using the smaller twigs for the binding purposes also. Hair, rootlets and other materials are used to line the nest. The nest is usually placed at a height of 2-5 meters. The clutch size is usually 2. Nothing is available on the details of its breeding biology.

**FEEDING:** Food consists of fruits and berries of the (*Zizyphus Lantana*, *Mimusops*, *Streblus*) and various figs, and flower nectar (*Erythrina*, *Salmalia*, etc.) also spiders and insects.

**COVER:** Prefers thickets and thorny bushes are preferred for the breeding and feeding purposes.

**STRUCTURAL STAGE:** Old successional stages and Middle successional stages are preferred.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 “ Handbook of the Birds of India and Pakistan” together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition). Oxford University Press, Delhi, Oxford, New York.

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**Brown-capped Pygmy Woodpecker *Dendrocopos nanus* (Virgos)**  
**Status: Resident**

Widely distributed all over the Peninsular India Northward to southern limit of the *Dendrocopos nanus* in Gujarat through the Madhya Pradesh and east to Orissa, plains and foothills up to c. 1200m.

**ECOSYSTEM USED**

Affects light Deciduous, Bamboo Forest and Secondary Jungle and groves of trees in and around cultivation.

**HABITAT REQUIREMENTS**

**REARING:** Breeding season mainly March and April, varying locally. Nest a tiny hole under 3cm in diameter drilled in a small dead branch between 2-12 meter height in open forest or a mango grove. The hole usually of a length of 5-10cm and with somewhat widened egg chamber. The nest when on the horizontal branch the entrance hole is placed at the lower side of the branch. Normally care is taken to place the entrance facing away from the open areas to avoid easy detection. 2-3 eggs are laid in a clutch and the parental care and nest making are shared between the sexes. Incubation period and other details need study.

**FEEDING:** Chiefly insects and grubs, ants, bees, caterpillars, weevils, figs (*Ficus* sp.) fruits of *Buchmania latifolia* drupes, *Madhuca indica* flowers and flower nectar like *Salmalia*, *Erythrina*, *Bombax ceiba* and *Butea monosperma* thus helps in cross pollination of trees species.

**COVER:** Dry deciduous forests and groves are preferred for the breeding activities.

**STRUCTURAL STAGES:** Middle and Old successional stages are preferred in both managed forests and unmanaged forests.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition). Oxford University Press, Delhi, Oxford, New York.

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**White-bellied Woodpecker *Dryocopus javensis* (Jerdon)**  
**Status: Resident**

Distributed along the humid tracts of the Western Ghats up to the Tapti (c. 21°N) river in the north through Western Tamil Nadu, Western Mysore, Goa, Western Maharashtra and southern Gujarat. Also procured in the Bastar district of the Madhya Pradesh. Even though the distribution range is wide it's locally restricted in the distribution. Distributed even in to the Terai Conservation Area also.

**ECOSYSTEM USED**

Evergreen and semi-evergreen forest types.

**HABITAT REQUIREMENTS**

**REARING:** Breeding season is primarily from January till March. Nest usual Woodpecker hole on large sized tree trunks deep within the Evergreen forest patches at heights between 8-16 meter heights.

The shaft and egg chamber are often up to 50 - 60cm deep. Normal clutch size is 2 and both the sexes take part in the excavation and other duties of parental care. They are extremely wary of the human presence, due to the hunting by the tribals in different parts of the country.

**FEEDING:** Chiefly ants, termites, grubs, pupae of wood boring beetles. Even small honeybee (*Apis florea*) combs are excavated and fed on the bees and the pupae.

**COVER:** Evergreen forests are preferred for both the foraging and breeding activities.

**STRUCTURAL STAGES:** Old successional stages are only preferred.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition). Oxford University Press, Delhi, Oxford, New York.

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## Heart Spotted Woodpecker *Hemicircus canente* (Lesson)

### Status: Resident

Locally common, but patchily distributed in different parts of Peninsular India. Along the Western Ghats from Kerala Tamil Western Nadu, Karnataka, Through Goa up to Gujarat and Hilly tracts of Madhya Pradesh to the Chanda district of the Orissa West Bengal, Assam through south of Brahmaputra River to Manipur, plains and foothills up to c. 1300m altitude.

#### ECOSYSTEM USED

Moist Deciduous, Secondary Evergreen Forest and Plantations.

#### HABITAT REQUIREMENTS

**REARING:** Breeding season starts from November and lasts till the March and even to April. Nest a tiny hole drilled in to dry and dead branch usually between 3-4 meter height from the ground on a soft wooded tree like *Erythrina* or *Bombax ceiba*. The height of the nest can be considerably higher according to locality or availability of the favourable sites. Nest hole goes obliquely up to 20cm, ending an egg chamber slightly larger in diameter. 2 eggs are laid in a clutch other details are not available.

**FEEDING:** Food chiefly consists of ants, termites, grubs, and other small insects caught by tapping on the bark of thin branches. These birds are seen exclusively restricted to the very delicate branches of the soft wooded trees. And are particularly fond of the *Erythrina* Sp., which are quiet common all through ACA.

#### COVER:

**STRUCTURAL STAGES:** Old successional stages are preferred in both the managed and unmanaged forest types.

#### REFERENCES:

Salim Ali and Sidney Dillon Ripley 1983 “ Handbook of the Birds of India and Pakistan” together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition). Oxford University Press, Delhi, Oxford, New York.

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## Asian Elephant *Elephas maximus*

### Status: Resident

An object of worship, a target of hunters, a burden of beast, gentle in captivity, dangerous in the wild, the possession of the Kings, the companion of the tribals, a machine of war, an envoy of peace, loved, feared, and hated, the elephant has had an infamous association with man in Asia (Sukumar 1989). Once distributed all over the country now patchily distributed in four major populations in the country. The present distribution of the Elephant in Indian subcontinent can be considered under four widely separated regions: 1. South Indian, elephants are distributed all along the hilly tracts of the Western Ghats, Eastern Ghats in the southern states of Karnataka, Tamil Nadu and Kerala. The ACA population comes under this region. 2. Northwest region, elephants of the Himalayan foothills in the *Terrai* forests, population in the Eastern Dehradun, Shivalik, Lansdowne, Bijnor, Kalagarh, Ramanagar, Corbett National Park, and Haldwani. The TCA population comes in this region. 3. Central Indian region, elephants of the Simlipal tiger Reserve, Bihar, Orissa, southern West Bengal come in this region. 4. Northeast Indian region, elephants of the Himalayan foothills of Bhutan, northern West Bengal, border eastwards in to the states of Assam, Meghalaya, Manipur, Mizoram, Tripura, and Meghalaya come in this region. The GCA Population is a part of this region.

Within these four major regions the elephants are further fragmented in the populations and are in small to larger available habitats with interconnected or isolated populations.

#### ECOSYSTEM USED

They are found to utilize all the major ecosystems, like Evergreen, Montane Shola, Grassland, Moist Deciduous, Dry deciduous, Thorn forest types to scrub jungle and monoculture plantations like Teak, Eucalyptus, Tea, Coffee and Cardamom plantations.

#### HABITAT REQUIREMENTS

**REARING:** The first calving age in elephants normally varies from 12-20 years. Even though puberty may be reached even by the age of 11 itself, conceiving takes a longer time by various reasons in the wild and in captivity. Normal gestation period is 20-22 months in Asian Elephants.

**FEEDING:** The quantity of the food consumed, depend on the age sex and the size of the animal. Laws *et al.* (1975) estimate that an elephant need 1.5% of the dry weight fodder or 6% of fresh fodder of its total weight for daily consumption. Though a generalist feeder, the most commonly eaten plants are from only four botanical taxa - the order Malvales and the families Leguminosae, Palmae, and Gramineae. These account for the 72% of the recorded food species in the Sukumar (1989).

**COVER:** Elephants uses a large variety of forest covers from evergreen forests to moist and dry deciduous. Temporal use varies according to prevailing ambient temperature (Jones E.E. 1955). Dense cover is more crucial during day hours in summer month when they prefer to remain in riverine areas where water and shades are available. African studies reveal that the dry season home ranges of elephant cover only about 10% area of wet season, and are based around the permanent water sources (Owen Smith, 1988).

**STRUCTURAL STAGES:** Elephants are known to have a propensity of utilizing forest clearing and secondary growth more so than close-canopy, mature forest (Laws *et al.* 1975, Jones, 1955). Preponderance of herbacious tangle in the forest clearing and secondary forest are the important influence factor for increased utilization by elephants.

#### REFERENCES:

Sukumar, R. 1989; Laws, H.M, Parker, I.S.C. and Johnstone, R.C.B. 1975; Jones, E.E. 1955; Daniel, J.C. and Datye Hemant, "A week with elephants", BNHS, Mumbai; Smith, O., 1988.

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## Kerala Warty Frog *Fejervarya keralensis*

**Status:Resident**

Distributed along the Western Ghats; Kerala, Western Tamil Nadu, Goa, Karnataka, up to 7000ft height.

### **ECOSYSTEM USED**

Seen along the major Water bodies of its distribution range, in the forested tracts of the country.

### **HABITAT REQUIREMENTS**

**REARING:** No information

**FEEDING:** No details available

**COVER:** Evergreen forests

### **STRUCTURAL STAGES:**

### **REFERENCES:**

For notes on taxonomy and distribution.

Dutta S.K. 1997. Amphibians of India and Sri Lanka : Checklist & Bibliography). Odyssey, Publ. House. India.

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**Black Narrow Mouthed Frog *Melanobatrachus indicus* Beddome 1878**  
**Status: Resident**

Distributed along the forested tracts of South Indian Hills, in the states of Tamil Nadu (Kalakkad Mundanthurai Forests, Anaimalais) and Kerala (Travancore hills).

**ECOSYSTEM USED**

**HABITAT REQUIREMENTS**

**REARING:** No Information available on the breeding biology of this particular species.

**FEEDING:** No information available on this aspect of the species.

**COVER:** Evergreen forests

**STRUCTURAL STAGES:**

**REFERENCES:**

For notes on taxonomy and distribution.

Dutta S.K. 1997. Amphibians of India and Sri Lanka : Checklist & Bibliography). Odyssey, Publ. House. India.

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**Large Wrinkled Frog *Nyctibatrachus major* Boulenger 1882**  
**Status: Resident**

An endemic resident of the Western Ghats, distributed through the south Malabar, at 1500-4000ft, Wayanadu District in Kerala and in the Anaimalai hills, and Tirunelveli district of Tamil Nadu

**ECOSYSTEM USED**

Evergreen, Moist Deciduous, Montane shola forests, along the hill streams.

**HABITAT REQUIREMENTS**

**REARING:** No information available on the breeding biology of the species. Breeds during post-monsoon season.

**FEEDING:** No information available on the feeding and foraging of the species.

**COVER:** Rainforest streams

**REFERENCES:**

For notes on taxonomy and distribution.

Dutta S.K. 1997. Amphibians of India and Sri Lanka : Checklist & Bibliography). Odyssey, Publ. House. India.

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**Burrowing Frog *Sphaerotheca parambikkulamana* (Rao 1937)**  
**Status: Resident**

Only known from type locality (Parambikulam).

**ECOSYSTEM USED**

**HABITAT REQUIREMENTS**

**REARING:** No information available on the breeding biology of the species.

**FEEDING:** No information available on the breeding biology of the species.

**COVER:** Unknown. This species is known only from its description. The type specimens are lost and it has not been found again after description.

**REFERENCE:**

For notes on taxonomy and distribution.

Dutta S.K. 1997. Amphibians of India and Sri Lanka : Checklist & Bibliography). Odyssey, Publ. House.  
India.

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**Little Spiderhunter *Arachnothera longirostris longirostris* (Latham)**  
**Status: Resident**

Disjunctly distributed all along the Western Ghats complex of south western India through north Kanara south through western Karnataka, Kerala and western Tamil Nadu, from the low country up to 2100meter altitude, Eastern Ghats, form the extreme southeastern Nepal, Darjeeling and Jaipauri districts, Bhutan and Arunaachal foothills, Manipur, Nagaland, Bangladesh, and Chittagong hill tracts up to 1500m altitudes and 1800m altitudes in Himalayas. Seen in ACA, TCA and GCA.

**ECOSYSTEM USED**

Evergreen and Moist Deciduous Forests, Riverine vegetation, both dense forests and edges, secondary growths, Coffee and Cardamom Plantations, and Banana plantations.

**HABITAT REQUIREMENTS**

**REARING:** Breeding season is mainly March to September. Nest is a compact cup made of skeleton of leaves, soft grass, vegetable down, neatly felted together; attached by its rim like an inverted dome to the underside of a banana leaf or similar broad leaves, by cobwebs or threads of vegetable cotton, passed through the leaf and neatly knotted on its upper surface, with a semicircular entrance hole at one side.

Eggs usually 2 and occasionally 3 are laid. Both the birds share parental duties. Incubation period and other details are not yet determined.

**FEEDING:** They mainly feed on the Insects, spiders, and nectar.

**COVER:** They prefer dense forest cover for both the breeding and feeding purposes

**STRUCTURAL STAGES:** They are seen utilising all the three successional stages in both the managed and unmanaged forest types.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 “ Handbook of the Birds of India and Pakistan” together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition). Oxford University Press, Delhi, Oxford, New York.

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**Anaimalai Salea *Salea anamallayana* Roux**  
**Status: Resident**

Distributed along the southern Western Ghats in the Nilgiris and Anaimalai hills up to 7000ft altitude.

**ECOSYSTEM USED**

Montane Shola and Grassland system.

**HABITAT REQUIREMENTS**

**REARING:** No information is available on the breeding biology of the species.

**FEEDING:** Feeds on the insects termites and ants.

**COVER:** Are seen equally in Grassland interspersed with scanty scrubby vegetation and in the Montane Shola (*pers. Obser.*).

**REFERENCES:**

Malcom A. Smith, (1974) The Fauna of British India, Including Ceylone and Burma. Reptilia and Amphibia  
Vol. II-Sauria. PP179-180.

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**Bamboo Pit Viper *Trimeresurus gramineus* Smith**  
**Status: Resident**

Distributed along the peninsular India especially along the Western Ghats and Eastern Ghats Hill complexes, south of the latitude 22° N.

**ECOSYSTEM USED**

Evergreen, Montane Shola, Moist Deciduous, and Dry Deciduous Forests.

**HABIAT REQUIREMENTS**

**REARING:** No details are available on the breeding biology of the species.

**FEEDING:** Food consists of small Lizards, frogs and occasionally large insects.

**COVER:** Thick Forest cover is preferred both for feeding and breeding purposes.

**STRUCTURAL STAGES:** Old successional stages are preferred.

**REFERENCES:**

Malcom A. Smith, (1974) The Fauna of British India, Including Ceylon and Burma. Reptilia and Amphibia  
Vol. II-Sauria.

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## The Clouded leopard *Neofelis nebulosa nebulosa* (Griffith) Status: Vulnerable/Endangered, Schedule I

The four sub-species of *Neofelis nebulosa* are found in parts of eastern Nepal, northeast India, southeast Asia and southern China. It is an animal of tropical forests and found up to altitudes of about 2,500 meters in the evergreen rainforests of Southeast Asia, in the islands of Sumatra and Borneo, the foothills of the Himalayas of India, Nepal, southern China and Taiwan. It has also been reported from Bangladesh, Burma, Thailand, Malaysia, Vietnam, Cambodia and Indonesia. Within India, *Neofelis nebulosa nebulosa* occurs in the rainforests of the north-eastern region in north Bengal (Buxa Tiger reserve), Arunachal Pradesh (Namdapha Tiger Reserve), Assam (Manas Tiger Reserve) and Meghalaya (Balpakram National Park). Within GCA *N. n. nebulosa* can be seen in Balpakram area, Shooling area, Chutmang Hill, Jigrik hills and Roncheng area in Garo hills. It is believed that the Taiwanese subspecies *N. n. brachyurus* has already become extinct. It is absent in other three project sites i.e. ACA, SCA and TCA.

Throughout its range the animal has been heavily hunted for its teeth and bones which are commonly used in oriental medicine preparations. In Asian markets, the teeth and pelts are sold for decoration and the bones are sold for traditional medicines. The clouded leopard has been persecuted for its coat for many years. People desire coats made of this fur because of its unique pattern. It takes about 20 to 30 cats to make one full-length coat. Clouded leopard has even appeared on the menu of restaurants in Thailand and China that serve wealthy tourists. This coupled with the loss of habitat, mainly due to deforestation, has led to the animal being endangered. Clear cutting of forests for use as agricultural lands is its primary threat, as the clouded leopard requires large tracts of forest for hunting. It is a victim of hunting and has been poisoned as well as a livestock predator.

Two individuals of clouded leopard were radio collared during 1999 in Thailand and tracking of these two individuals indicate a large home range about 33-36 sq km (Fletcher N., Personal Communication)

### ECOSYSTEM USED

The clouded leopard was believed to inhabit only dense evergreen forests. However, it has also been reported from coastal mangrove swamps, coniferous forests, selectively logged forests and even degraded dry woodland and scrub.

### HABITAT REQUIREMENTS

**REARING:** Cubs usually born in a hollow tree. Deep forests with dense and impenetrable vegetation COVER nearby water bodies are preferred. Sexual maturity is not known for certain, but probably 5 years. Mating season is not known in the wild. Cubs born in captivity from March to May. No. of young produced varies between 1 to 5 but usually 2. Weaning period is 5 months. Cubs stay with the female until 9 months old.

Little is known from the wild about breeding habits, but pregnant females become very secretive when they are about to give birth. Most litters consist of two cubs but four or even five have been born in captivity. Gestation periods range from 86 to 109 days. The cubs weigh about 140 to 280 g at birth and are weaned in 93 days. Their eyes are open by 12 days and the cubs can walk when they are about 20 days old. If allowed, they will

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continue to suckle for five months. Males are said to develop faster than females and they achieve adult coloration when they are about six months old. LIFE SPAN: 10 - 15 years in the wild; 17 years in captivity.

**FEEDING:** Clouded leopards are rainforest dwellers and depend upon the forest and its intricate web of plants and animals for survival. Although in part arboreal, the clouded leopard hunts mainly on the ground at night. Clouded leopards are opportunistic predators, as are most cats. Recorded prey are sambar, barking deer, birds, wild boar, civet, primates, squirrels, porcupines, fish, reptiles, domestic cattle and chickens. Among primates Hoolock gibbons, Pig-tailed, Assamese, Rhesus macaques and Capped langoors are common. Red Jungle fowls and Kaleej pheasants are major prey among bird. Lying motionless on overhanging branches, clouded leopards often spring on unsuspecting prey from above, or stalk and capture prey, on the forest floor, by traditional felid hunting techniques.

**COVER:** Clouded leopard is an extremely good climber, foraging in trees and uses them for resting. They prefer the deep forest away from human habitation. The clouded leopard was previously thought to be highly arboreal based on anecdotal observations. However, there is no evidence to support this assumption. It now appears that trees are used primarily for resting sites, and clouded leopard movements are typically terrestrial. They build nests in trees and are most active in early mornings and late afternoon. Dense forest COVER in deep forests. Avoid disturbed forest patches. It may also inhabit more open forested terrain and swamp margins. Swim well and uses riparian habitats. Prefers areas devoid of tigers and leopards.

In addition to traversing the treetops upright, the clouded leopard has been observed to travel horizontal branches by hanging beneath them like a sloth and to dangle from a branch using only its hind legs. This hanging posture, using only the hind legs, has been observed in relation to hunting techniques where a victim is dropped upon from above.

**STRUCTURAL STAGES:** Mainly high forests (usually catches its prey entirely on the crown of trees). Clouded leopards are more closely associated with primary evergreen tropical rain forests/moist forests but also utilise other STRUCTURAL STAGES such as secondary and selectively logged forests, dry tropical forests, grasslands and marginal scrubs.

**REFERENCES:**

Fletcher N. (1994 and 1996), Fletcher (Personal Communication), David A.(1993), Kitchener A. (1991), Garman (1997), Nowell K. and P. Jackson (1996), Rabonowitz A. (1988), Santiapillai C and K.R. Ashby (1988), Santiapillai C (1989), Choudhury A. (1989, 1993), Davies R.G. (1990), Dinerstein E. and J.N. Mehta (1989), Griffiths M. (1993), Prater, S.H. (1980).

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## The Hoolock/White-browed Gibbon *Hylobates hoolock* (Harlan, 1834) Status: Endangered, Schedule I

The only ape of India 'the hoolock gibbon' was formerly widespread from eastern India, through Bangladesh to China and south to the Irrawaddy in Myanmar. In 1967 it was reported to occur in Assam, upper Myanmar, Tenasserim, northern Thailand and northern Laos. By 1987 it had declined drastically, particularly in Bangladesh and India, and was thought to be located in India, the east of Bangladesh, Myanmar, and Yunnan Province in China. Currently it is thought to occur in the forests of north east India, Bangladesh (east of the Brahmaputra River), south Yunnan (China), and Myanmar (WCMC/WWF 1997z). and may occur in Laos (IUCN 1996). The eastern limit of distribution of the hoolock gibbon is the Salween river in Burma (Groves, 1972) while the Brahmaputra river marks its western limit (Choudhury, 1989). In India it is found in all the seven states of north east India, mainly the south of Brahmaputra river. A small population was introduced in Mahananda Wildlife Sanctuary in Darjeeling district during 1965.

Previously found throughout the forests of its present range; deforestation and hunting have exterminated gibbons from many areas. Originally 168,000 sq km of available habitat; available habitat in 1987 was 56,378 sq km; representing a 67 per cent habitat loss. Total world population estimate was 532,000 during 1977 ("may be too high") (Nowak & Paradiso 1983) which was reduced to around 170,000 animals in 1987 (Mackinnon and MacKinnon, 1987). In India population estimate comes to 6,200-6,700 individuals utilising about 4,500 sq km of good habitat and 2,500-3,500 sq km of degraded habitats with the density of 1.1 and 0.5 per sq km, respectively. In West Garo Hills, Meghalaya of north east India 130 individuals (126 in 42 groups and 4 solitary) were recorded from 32 localities COVERing 812 sq km of forest area (Alfred and Sati, 1990). Major threats to this species include the rapid deforestation, poor environmental education, the absence of conservation measures agriculture including tea plantations. Destruction of habitat during the 1960s and 1970s in China of suitable gibbon habitat. Currently, much of the Hoolock gibbon's habitat is being destroyed for lumber, firewood, and farming (Nowak, 1999). In recent years, several sanctuaries and reserves that lie inside the Hoolock gibbon's natural range have been created, however the increased problem of habitat fragmentation is still of much concern (Wolfheim, 1983). Habitat destruction through shifting cultivation by hill tribes and logging has created a fragmented habitat. Gibbons are forced to descend from trees to cross clearings making them vulnerable to hunting and predation. Intense hunting of gibbons by local tribes is reported in Assam. Gibbon meat and bones are of value as a tonic in some traditional Asian medicines. Home range of hoolock gibbon may vary from 18 to 30 ha with a mean of 22 ha (Choudhury, 1989).

### ECOYSTEM USED

Tropical rainforest mainly. The hoolock gibbon is found in tropical evergreen rainforest, semi-evergreen forest, tropical mixed deciduous-dominated forest, tropical deciduous forest, tropical scrub forest and sub-tropical broadleaf hill forest up to 1400 m (4500') (WCMC/WWF1997z, Choudhury, 1991)

### HABITAT REQUIREMENTS

**REARING:** Average life expectancy is 40 years (Rowe, 1996). The hoolock gibbon gives birth to a single offspring. A single young is born every 2 - 3 years. Mating takes place during rainy season. Gestation period varies from seven (7) to eight (8) months. Normally a single young is born, sometimes twins, every 2-3 years.

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Birth typically occurs from November to March. The estrous cycle averages is of 28 days. After the young is born, it clings tightly to the mother around the waist and remains there for the first few months of its life. Gradual weaning will occur in 1.5-2 years and the young usually reach sexual maturity in 84 months (Rowe, 1996), although gibbons in captivity are known to have reached maturity at 6-7 years of age.

Like all gibbon species, *Hylobates hoolock* is monogamous (Nowak, 1999). The mated pair, along with their offspring (typically one or two), occupy a fiercely defended and stable territory. Occasionally, lone adults—usually sub-adults recently forced from their family group—will establish solitary territories. In Assam and Bangladesh, the Hoolock gibbon's average territory size is 22 ha (Nowak, 1999).

**FEEDING:** Shy and diurnal, it is almost arboreal, mainly feeds above 15m from ground (Choudhury, 1989). Like other gibbon species it is basically frugivorous, only one (1) percent of its FEEDING time is being spent on insect (Tilson, 1979). It was observed FEEDING on the fruits of *Ficus hispida*. It feeds with both hands sitting on a tree branches, or with one hand by hanging from a tree branch. Generally frugivorous, but the diet may be mixed with insects, leaves, and other vegetable matter. Usually ripe, pulpy fruit is preferred, so gibbons compete mainly with squirrels and birds, rather than other primates. Small vertebrates and eggs may be eaten occasionally. Generally, about 35 percent of the daily activity is spent on FEEDING, and of that, up to 65 percent of the time is spent on foraging for fruit (Chivers, 1977). Preferred food plant species are *Terminalia chebula*, *T. bellerica*, *Lagerstroemia flos-reginae*, *Castanopsis ondica*, *Dillenia indica*, *Sapium baccatum*, *Sterculia villosa*, *Artocarpus chaplasha*, *Garcinia morella*, *Hoya parasitica*, *Ficus religiosa*, *Amoora wallichii*, *Desmodium species*, *Cinnamomum granduliferum* and *Alstonia scholaris*.

**COVER:** It survives only in undisturbed forests and occupy upper canopy. This species sleeps and rests in the emergent trees (Leighton, 1987). All gibbons are arboreal and diurnal. The hoolock gibbon is a good swimmer and frequently uses riparian habitats. It takes shelter in the shady trees during the hot hours of the day while at night it sleeps in the top canopy of tall trees. This species lives in undisturbed primary forests, evergreen forests, mixed evergreen forests, scrub forests, subtropical monsoon forests, and humid mountainous broadleaf evergreen forests throughout their natural range. The tall trees of deciduous species in semi-evergreen forests provide it vantage place for sub-wasking. Hoolock gibbons usually prefer undisturbed forested areas and are found at elevations ranging from 152 to 1370m (Wolfheim, 1983).

**STRUCTURAL STAGES:** The hoolock gibbon is found in the primary forest patches of tropical evergreen forests in lower hills and broad-leaved forests of subtropical forests in higher hills. It can also be observed in the old secondary vegetation which in the course of time develops as deciduous forests in the hilly region and in bamboo brakes in the plains. Young age secondary forests with the dominance of bamboo thickets, for example, *Melocanna bambusoides* and young age secondary forests dominated by *Macaranga denticulata* in the jhummed unclassified community/privately owned secondary forests.

#### REFERENCES:

Burton & Pearson (1987), Gittins & Akonda (1982), Haimoff et al. (1987), Macdonald (1984), Nowak (1999), Nowak & Paradiso (1983), Olson & Dinerstein (1998), Olson & Dinerstein (1999), Schuhmacher (1967), Rowe (1996), Shrivastava (1999).

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## Slow Loris *Nycticebus coucang* Status: Schedule 1

Four (4) subspecies (disputed) distributed throughout South-east Asia, China, India and Indonesia (from Vietnam to Borneo). Within India, in all the seven states of north-east India. The north-western limit of its range is the southward band of the river Brahmaputra. Slow loris absent from other project sites *i.e.* ACA, SCA and TCA. According to CITES II rating this species is at lower risk.

### ECOYSTEM USED

Subtropical and tropical moist forests upto 1300 m.

### HABITAT REQUIREMENTS

**REARING:** Birth season: When vegetation is at a maximum level. Mothers carry infants upto six (6) months. Sexual maturity reaches at the age of 17-21 and 17-20 months for females and males, respectively. Birth interval varies from 12 to 18 months. Infants are parked while mother forages.

**FEEDING:** Slow loris is solitary foraging animal. The male loris's range may be larger than the female's. It is nocturnal, arboreal and hang from a branch upside down to eat with both hands. Their diet include the fruit (50%), animal prey (30%), gum (10%), shoots, bird eggs and insects that have a repugnant taste and smell. Leaves are not consumed but the sap from leaf petiole is sucked. Preferred food plant species recorded is *Dillenia pentagyna*.

**COVER:** Slow loris is arboreal in nature and only inhabits the thickest of vegetation in the tropical evergreen forests. It prefers the regenerating forests. It occupy the lower canopy. Also reported from the sub-urban gardens, secondary growths and scrubs.

**STRUCTURAL STAGES:** Mainly primary forests, sometimes secondary forests and groves of Bamboo. Slow loris prefers forest edges in and around tropical evergreen forests. The edges provide them more support and prey base.

**THREATS:** *Jhumming*/Deforestation, even moderate selective logging affects adversely. Hunted for food, medicine and religious ceremony.

### REFERENCES:

Rowe (1996), Shrivastava (1999).

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## Stump-tailed Macaque *Macaca arctoides* Status: Schedule 1

Stump-tailed macaque is monotypic. It is found in Southern China and South East Asia. Within India it is found in all the seven states of North-east India. The north-western limit of its range is the south of river Brahmaputra. The species is vulnerable as per the IUCN ratings. Life span is 30 years. They live in groups of 5-40, and day range varies from 400 to 3000 m.

### ECOYSTEM USED

Tropical forests

### HABITAT REQUIREMENTS

**REARING:** Mothers carry infants upto the age of 6-12 months and weaning continued till 9-18 months. Female's age at first birth varies from 46 to 56 days. Average interval between two successive births is 19 months (12-24 months). Juvenile and sub-adulthood is between 12-48 and 48-96 months, respectively.

**FEEDING:** Stump-tailed Macaques are diurnal, arboreal and terrestrial. Diet includes fruits, seeds, young leaves flowersbuds and animal prey, including insects, birds and eggs. They spend considerable time FEEDING on stem cortex, corn tubes, bulbs and rhizomes. They have been observed eating tree frogs. Preferred food plant species are *Castanopsis indica*, *Artocarpus chaplasha* and *Ficus religiosa*.

**COVER:** They are found in lowland, monsoon, semi-evergreen and dry forests. They prefer dense forests and are rarely seen near human settlements. Sometimes seen in *jhum* fields and damage maize crops. They occupy lower canopy, but also travel on the forest floor and along the banks of streams. They do not swim.

**STRUCTURAL STAGES:** Mainly primary forests with dense canopy. Old secondary forests are also being utilised by this species.

**THREAT:** Loss of habitat, which is mainly due to *jhumming*. Hunting for food and to protect the maize fields.

### REFERENCES:

Rowe (1996), Shrivastava (1999).

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**Assamese Macaque *Macaca assamensis***  
**Status: Schedule 1**

Two subspecies of this macaque occurs in South East Asia from Nepal to Vietnam to Southern China. Within India, they inhabit the forests of northeast India and West Bengal.

**ECOSYSTEM USED**

Tropical moist and humid forests. Tropical evergreen and semi-evergreen forests.

**HABITAT REQUIREMENTS**

**REARING:** Copulation during October to December. Birth during Monsoon *i.e.* in April-May. Five to eight years old females give birth at alternate year but older females give birth every year.

**FEEDING:** Diurnal, arboreal and terrestrial. Its diet includes fruits, young leaves, insects, crops and animal prey. Assamese Macaques have been observed on fig trees. They are observed FEEDING 11% fruits, 32% young leaves, 7% flowers, 30% buds, and 20% animal prey in Assam. Preferred food plant species are *Castanopsis indica*, *Sapium baccatum*, *Artocarpus chaplasha*, *Hoya parasitica*, *Psuedostachyum polymorphism*, *Ficus religiosa* and *Bombax ceiba*.

**COVER:** These macaques have been observed frequenting high canopy. Assamese macaques use trees and rock outcrops as sleeping sites.

**STRUCTURAL STAGES:** Primary forests with dense canopy COVER. It uses monsoon, evergreen, bamboo and deciduous forests also.

**THREAT:** Habitat destruction. Sometimes hunted to protect the *jhum* crops.

**REFERENCES:**

Rowe (1996), Shrivastava (1999).

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## Pig-tailed Macaque *Macaca nemestrina* Status: Schedule 1

Four (4) subspecies (disputed). Pig-tailed macaques have been distributed North East India, Burma to Malay Peninsula and Sumatra. In India, throughout north east India with the north-western limit of its range is south of Brahmaputra river. Males emigrate and remain solitary or peripheral to a group. Group size varies from 15-40. Home range varies from 62 to 828 ha. The day range is 2000 m. This species is vulnerable as per the IUCN ratings. This species is currently in demand by medical laboratories for HIV (AIDS Virus) research.

### ECOSYSTEM USED

Low land primary and secondary forests.

### HABITAT REQUIREMENTS

**REARING:** Infants dependent on mothers for milk upto the age of 12 months. Sexual maturity in females reaches at the age of 35 months. Age at first birth is 44-47 months and interval between two successive births varies from 12 to 24 months. Mating takes place round the year, at peak during Jan-May.

**FEEDING:** Fruit and seeds (73.8%); animal prey including insects, nestling birds, termite eggs, larvae and river crabs (12.2%); leaves (5.4%); buds (3%); flowers (1.1%); other plant matter including fungus. Preferred food Plant species are *Castanopsis indica*, *Sterculia villosa*, *Artocarpus chaplasha*, *Gmelina arborea*, *Pseudostachyum polymorphism* and *Ficus religiosa*.

**COVER:** Usually associated with Gibbons and compete with them for feed and space. Diurnal, arboreal and terrestrial. Pig-tailed Macaques are on the ground 8.4% of the time, in the lower canopy 33.8%, in the middle canopy 33.8% and in the upper canopy 10.4%

**STRUCTURAL STAGES:** Primary forests and old secondary forests.

**THREAT:** Habitat destruction especially through *jhumming* and killing for food.

### REFERENCES:

Rowe (1996), Shrivastava (1999).

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## Capped Leaf Monkey/Capped Langur *Trachipethacus pileatus* Status: Schedule 1

Five (5) subspecies, occurs in India, Burma, Bangladesh and China. Within India it is distributed throughout northeast India. This species is highly endangered as per the IUCN ratings. It emigrates, all males bands and lone males have been reported. Group size- 6.4 (2-13); Home range-21.6 ha (16-24); Day range-25 m (50-700).

### ECOSYSTEM USED

Tropical, Sub-tropical, Evergreen, Bamboo forests upto 1000m. Teak and Sal plantations.

### HABITAT REQUIREMENTS

**Activity budget:** Rest, 40%, FEEDING; 35%; moving, 18%; play, grooming and other, 6.8%.

**REARING:** Infants, 14 months; Juvenile, 15-24 months; Sub-adults, 24-48 months. Mating season, Oct-Dec.; birth season, April. Adult females lead the group 90% of time. Allomothering takes place among adult females, increasing the mother's available FEEDING time.

**FEEDING:** Fruit, 24%; young leaves, 22%; mature leaves, 20%; seeds, 9%; flowers, 7%; animal prey, 1.6%. These monkeys have been reported eating 35 plant species and one (1) caterpillar in Bangladesh (Stanford, 1991). During the rainy season, when fruit is abundant, 50% of their FEEDING is on fruit, particularly figs. In the dry season they survive on mature leaves and some seeds. Occasionally, they eat gum and termite soil trails. They drink water from the cavities. They are found eating water chest nut. They spend considerable time on FEEDING bamboo shoots. Preferred food plant species are *Terminalia chebula*, *Lagerstroemia flos-reginae*, *Albizia lebbek*, *Litsea augustifolia*, *Stereospermum chelonoides*, *Gmelina arborea*, *Catanopsis indica*, *Dysoxylum binectariferum*, *Artocarpus chaplasha*, *Garcinia morella*, *Hoya parasitica*, *Pseudostachyum polymorphism*, *Ficus religiosa*, *Amoora wallichii*, *Desmodium species*, *Cinnemomum granduliferum*, and *Alstonia scholaris*.

**COVER:** Dense tropical evergreen, semi-evergreen and deciduous and bamboo forests upto 1000m. It uses the upper level of these forests. It occupies middle canopy.

**STRUCTURAL STAGES:** Primary forests and old secondary forests.

### THREAT

Habitat destruction. They are being hunted for food, ornamentation, taboo, religious ceremonies and the traditional medicines.

### REFERENCES:

Rowe (1996), Stanford (1991), Shrivastava (1999).

Burton, F. 1995. The Multimedia Guide to the Non-human Primates. Prentice-Hall Canada Inc.

Estes, R.D. 1991. The Behavior Guide to African Mammals. University of California Press.

Fleagle, J. G. 1988. Primate Adaptation and Evolution. Academic Press.

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## Great Pied Hornbill/Great Indian Hornbill *Bruceros bicornis* Linnaeus

### Status: Resident

A huge, black-and-white hornbill with an enormous bill of a vulture. Distributed along the base of Himalayas, North-east India and western ghats of the peninsula, South Nepal, N. Bangladesh, Myanmar, China, Vietnam, Laos, Cambodia, Thailand, Peninsula Malaysia, Indonesia and Sumatra.

Within GCA, this species occasionally seen in the Rompa, Mahadeo, Kundulgop, Pindengru, Cutmang and Balpakram area mainly between 200m to 1000m. Also reported from Jigrik, Siju, Rewak, Chimitab, Shooling and Imangiri area.

#### ECOYSTEM USED

Primary tropical forests, prefers old growth with tall and huge canopied trees, mainly undisturbed forests.

#### HABITAT REQUIREMENTS

**REARING:** Breeding season from March to April. It nests in natural holes in trees, prefers entrance with elongate vertical slit. Nest above 8-25 m above ground in trunk of the snags or big trees of *Lagerstroemia*, *Tetrameles*, *Eugenia*, *Palaquim* (Spelling), and *Hopea*. Mainly in deep dense forests, sometimes on edges and rarely in open forests. Mean nest tree DBH 111 cm (107-132) and height 25-53 m, cavity 12-22 m up in live trunk, prefers elongate slit 8-9 cm wide. Average entrance 40x14 cm.

**FEEDING:** Primarily frugivorous but also a capable predator, mainly fig crops (*Ficus* species) and other fruit bearing trees of *Polyalthia*, *Canarium*, *Elaeocarpus*, *Cinnamomum*, *Litsea*, *Amoora*, *Aphanamixis*, *Horsefieldia*, *Knema*, *Eugenia*, *Piper* and *Symplocus*. Animals in diet are beetles, wasps, grasshoppers, leaf insects, stick insects, Cricket, Cockroaches, Lepidoptera larvae, Centipedes, Millipedes, Scorpion, crabs, land snails, Earthworm, Frogs, Lizards, Skinks, Geckos, Snakes, birds like barbet, nightjar, Drongo, Owls, bird eggs and chicks, insectivorous bats, Rats, Squirrels, Flying squirrels. No drinking of water ever recorded.

**COVER:** Common in larger forest tracts, but uncommon to scarce in fragmented habitats. Local resident in thick forests. Occasionally seen nearby habitation. It requires old-growth trees for roosting, FEEDING and nesting throughout their lifecycle. Roosting among the top most branches of large thinly foliated trees. Bathe in wet foliage, not clumped together but dispersed over neighbouring trees in grooves, with 3-4 per tree and with constant changes of position late into the dusk. Sleeps in typical posture, squatting on branches with head sunk between soulders, thus need thicker branches with enough leaves to hide the bird.

**STRUCTURAL STAGES:** Primary forests and old secondary forests. Tropical moist evergreen, semi-evergreen and moist deciduous forests in high rainfall zones (Ca.2000 cm/annum), prefers undisturbed primary forests, silviculturally mature/over-mature forests, old growth forests, riparian tall tree forests and large patches of stands within secondary forests. It can also be seen in selectively logged forests.

**THREAT:** Sensitive to deforestation. Scarcity of old-growth trees for nesting limit the population, which is already plagued by the problem of habitat shrinkage.

#### REFERENCES:

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi, Oxford, New York.

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**Black-crested Baza *Aviceda leuphotes***  
**Status: Resident (?)**

A handsome, prominently crested black and white hawk of pigeon size. Distributed from Nepal and southern India east through the Indo-Chinese sub-region to southern China and Malaya.

**ECOYSTEM USED**

Evergreen forests adjacent to the forest clearings upto 1200 m altitude.

**HABITAT REQUIREMENTS**

**BREEDING/REARING:** Breeding season is April to June. Nest, a well-made of thin twigs with the central depression *ca.* 20 cm across and 5-10 cm deep; placed on moderate heights of old growth trees.

**FEEDING:** Chiefly lizards, frogs, large grasshoppers, mantises, and other big insects. Occasionally feeds on bats and small birds, *e.g.*, Wag-tails.

**COVER:** Prefers undisturbed evergreen forest, preferably close to secondary forests and forest clearings (*jhum* patches) and wide streams, chiefly in foothills country. Such a landscape mosaic is increasingly scarcer to find out and the population may face threat in near future.

**STRUCTURAL STAGES:** Old growth primary, secondary forests along riparian vegetation and forest villages. Optimal requirements for habitat structure and are un and wide streams, chiefly in foothills country known.

**THREATS:** Very sensitive to human disturbance. Habitat destruction through disappearance of patches of primary evergreen forests by *jhumming* expansion.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi, Oxford, New York.

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**Lesser Kestrl *Falco naumanni***  
**Status: Passage migrants/Winter visitor**

A small dainty, falcon of pigeon size. Migratory in large flocks.

**ECOSYSTEM USED**

Open savannah country

**HABITAT REQUIREMENTS**

**BREEDING/REARING:** Outside India.

**FEEDING:** Mainly insects of agro-ECOSYSTEM USED; particularly grasshoppers, beeyles and mole-crickets.

**COVER:** Open cultivation with small patches of trees. Avoids primary evergreen forests/Plantations.

**STRUCTURAL STAGES:** NIL. Open country preferred.

**THREATS:**

Globally threatened species. Reasons for diminishing population uncertain. GCA, an important stop-over for large migratory population, in India. long term monitoring urgently required.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi, Oxford, New York.

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**Grey Peacock Pheasant *Polyplectron bicalcaratum***  
**Status: Resident**

A small pheasant with metallic coloured ocelli on the wings and tail of the size of domestic hen. Distributed from Sikkim east through Burma and the Indo-chinese sub-region to Hainan Island in China.

**ECOYSTEM USED**

Duars and associated hills to 1200 m altitude.

**HABITAT REQUIREMENTS**

**BREEDING/REARING:** Breeding season is March to June. Nest, in shallow scrap or natural depressions well hidden under dense vegetation. Clutch size normally two (2), sometimes one (1).

**FEEDING:** Omnivorous, Crain, seeds, berries, wild fig, insects, snails and other small animals. Has a strong liking for bamboo seeds and white ants

**COVER:** Dense evergreen forests along the eastern Duars. A great skulker and thus needs very dense COVER.

**STRUCTURAL STAGES:** Primary and old secondary forests.

**THREATS:** Sensitive to opening of forests, habitat destruction and very low recruitment rate of population.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi, Oxford, New York.

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**Purple Wood Pigeon *Columba punice***  
**Status: Resident**

A large brilliantly coloured pigeon with pale crown. Distributed in eastern India, Bangladesh, Burma and the Indo-chinese sub-region.

**ECOYSTEM USED**

A mosaic of dense forests with patches of open forests and clearings in hilly country upto 1600 m altitude.

**HABITAT REQUIREMENTS**

**BREEDING/REARING:** Breeding season is May to August. A typical pigeon nest, a filmsy platform of twigs placed fairly low down, normally under 6 m, in a tall bush or bamboo clamp. Clutch size is one.

**FEEDING:** Mainly figs, fruits and other berries (those of *Litsea nitida* preferred). Also seeds, grains and bamboo seeds.

**COVER:** Wooden ravines with dense evergreen undergrowth.

**STRUCTURAL STAGES:** Forested areas interspersed with scrub jungle and cultivation. Secondary *jhum* forests of 25 years or more preferred.

**THREAT:** A globally threatened species. A very low population recruitment rate is the major reason for dwindling population.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi, Oxford, New York.

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**Lesser Coucal *Centropus toulou***  
**Status: Resident**

A small version of our common Coucal confined to grassland ECOSYSTEM USED. Distributed from Madagascar east to India, Southern China and the Indo-chinese sub-regions.

**ECOYSTEM USED**

Submontane grasslands upto an altitude of 1500 m (including Terai, Bhabar, duns and duars)

**HABITAT REQUIREMENTS**

**BREEDING/REARING:** Breeding season, May to September. Nest, a small dome of twigs, grasses and leaf blade with lateral entrance; usually placed <1.5 m above the ground in a dense bush.

**FEEDING:** Less omnivorous than common Coucal, feeds largely on grasshoppers.

**COVER:** Very sensitive any disturbance to grassland ECOSYSTEM USED or forested tracts. Preference for tall grasses indicate that it requires dense COVER.

**STRUCTURAL STAGES:** Stretches of tau grassland and dense scrub jungle; Elephant grass on the edge of swamps and *jheels*. Grasslands of < 2 m bordering scrub jungle are usually preferred.

**THREAT:** Habitat disturbance (decreasing areas under natural grasslands) poses a major threat.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi, Oxford, New York.

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**Grass owl *Tyto capensis***  
**Status: Resident**

The grassland equivalent of common Barn owl. Has a wide distribution from Africa eastwards to Australia though very local.

**ECOSYSTEM USED**

Sub-montane grasslands upto 1800 m altitude in Southern Indian hills. ????????

**HABITAT REQUIREMENTS**

**BREEDING/REARING:** Breeding season, October to May. Nest, a pad or mat of flattened-down grass amidst tall grasslands, canopied by the arching surrounding growth.

**FEEDING:** Chiefly rodents; occasionally small birds and reptiles.

**COVER:** Frequent tall, grass jungle, open grasslands on flood plains, and in depressions among low rolling hilltops.

**STRUCTURAL STAGES:** Tall grasslands along the Terai and Bhabar and bushy grass jungle of higher hills are usually preferred. The optimal structural requirements are unknown.

**THREAT:** Very sensitive to habitat disturbances. Habitat destruction is the major threat. The sub-montane grasslands are the most vulnerable ECOSYSTEM USEDs in India. GCA support a small population along grasslands of the plateaux.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi, Oxford, New York.

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**Red-Headed Trogon *Harpactes erythrocephalus***  
**Status: Resident**

A brilliant black, red and white bird of Myna size with a longer tail. Females are duller. Distribution extends along the Himalayas from Kumaon east through the Indo-chinese sub-region.

**ECOSYSTEM USED**

Tropical Secondary evergreen forests up to 1800 m altitude. ?????????

**HABITAT REQUIREMENTS**

**BREEDING/REARING:** Breeding season, April to July. Nest, an unlined natural hollow in a rotten tree trunk, or old holes made by woodpeckers, *Ca.* 1.5-5m up in dense jungle.

**FEEDING:** Insects and larvae; prefers stick insects, beetles and grasshoppers. Also feeds on leaves and berries.

**COVER:** Found only in dense secondary forests with a canopy COVER of 80%. Sensitivity to habitat disturbance is undocumented.

**STRUCTURAL STAGES:** Dense secondary evergreen forests of preferably more than 30 years old in *jhum* succession. Being a secondary hole-nester, apparently needs old-growth trees and snags for nesting.

**THREAT:** Scarcity of nesting trees *i.e.* snags or old growth trees is a problem. Decreasing *jhum* cycle may eventually replace all the existing patches of old secondary evergreen jungle.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi, Oxford, New York.

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**Glossy Starling *Aiponis panayensis***  
**Status: Summer visitor (to GCA)**

A small, brilliant and glossy Myna. Distributed from Assam, Meghalaya eastwards to Indo-chinese and Philippines.

**ECOSYSTEM USED**

Open woodlands with fruit trees.

**HABITAT REQUIREMENTS**

**BREEDING/REARING:** Very little known.

**FEEDING:** Insects, berries, Ficus, figs, and flower nectar.

**COVER:** Prefers open forest and a mosaic of clearings, hence, COVER may not be required habitat parameter.

**STRUCTURAL STAGES:** Forest edges, woodlands, and forest clearings (Cultivation) with scattering of Ficus and other fruit trees.

**THREAT:** The only breeding population of mainland India seems to be in Garo, Khasi of Meghalaya and North Cachar Hills of Assam.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi, Oxford, New York.

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**Hill Myna *Gracula religiosa***  
**Status: Resident**

A stocky jet-black Myna with bright orange-yellow patches/wattles on face. Distribution extends from Indian subcontinent to Indo-chinese sub-regions.

**ECOSYSTEM USED**

Tropical moist-deciduous and semi-evergreen forests. Habitat

**HABITAT REQUIREMENTS**

**BREEDING/REARING:** Breeds principally from April to July. Nest is a loose collection of twigs, grass, feathers and rubbish in a tree-hole up 10-15 m. A secondary hole-nester.

**FEEDING:** Mainly berries, wild figs and other fruits. Also flower nectar, buds and insects.

**COVER:** Presence of wild (Ficus) fig trees is an important requirement. Usually prefers dense canopied secondary forests.

**STRUCTURAL STAGE:** Dense secondary forests upto 2000 m

**THREAT:** Quite sensitive to human disturbances. An accomplished mimic and much prized in market as a talking bird/pet. This illegal trade is a major threat to local populations.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi, Oxford, New York.

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**Long-Tailed Wren-Babbler *Spelaornis longicaudatus***  
**Status: Resident and endemic**

A tiny bird of sparrow size with brown body and scaly appearance. Endemic to eastern Himalayas and associated foothills. Found in Khasi Hills and Cachar Hills and Manipur Himalayas.

**ECOSYSTEM USED**

Tropical Evergreen forest

**BREEDING:** Maily April to June. Nest is a dome of vegetable matter placed on ground or among boulders with an undergrowth of moss/ferns.

**FEEDING:** Insects

**COVER:** Forest with dense undergrowth. With ample undergrowth, keeping to ravines or steep hillsides with rock and boulder outcrops COVERed with moss, fern and orchids. Dense canopied forests with thick undergrowth (ground layer) indicates that the bird requires high COVER percentage.

**STRUCTURAL STAGES:** Unknown

**THREAT:** An endemic bird of Eastern India, its very localized distribution warrants measures of protecting. Habitat may also be in jeopardy because of heavy degree of *jhumming*.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi, Oxford, New York.

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**Chestnut-Fronted Shrike-Babbler *Pteruthius aenobarbus***  
**Status: Resident**

A tiny brilliantly plumaged babbler of sparrow size. Though it is found east to Vietnam and South through Malayan Peninsula, in India it was found only in Garo Hills. No sight records/collection after 1954. [The Indian population belongs to an endemic race *P. a. aenobarbulus*].

**ECOSYSTEM USED**

Presumably humid, evergreen forests.

**HABITAT REQUIREMENTS**

Evergreen forests. Other details unknown.

**BREEDING/REARING:** Probably April and May. Nest, unknown.

**FEEDING:** Insects.

**COVER:** Unknown.

**STRUCTURAL STAGES:** Unknown.

**THREAT:** An immediate survey of Garo Hills and adjacent localities needs to be undertaken to assess its present population status. A possibility of local extinction is not ruled out.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi, Oxford, New York.

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**Binturong *Arctictis binturong*, Raffles 1821, Viverridae**  
**Status: Endangered (IUCN),**  
**Schedule I (WPA) and Appendix III (CITES)**

Vernacular name: Young (Assamese)

Distribution: Central and Eastern Himalayas from Nepal to Arunachal, east to Vietnam, not to China and south east to Indonesia and Phillipine Islands.

Head and body length: 61-96 cm, tai 56-89 cm

**ECOSYSTEM USED**

Tropical foot hill forests

**HABITAT REQUIREMENTS**

Live in dense tropical foot hill forests, secretive and nocturnal. It is arboreal and spends the day curled up in a tree hole.

**BREEDING/REARING:** Breed year round.

**FEEDING:** Omnivorous in diet and feed on small mammals, birds, fish insects and other plant material including carrion.

**COVER:**

**STRUCTURAL STAGES:**

**THREAT:**

**KCF:** Chinese use this animal for medicinal purpose.

**REFERENCES:**

Prater, S.H. 1980. The Book of Indian Animals. Bombay Natural History Society, Bombay, 324.pp.

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**Hog-Badger *Arctonyx collaris*, Cuvier 1825, Mustelidae**  
**Status : Insufficiently known, Schedule 1 (WPA)**

V. name: Bahla sur (Hindi)

Head and body length 55-70 cm, tail 12-17 cm

Northeastern India, also Bangladesh, China, Myanmar, East to Vietnam, Sumatra and probably Perale in Malaysia. The exact population status is unknown and appears to have colonized in eastern India in recent time.

**ECOSYSTEM USED**

**HABITAT REQUIREMENTS**

Lives in stony ground or small hills amongst tropical jungle. Spends the day in rock crevices or in deep burrows. Nocturnal and seclusive.

**BREEDING/REARING:**

**FEEDING:** In captivity it is omnivorous (Prater, 1980).

**COVER:**

**STRUCTURAL STAGES:**

**THREAT:** Habitat destruction in India, however for commercial purpose and hunted extensively.

**KCF:** In China pelt of hog-badger is used making rugs. Its guard hairs for making brushes and fat in medicine (Bangjie, 1989)

**REFERENCES:**

Prater, S.H. 1980. The Book of Indian Animals. Bombay Natural History Society, Bombay, 324.pp.

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**Serow *Capricornis sumatraensis*, Bechstein 1979, Bovidae**  
**Status : Vulnerable (IUCN),**  
**Schedule I (WPA), Appendix II (CITES)**

Head and body length 140-150 cm, tail 8-12 cm, Height at the shoulder 85-90 cm. Horns 15-25 cm (Walker, 1964)

The Himalays from Jammu and Kashmir to Arunachal Pradesh including Nepal, also in central and southern China. From Myanmar to Vietnam, Malaysia and Indonesia

**ECOSYSTEM USED**

**HABITAT REQUIREMENTS**

Serow lives at higher elevation in the recesses of thickly wooded gorges. Generally solitary though 4 or 5 may be seen FEEDING on the same hill (prefers leaves and shoots of aromatic plants as food (Peacock 1933).

**BREEDING/REARING:** In the Himalyas the rut commences at the end of October and the young are borned in May and June. In Myanmar in end of September (Prater, 1980). In Thailand October to November. Gestation period is about 7-8 months. A single kid occasionally twin is borned at a birth.

**FEEDING:** Prefers aromatic plants

**COVER:**

**STRUCTURAL STAGES:**

**THREAT:** Destruction of forest for construction purposes. Increased military activities in the areas of its occurrence. Illegal hunting for flesh.

**KCF:** It is killed by tribals for its flesh, skin and supposed to have medicinal value

**REFRENCES:**

Prater, S.H. 1980. The Book of Indian Animals. Bombay Natural History Society, Bombay, 324.pp.

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**Malayan Sun Bear *Helarctos malayanus*, Raffle 1821, Ursidae**  
**Status : Endangered (IUCN),**  
**Schedule 1 (WPA), Appendix I (CITES)**

Head and body length 110-140 cm, height at shoulder about 70 cm.

Hills of northeast India (Bedi and Bedi 1994, Ghosh 1987). Also found in Bangladesh, Myanmar, Thailand, Vietnam, southern China, Malaysia and Indonesia (Ellerman and Morrison-scott 1966). Sclater (1891) recorded two specimen from Assam and one from Meghalaya, mammal survey could collect one specimen from Duragiri, Meghalaya. However, Hinton and Lindsay (1926) commented that this bears were common and frequently seen on high trees in Garo Hills, Meghalaya. As per available records this species appears to be very rare.

**ECOSYSTEM USED**

**HABITAT REQUIREMENTS**

Lives in forestry hilly regions. Occasionally seen in high trees. Nocturnal and a good climber (Medway, 1969)

**BREEDING/REARING:** It is believed to be monogamous (Walkar 1964). Breeds throughout the year or one or two are born in a litter after a gestation of 95-96 days.

**FEEDING:** Omnivorous in diet. Feeds on locally available fruits, buds, invertebrates and small vertebrates.

**COVER:**

**STRUCTURAL STAGES:**

**THREAT:** Desruction of forests. It is also killed as a pest of coconuts. Illegal hunting for its skin, flesh and gall-bladder.

**KCF:** It is one of the smallest species of bears and is said to be most dangerous. Inflicts severe damage to coconut plantaion (Lekagul and McNeely, 1977). Its flesh is eaten in Nagaland and skin is used for preparation of caps and other fancy articles. Gall-bladder contains a high values for medicinal purposes.

**REFERENCES:**

Prater, S.H. 1980. The Book of Indian Animals. Bombay Natural History Society, Bombay, 324.pp.

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**Chinese Pangolin *Manis pentadactyla* Linnaeus 1758, Manidae**  
**Status : Insufficiently known (IUCN),**  
**Schedule I (WPA), Appendix II (CITES)**

V. name: Salek (Khasi)

Head and body length 48-58 cm, tail 33-38 cm.

Found from Nepal to Arunachal Pradesh and northeast India. Also found in Bangladesh, Myanmar, east to Vietnam and southern China.

**ECOSYSTEM USED**

**HABITAT REQUIREMENTS**

Chinese pangolin inhabits tropical Asian forests and hill countries. Nocturnal. Spends most of the day sleeping in burrows.

**BREEDING/REARING:** One or two young are born at a birth during spring or early summer (Lekagul and McNeely 1977).

**FEEDING:** Eggs, adults of termites and ants.

**COVER**

**STRUCTURAL STAGES**

**THREAT**

Destruction of habitat, poaching and use of insecticides. Harrison and Lah (1965) reported that over 60 tonnes of Pangolin scales were legally exported between 1958 to 1964 from Sarawak representing over 50,000 animals.

**KCF**

Because of highly specialized feeding habit it helps to keep the number of termites and ants under control. Its meat is delicious and scales are supposed to have medicinal values.

**REFERENCES:**

Prater, S.H. 1980. The Book of Indian Animals. Bombay Natural History Society, Bombay, 324.pp.

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**Lesser Necklaced Laughing Thrush *Garrulax monileger*, Hodgson**  
**Status : Resident**

Myna+, length *c.* 27 cm

Locally frequent in Himalayas, very rare in northeast Hills. Behaves exactly as *G. petoralis* (Greater Necklaced), with which it shares the same ecological niche. If disturbed while FEEDING hides in bushes and trees.

**ECOSYSTEM USED**

**HABITAT REQUIREMENTS**

Thick evergreen and moist deciduous forests and secondary jungle with undergrowth of rattan brakes. Dense broad leaves, bamboo brakes.

**BREEDING/REARING:** March to July season, chiefly April and May. Nest in Bushes or small trees up to 6 m above ground. Nest is a broad rather shallow but bulky saucer with other dead leaves, roots, scraps of moss etc., bound by weed, stems and tendrils lined with rootlets and fine grass stems.

**FEEDING:** Feed on the ground, tending over dead leaves with much rust line. And scratching. The major food items include insects, snails, small lizards etc. Also berries, seeds and other vegetable matter.

**COVER:**

**STRUCTURAL STAGES**

**THREAT:**

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi, Oxford, New York.

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**Silver Eared Mesia *Leiothrix argentauris aureigularis* Koelz**  
**Status : Common Resident**

Sparrow, length *c.* 15 cm

Common Garo, Khasi and Mizo Hills, and in the Chittagaon Hills of Bangla Desh

**ECOSYSTEM USED**

**HABITAT REQUIREMENTS**

Scrub jungle, bush-clad open spaces, secondary growth, bushes in evergreen forests, especially the outskirts and more open portions, abandoned cultivations, clearing tea plantations.

Keeps to Bushes in forest, sometimes going fairly high up in the canopy. Searches actively for insects among the foliage, behaving much like Tits, clinging to springs in acrobatic positions and peering under leaves, the flocks rapidly flowing from tree to tree disorderly follow-my-leader style, all the while uttering subdued chirrups. Seemingly always in great haste. Occasionally makes fly catching sallies after escaping insects.

**BREEDING/REARING:** Season, April to August. Nest, cup-shaped, *c.* 8.5 cm in diameter. 8 cm in overall depth, the depth of cup being approximately 6.5 cm, made of bamboo and other leaves, grass and moss, lined with rootlets. Placed in bushes within a couple of meters above ground, sometimes as low as a few cm. Indistinguishable in size, structure and situation from that of *L. lutea* (Red-billed Leiothrix)

**FEEDING:** Insects, seeds and berries

**COVER**

**STRUCTURAL STAGES**

**THREAT**

**KCF:** This species and the red-billed Leiothrix are commonly kept as cage birds under the name of Silver eared and Peking robin, respectively. Largely exported to Europe and the USA.

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi, Oxford, New York.

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**White Napped Yuhina *Yuhina bakeri* Rothechild**  
**Status : Resident**

Sparrow, length *c.* 13 cm

Common, residents, Himalayas from east Nepal, east to Arunachal Pradesh, northeast India and Bangla desh. Kachar in Assam and Khasi hills. Locally fairly common in India.

**ECOSYSTEM USED**

**HABITAT REQUIREMENTS**

Found in secondary jungle and evergreen forest, arboreal. In non-breeding season keeps in parties, commonly in association with other small insectivorous species (like Babblers, Tits and Warblers), moving about in tree tops and bushes. Forages actively mainly in the middle level of forests and in bushes.

**BREEDING/REARING:** Season, April to July, Chiefly May and June. Nest, cup-shaped or domed. According to site selected. Domed in unsheltered, cup-shaped when build in a hollow in a bank. Nest is built low in bushes or against a mossy trunk made by moss or less mixed with dead leaves, roots and bits of branches, lined with fine rootlets. Comparatively open forest is chosen for the purpose, such as along paths, streams, clearing of forest edges.

**FEEDING:** Mainly insects and berries.

**COVER**

**STRUCTURAL STAGES**

**THREAT**

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi, Oxford, New York.

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**Striated Grassbird *Megalurus polustris toklao* Blyth**  
**Status : Resident**

V. name: Tako, Jal-aggin (Hindi), Nul Chaypee (Assamese)  
Bulbul+, length *c.* 25 cm.

Locally common, northeast India, found frequently in grasslands near cultivation and villages. It may commonly perch on bush tops and reeds, especially in the early mornings, when reminiscent in the distance of Brown shrike (*Lanius cristatus*). Searches for food in dense COVER, climbing above rapidly among reeds and grasses, and threading its weigh through the streams and brush wood. Occasionally descend to the ground, walking above and FEEDING like a Pipet (not Hopping).

**ECOSYSTEM USED**

**HABITAT REQUIREMENTS**

Tall damp grasslands, reed beds, and Tamarisks along large rivers and around ponds.

**BREEDING/REARING**

Seaon, April to June. Nest, rough ball of coarse grassland with finer grasses, placed low down in reeds or grass clumps close above the sloppy grounds

**FEEDING:** Insects.

**COVER**

**STRUCTURAL STAGES**

**THREAT**

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi, Oxford, New York.

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**Buff-Barred Warbler *Phylloscopus p. pulcher* Blyth**  
**Status: Altitudinal migrant**

Sparrow-, length *c.* 10 cm.

Common from western Nepal to south of Nagaland, Manipur to the Khasi, Garo and Mizo hills.

**ECOSYSTEM USED**

**HABITAT REQUIREMENTS**

In the breeding season found in mixed conifer, Rhododendron and Birch forest, also dwarf Junipers and other scrub above tree line. Winters (October to March) between 500 and 2800 m, its movement then influenced by weather conditions. At this season frequents oaks and other dense forests. Arboreal, forages actively among foliages and twigs in the upper story.

**BREEDING/REARING:** Season, mainly June and July. Nest, a ball of green moss, grass, lichen, an strike of birch bark. Capiously lined with feathers. Placed in the outer branches of a conifer, in dense bushes or against trunks of trees. Some 60 cm to 4 m above the ground.

**FEEDING:** Insects. Observed drinking sap of Oak (*Quercus*)

**COVER**

**STRUCTURAL STAGES**

**THREAT**

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi, Oxford, New York.

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**Rufous Woodpecker *Celens brachyurus***  
**Status : Resident**

Myna+ -, *c.* 25 cm.

Himalyas from UP east to Arunachal Pradesh, northeast and eastern India and Bnagla Desh, west India from south of Gujrat through the peninsula and Shri Lanka. Locally fairly common upto 1000 m. Frequently seen hammering away and digging into nest of tree ants with which it is closely associated.

**ECOSYSTEM USED**

**HABITAT REQUIREMENTS**

Broad leaved forests, sal forests and mixed secondary and bamboo jungle.

**BREEDING/REARING:** Season, Chiefly February to June, also December. Nest, normally a hollow excavated in a live oval shaped carton nest of tree ants made of a blackish papier-mâché-like sustance commonly in trees 4 or 5 m from the ground. Usually a lateral entrance hole *c.* 5 cm in diameter gives access to hollowed out interior leaving a wall about 25 mm thick around the chamber. Only occasionally nest entry holes like a conventional woodpecker.

**FEEDING:** Mainly ants and their pupae, occasionally takes fruits, especially wild fig (*Fucus*) and flower necter (*Erythrina*, *Salmalia*), has been observed. Clinging to a smooth banana string, puncturing it near the base of the leaved and sucking the sap.

**COVER**

**STRUCTURAL STAGES**

**THREAT**

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi, Oxford, New York.

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**Great Cormorant *Phalacrocorax carbo sinensis* Shaw**  
**Status : Resident, winter visitor**

V. Name: Nowgang (Assam)  
Large Duck, length c. 80-100 cm  
Wide spread locally frequent

**ECOSYSTEM USED**

**HABITAT REQUIREMENTS**

Settles on rocks, sand banks and trees with an upright carriage. Frequents large inland water-Himalayan torrents and lakes and lowland rivers, jheels, irrigation reservoirs etc. Also tidal lagoons and salt pans.

**BREEDING/REARING:** Seaso, mainly between September and February dependant on Monsoon, the filling of jheels and availability of fish supply for the young. In Assam (Subansiri river) during January and February

**FEEDING:** Hunts fish by diving and underwater pursuit, almost exclusively fish.

**COVER**

**STRUCTURAL STAGES**

**THREAT**

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi, Oxford, New York.

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**Purple Swamphen *Porphyrio porphyrio***  
**Status: Resident**

V. name: Kaim, Kalim, Karim, Khima (Hindi)

Village Hen + -, length c. 45-50 cm

Possible local migrant, locally widespread.

**ECOSYSTEM USED**

**HABITAT REQUIREMENTS**

Prefers dense reed beds around large swamp and jheels. Stalks through the marshy reed beds or weeds over matted floating vegetation. Fond of clambering among the reeds walking upto the tops in ungainly hand-over-hand style, clinging and balancing itself insecurely on the pliant bending stems. Large marshes and extensive reed beds bordering lakes.

**BREEDING/REARING:** From April to September, varying locally. Nest in large pad of firmly interwoven rush-paddy or grass stems, place on a floating icelet of matted weeds or up to a meter or so over water level among partially submerged buttresses and reeds

**FEEDING:** Forages mainly within reed beds and readily climbs above reeds. Mainly seeds, grains and vegetable matter, also insects and mollusks recorded flighting in large numbers to rice fields in the evening. Does considerable occasional damage to rice crops not only by cutting the stalks above the roots to eat the tender pitch and the ripening grain, but also by tempering down the plants with its large and heavy feet.

**COVER**

**STRUCTURAL STAGES**

**THREAT**

**REFERENCES:**

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi, Oxford, New York.

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**Peninsular Crested Serpent Eagle *Spilornis cheela melanotis* (Jerdon)**  
**Status : Endangered Schedule I**

Resident. Widely distributed south of Gangetic plain in the peninsula along the Dry and Moist Deciduous forests, Semi-Evergreen and broadleaf Evergreen forests; plains and hills. The presence is readily discerned by its characteristic high-pitched calls while soaring and sometimes from a perch. The calls can readily be distinguished from those of the somewhat similar whistles of the crested hawk eagle. Occurs in ACA and SCA. The GCA and TCA have another sub-species *S.c.cheela* (Latham), with similar habitat orientation.

**ECOSYSTEMS USED**

The Dry, Moist, Semi-evergreen and Evergreen broad leaf forests. Partial to riparian forests.

**HABITAT REQUIREMENTS**

**REARING :** The breeding season is between March to May. The nest is built high up in the crown of tall and large old trees, near a clearing. Partial to riparian forests along streams in the vicinity of a swamp or a reservoir. The nest is a large structure of sticks and twigs often lined with green leaves. The nest may be used year after year with material being added each time. Both sexes participate in nest building but only the female incubates. The clutch size is of one egg.

**FEEDING:** Mainly snakes, frogs, crabs, lizards, rats and mice, injured or sick birds.

**COVER:** Well-wooded forests.

**STRUCTURAL STAGES:** A mosaic of early to late successional stages, favoring middle to late, especially riparian vegetation, late and old growth.

**REFERENCES:**

Ali and Ripley 1983; Grimmett, Inskipp and Inskipp 1999.

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**Bonelli's Hawk- Eagle *Hieraaetus fasciatus fasciatus* (Vieillot)**  
**Status : Endangered, Schedule I, Part III**

Resident, widely distributed but not common, all India, from about 2400 m. in the Himalayas. Hills and plains. Ranges from dry deciduous forests to the rain forests in well-wooded tracts. It is essentially a forest dependent species. Extremely agile and dexterous while hunting. Occurs in ACA, GCA, SCA, TCA.

**ECOSYSTEMS USED**

The dry deciduous to rain forests, plains and hills.

**HABITAT REQUIREMENTS**

**REARING:** Courtship display is spectacular with sorties of soaring and diving in all manners of loops and tumble. Breeds between December to March with local variations. The huge nest of sticks and twigs lined with green leaves is located in the crown of old, large and tall trees. The pair tends to use the same nest year after year by adding fresh nest material each time. Thus the nests attain huge size. In hills cliff ledges are also used for the purpose. Both sexes share nest building and incubation. The male mainly brings food.

**FEEDING :** Mainly large birds and mammals like hare. Prey recorded include myna, crow, green pigeon, coucal, partridge, spur fowl, jungle fowl, pea fowl, painted stork, kite and other raptors. It uses both ambush and pursuit. Frequently the pair may hunt in tandem. The larger birds are hit and caught from below. A truly great hunter often killing prey that is larger and heavier than itself.

**COVER :** Leafy tree crowns for ambush.

**STRUCTURAL STAGES :** A combination of early to late succession and old growth in a well-wooded forest.

**REFERENCES:**

Baker EC Stuart 1922-'31, Vol 7: 114; Ali and Ripley 1983; Grimmett, Inskipp and Inskipp 1999.

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**Greyheaded Fishing Eagle *Ichthyophaga ichhyaetus ichhyaetus* (Horsfield)**  
**Status : Endangered, Schedule I, Part III**

A resident, widely though patchily distributed eagle. From the northern terai through the peninsula along well-watered, well wooded forests. Mainly plains but also rolling country. It is readily identified by its weird sounding repetitive calls. Especially noisy during courtship. Occurs in TCA and SCA. In the latter it is becoming rare with heavily used perennial pools by cattle, streamside village communities, and the practice of fishing pools by using pesticides.

**ECOSYSTEMS USED**

The dry, moist, semi-evergreen and evergreen forests with large pools of water, sluggishly flowing streams, tanks and swamps.

**HABITAT REQUIREMENT**

**REARING :** Breeds between November to January. An enormous nest of sticks and twigs is placed high up in an old tall tree along the margin of water. If large branches are hanging over water, the nest could be as low as 10 to 15 m. above ground, otherwise 30 or >30 m. high into the tree. Large, tall, old trees in the riparian forest near water are important. A pair may maintain two or more nest sites that may be used alternately in successive years. The nests are repaired, added to year after year by both sexes. If not by the pair but at least one of them will use a nest throughout the year for roosting. The clutch size is of 2-3 eggs. Both sexes participate in incubation and later feeding the young. The period of incubation is 28-30 days. The young remain in the nest for 10 weeks.

**FEEDING :** Food consists almost exclusively of fish. Fish is commonly caught from a lookout perch near the water, less commonly by quartering and swooping over water in the manner of an Osprey unless a stretch is known for abundance of fish. Rarely seen soaring like other eagles. Often fish of very large size is caught and as the eagle is unable to fly with a struggling fish of enormous size, the eagle will drag it through water while appearing to be swimming. Large woody debris such as fallen big branches or fallen tree near the edge of water is used as a feeding post/site. The heavy fish is dragged to such platform and then quartered and eaten. Accumulation of large fish bones and scales at such sites are an evidence of frequent use of such structures. During nesting birds and smaller mammals are hunted in addition to fish.

**COVER :** Varied as above. Old riparian forest patches along the edge of water is important with overhanging branches and crowns.

**STRUCTURAL STAGES :** Old riparian forests.

**REFERENCES :**

Baker E.C. Stuart 1922-'31, Vol 5:7; Ali and Ripley 1983; Grimmett, Inskipp and Inskipp 1999

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**Osprey *Pandion haliaetus haliaetus* (Linnaeus)**  
**Status : Endangered, Schedule I, Part III**

Mainly winter visitor, September to March throughout India. No breeding sites within the Project areas. Singly or in pairs, widely scattered but very patchily distributed along large bodies of water, large rivers and inland lagoons and dammed reservoirs. Occurs in localities of the Tawa reservoir, SCA and Aliyar dams in the ACA.

**ECOSYSTEMS USED**

As above.

**HABITAT REQUIREMENTS**

**REARING :** Not applicable

**FEEDING :** Uses snags near the margins of water or in water, also isolated rocks well within the water to perch. From such perch it launches sorties and reconnoiters stretch of water, at places it will hang still over a spot in the manner of a kestrel and dive into the water, completely submerging and then emerging with fish caught in its talons. The catch is then taken to the favorite/convenient perch, usually a snag, the prey is quartered and eaten. Will often strike Mahseer. Heavy fish is dragged in water and beached on the nearest shore to be eaten.

**COVER :** As above.

**STRUCTURAL STAGES :** Not applicable.

**REFERENCES:**

Ali and Ripley 1983; Baker E.C.Stuart 1922-'31, Vol 5: 3; Grimmett, Inskipp and Inskipp 1999

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## Grey Junglefowl *Gallus sonneratti* Temminck

### Status : Schedule IV

The distribution mainly covers the peninsular India, roughly south of a line connecting Mount Abu, south Rajasthan in the west, eastward to Pachmarhi(MP), Polavaram(Andhra Pradesh) to the mouth of Godavari. It is an associate of teak forest and is said to frequently hybridize with the Red Junglefowl at the interface of their respective range of distribution. In the SCA both species occur. The Grey is confined to the Melghat forests and the teak forests of Hoshangabad, and all three divisions of Betul in MP. While the Red occurs in the sal forests of the Pachmarhi WLS and the Satpura national park. The two species can easily be distinguished by sight and by their separate distinctive calls heard during the early morning hours and dusk. The Grey occurs in ACA and SCA.

#### ECOSYSTEMS USED

The species has a wide range of habitat orientation from open secondary Dry Deciduous forest to Wet Evergreen forests. It occurs in plains as well as in hills upto an elevation of 2400m. in the Nilgiris. Favours bamboo and shrubby undergrowth, forest clearings, neglected tea, coffee and rubber plantations, lantana thickets. Shrubby undergrowth is an essential element of habitat of all gallenacious birds.

#### HABITAT REQUIREMENTS

**REARING:** The peak breeding is recorded between the months of February to May, but young are seen almost throughout the year. The nest is a scrape on the ground lined with grass, and leaves in dense shrubby thicket, sometimes against the bole of a tree. Clutch size varies between 3 to 6. The incubation period is 20-21 days.

**FEEDING:** Seeds and shoots of grass, and cultivated crops, tubers, berries such as *Zizyphus* and *Lantana*, seeds of bamboo and *Strobilanthes*, seeds from fallen fruit like wild figs, termites, other small insects, maggots, grasshoppers and small lizards. Food items are plucked from low bushes, scratched from among leaves and grass. Large parties can be seen when bamboo is flowering. During early mornings, late afternoons and evenings the birds can be seen near waterholes. The popular method of poachig by locals involves placing a long line of noosed snares just above ground level hidden along bushes surrounding the waterholes.

**COVER:** As above. Shrubby undergrowth is very important for the species as breeding, rearing, feeding and persistence depends on such attribute. The birds however roost in trees or bamboo clumps.

**KEY CULTURAL FUNCTIONS:** The local forest dwellers capture the birds for food. The city dwelling poacher in quest of a wild table bird does the same. The neck hackles of the cock are speckled and in recent past these were in much demand for making artificial flies for fishing of trout in the USA. Large scale smuggling of these feathers reportedly had caused serious decline of its population in South India till protection measures were significantly stepped up.

#### REFERENCES:

Ali and Ripley 1983; Baker 1922-'31 Vol. 5-298; Grimmett, Inskipp and Inskipp 1999.

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**Spotted Deer or Chital *Axis axis axis* (Erxleben)**  
**Status : Common, Schedule III**

Distributed along the Himalayan foothills and southward almost throughout the peninsula, plains or rolling country. Does not occur in hilly terrain but may occupy the valleys, from semi arid country to the coastal mangrove system, the terai in the north and the northeast. Does not occur in the arid plains. Occurs in ACA, SCA, TCA

**ECOSYSTEMS USED**

Known to occur across a wide range of forest types from semi arid forested tracts to the coastal mangroves of the Sunderbans, where it is one of the principal prey of the tiger. It is found in the terai, the dry, the moist deciduous, and the semi evergreen forest. Avoids the rain forests, and natural scrub. While it is dependent on grasslands, these must occur interspersed within forests. It is variously described as a species associated with forested edges and ecotones, and a mosaic of forests and grasslands in well watered tracts. Notwithstanding the presence of the required vegetation and terrain features, if water is limiting, the population appears scattered in distribution, in low densities, and small herds or parties, though under ideal conditions it may form very large herds, and significantly high densities. As such it is an important prey of the tiger, leopard and the wild dog. It does best under an interspersed of the early to mid succession stages, considered together with other essential habitat features.

**HABITAT REQUIREMENTS**

**REARING :** Chital breed throughout the year. Peak fawning is observed during November to March and June to August. Usually a single fawn is born. Scattered patches of tall grass, and shrubs in grassland or woodlands are essential for dropping and hiding the fawns for a period of 4 to 5 weeks till they develop the capability of being able to successfully trail the mother. This means that such mosaics need to be maintained throughout the year.

**FEEDING :** It is primarily a grazer. Diversity of grasses and herbs is therefore important. The perennials become significant in relation to the ephemerals. The grazing intensity ( domestic stock or high-density wild ungulates) and frequency and intensity of fires arbiters the structure and composition of vegetation communities. Fresh sprouts are preferred. Following the seasonality of phenology and its relationship to nutrient contents of the diet, together with availability of food items, grazing is supplemented by browsing on a variety of plants, and parts such as leaves, flowers and fruits. Among the fruits, *ficus* spp., *Cordia* spp., *Grewia* spp., *Hollarrhanna antidysentrica*, *Helecteris isora*, mature *Lantana* berries, *Zizyphus* spp., *Terminalia bellerica*, *T. chebula*, etc are eaten. Depending on the vegetation composition and chital densities a clear browseline may be seen. Chital are frequently seen feeding in association with langur *Presbytis entellus*, who while feeding on leaves in the trees drop leaves, twigs, fruits on the ground as incidental to their feeding activities. The cruising radius with respect to a source of water is approximately 2 km.

**COVER :** Components as described above.

**STRUCTURAL STAGES :** Early to mid succession, In older succession stages the stands need to be relatively open ( 0.5 to 0.6 canopy density? ) with interspersed grassy openings.

**REFERENCES :**

Prater 1980, Putman 1988, Seidensticker, Christie and Jackson (Ed) 1999, Schaller 1967, Sankar 1994, Sankhla 1978, Wemmer (Ed) 1987, Whitehead 1972

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## The Sambar *Cervus unicolor* (Kerr) Status : Common , Schedule III

The largest of all the Indian deer, is a typically forest associated species of the southeast Asia. From about the middle lower altitudes of the Himalayas southward occurs practically throughout India, within the well-wooded forests. Occurs in ACA, GCA, SCA and the TCA. Along side the gaur it is the most important prey of the tiger.

### ECOSYSTEMS USED

Semi arid to broad leaf evergreen forests, across their range of forest types. Absent in coastal mangroves, grasslands without forested mosaic, scrub and desert. Presence of forests with grassy openings is essential for its existence. Occurs in plains, rolling and hilly terrain. The last two are ideal habitat features.

### HABITAT REQUIREMENTS

**REARING :** Fawning generally peaks in May and June. In the northeast during March – April. Tall grass patches, patches of dense shrubs are needed for the females to drop their fawns and subsequently for hiding them for about 4 weeks till they are able to trail the mothers.

**FEEDING :** It will graze but is mainly a browser, feeding on leaves, twigs, flowers and fruits of a variety of species, including the large and hard fruits of *Aegle marmilos*. The other favored fruits are those of *Terminalia bellarica* and *T. chebula*, *Ficus* spp., *Zizyphus* spp. *Diospyros melanoxylon*, *Syzigium cumini*, *Emblica officinalis*, *Cordia* spp. The inventory is fairly large. During summer when food resources decline, it will feed on the bark of trees such as *Tectona grandis*, *Mitragyna parviflora*. Young teak plantations display extensive feeding on the bark. It is also observed feeding on the dry fallen leaves of teak and *Anogeissus pendula* during the summer. This seldom causes mortality in teak. All fruit bearing tree species ought to be considered important. In shallow tanks and swamps it will get into the water and feed on aquatic plants reminiscent of the swamp deer. It will also swim freely. Since the sambar regurgitates seeds of the fruits eaten, it makes a valuable contribution to the process of forest regeneration.

**COVER :** Dense stands of trees, and shrubs, patches of tall grass are used as hiding and escape cover. It also uses rugged terrain features for the purpose. Often when chased by wild dogs it enters water to escape from being attacked. The cover requirement for dropping and rearing fawns has been described above.

**STRUCTURAL STAGES :** Mid succession to old growth. The ideal is a mosaic of early succession stage to old growth, with early succession stages represented as small openings, upto 40-hectare extent. Extensive grasslands are used only partially. Within the old growth stands of rain forests and Dipterocarps like *Shorea robusta* the density of sambar declines.

### REFERENCES :

Prater 1980, Putman 1988, Seidensticker, Christie and Jackson (Ed.) 1999, Schaller 1967, Sankar 1994, Sankhla 1978, Wemmer (Ed) 1987, Whitehead 1972

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**The Indian Chevrotain, or the Mouse Deer *Tragulus meminna* (Erxleben)**  
**Status : Endangered, Schedule I**

It is essentially a forest-associated species, occurring in rolling and hilly terrain, upto about 1850 meters elevation above the MSL. A single species representing the family Tragulidae in India, it is probably much more widely distributed than the described approximate range south of the 24 degrees North latitude in the Indian peninsula. It is tiny, solitary, cryptic in behavior, and has obliterative colours. It can thus escape detection. Occurs in ACA and SCA.

**ECOSYSTEMS USED**

Rain forests, semi evergreen and moist deciduous forests.

**HABITAT REQUIREMENTS**

**REARING :** Fawns are born towards the end of rains, i.e. December - January in south India, October – November in central India. Twinning is common. The female chooses suitable crevices among large bouldery outcrops to drop and hide the fawns till they are old enough to move on their own.

**FEEDING :** Feeds on grass and a variety of fruits. A diversity of fruit bearing trees and shrubs are therefore important. Grassy openings and such mosaic are necessary.

**COVER :** Grassy hill slopes with large boulders secreting crevices are essential as breeding, hiding and escape cover. Atleast 2 to 3 ( ? ) den trees per hectare with hollows going up from the base into the bole are necessary. When chased by an enemy, the mouse deer has the ability for climbing up the insides of such hollows to escape from harm.

**STRUCTURAL STAGES :** Mid to late successional stages interspersed with grassy openings.

**REFERENCES :**

Champion 1927, Gee 1955, Krishnan 1972, Prater 1980

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## The Four Horned Antelope, or Chowsingha *Tetracerus quadricornis* (Blainville) Status : Endangered, Schedule I

Along with the nilgai *Boselaphus tragocamelus*, the chowsingha is grouped under a separate sub-family *Boselaphinae* to distinguish it from the true antelopes. It is the only member of this group with two pairs of horns. It occurs in peninsular India south of the Siwaliks and the Gangetic plains. Absent in the western ghats and associated mountain ranges. It is a forest dwelling species in the rolling and hilly terrain. Present in only the SCA.

### ECOSYSTEMS USED

Dry and moist deciduous forests along the Satpuras and the Vindhyan hill ranges, and the semi arid forests in the Aravallis are among its better known habitats.

### HABITAT REQUIREMENTS

**REARING :** Fawns are dropped towards the beginning of rains i.e. during the month of June. Tall clumps of grasses, bushy patches are used to hide the newly born fawns till they are old enough to accompany the mother; usually three weeks. Twins are not uncommon.

**FEEDING :** Mainly grasses and leaves. Usually stay in the proximity of a source of water i.e. the cruising radius is short, approximately 1.5 km. Often found near small cultivation patches of forest dwelling villagers and village tanks.

**COVER :** Uses tall grass patches and bushy thickets for hiding and escape. Breeding cover as above.

**STRUCTURAL STAGES :** A combination of early to mid successional stages with open canopy ( 0.4 to 0.6). May also occur in late successional stage under such canopy conditions. Tracts adjoining habitations are important.

### REFERENCES :

Prater 1980, Krishnan 1972, Shaikh and Sawarkar 1973,

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## The Gaur, or Indian Bison *Bos gaurus gaurus* H.Smith

### Status : Endangered, Schedule I

The seven north eastern states, forests of Bihar, Madhya Pradesh, Maharashtra and south to Kerala and Tamil Nadu. Has been recorded at elevation upto 1850 metres in the western ghats. In eastern Himalayas confined to the hills. Essentially a forest dwelling species in rolling and hilly terrain. Along with the sambar it is the principal prey of the tiger.

#### ECOSYSTEMS USED

Dry and moist deciduous forests, semi evergreen and evergreen forests, especially those associated with bamboos, bogs.

#### HABITAT REQUIREMENTS

**REARING :** Tall grass patches, clumps of bamboo are used as cover for dropping and rearing calves. Peak calving months are December – January, though calves might be seen in other months of summer and winter.

**FEEDING :** Gaur is both a grazer and a browser. And therefore feeds on a variety of grasses, including those in a coarse condition. Bamboo leaves, twigs, young shoots are favorite. Will browse on leaves, twigs, flowers and fruits of a large variety of trees, shrubs, and climbers. When the food resources decline in summer, it will extensively feed on the bark of trees like the teak and *Mitragyna parviflora* which are of choice. The herd size varies from 5 to 10 animals. However sometimes composite herds of as many as 30 to 40 animals may be seen. A distinct seasonal movement is observed. Valleys and lower slopes are used during late winter and summer. During the rains and early winter the animals move extensively and use the upper slopes and plateaux. Thus extensive habitats and a variety of landforms are essential.

**COVER :** As above and a combination of forest conditions.

**STRUCTURAL STAGES :** A combination of early to late succession stages. The early succession stages, and old growth interspersed in patches of smaller size in large areas of middle to late succession. Grassy openings of the size 5 to 15 hectares in a mosaic constitute an ideal habitat.

#### REFERENCES :

Bhattacharya *et al* 1997, Conry 1989, Krishnan 1972, Lad and Rajesh Gopal 1992, Prater 1980, Sahai 1972, Schaller 1967.

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**The Flying Fox *Pteropus giganteus* (Brunnich )**  
**Status : Common, Schedule V**

The largest fruit bat in India, usually seen flying with slow wing beats in the evenings. Common and widely distributed. They are crepuscular and nocturnal. They are gregarious and roost during the day in large tall trees as noisy colonies which can at times include hundreds of animals. They are considered as a pest in orchards. Occurs in ACA, GCA, SCA and TCA

**ECOSYSTEMS USED**

Dry deciduous forests to evergreen forests. The most favoured are the dry and the moist deciduous forests Rare in semi-arid and arid country and absent in the temperate region. Often found amidst busy towns and cities

**HABITAT REQUIREMENTS**

**REARING :** The flying foxes mate between October to December during this period the gathering at the roosting site is particularly large as compared to the non breeding period. At times hundreds or even thousands may gather. After the period of gestation between 140 to 150 days a single young is produced between March and May. The young is carried by the mother from roosting site to the feeding sites till it is able to fly. There does not seem to be any separate roosting place/colony for females with young. However outside the breeding period colonies composed entirely of males have been seen.

**FEEDING :** Food is chiefly of a variety of fruits. The bat feeds on the fruit juice by chewing on it and the pulp and seeds are then spat out. If the seeds are small and the pulp soft then the pulp may be swallowed. The bat may carry fruit from the feeding to the roosting site. Since the bat is dependent on cycles of fruiting they may seasonally shift their foci of feeding sites. The flying fox thus is an important agent of dispersal of seed like all other species categorized as fruit bats.

**COVER :** The bats roost in tall trees. The colonies are observed in large trees with spreading crowns like tamarind, several species of ficus, *Adina cordifolia* etc. but also in stands of eucalyptus which have narrow crowns. Bats exhibit a strong roost fidelity and will return to the same roost tree from year to year. The roosting sites can be several kilometers away from the feeding site.

**STRUCTURAL STAGES :** A combination of early to late succession stages, groves and riparian forests.

**REFERENCES :**

Bates J.J. and D.L.Harrison 1997, Prater 1980, Walker 1975

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## **The Fulvous Fruit Bat *Rousettus leschenaulti* Desmarest**

### **Status : Common, Schedule V**

A medium sized bat, uniformly light brown, occasionally yellowish in colour. Their presence is characterized by odour like fermented fruit. They are readily distinguished from colonies of insectivorous bats by their large brilliant eyes. The species has an all India distribution. Occurs in ACA, GCA, SCA and TCA.

#### **ECOSYSTEMS USED**

Dry deciduous to tropical evergreen rain forests. The density and distribution in the latter is somewhat limited as compared to other vegetation types. Not common in semi-arid and arid ecosystems. Occurs also amidst human habitations in suitable habitat.

#### **HABITAT REQUIREMENTS**

**REARING :** Mating season reported between November and March, and is probably governed the distribution and availability of food for the adults in breeding age class. Two discrete birth seasons are observed, one in March and the other in August. The bats roost gregariously in large colonies and there is no sexual segregation till the females are gravid. In the forests the colonies are established in caves, manmade tunnels, wells, rooms in old ruins. Gravid females live in maternity colonies and leave the cave soon after arrival of monsoon. Normally a single young is born but twins are not unknown. The young are carried by the mother until they are able to fly, normally a period of two months. Once the juveniles become independent of the mother they live separately in colonies of their own.

**FEEDING :** The Rosette fruit bats are crepuscular and nocturnal. They feed on fruit juice and nectars from flowers. After having consumed the fruit juice they spit out the pulp and seeds. Thus they are agents of seed dispersal and regeneration of several species of plants. While feeding on nectar they carry pollen and thus perform the function of pollinators. The colonies may move from one locality to the other depending upon the phenology of fruiting trees.

**COVER :** The bat needs caves, manmade tunnels, old ruins, wells for shelter, roosting and breeding including separate caves for the gravid females who would continue to occupy the maternity caves as long as they are encumbered by the young and separate roosting caves exclusively for the juveniles. The bats are sensitive to disturbance and in such event may abandon a roosting site.

**STRUCTURAL STAGES :** Nothing specific, presumably mid- succession to old growth, groves and riparian forests.

#### **REFERENCES :**

Bates J.J. and D.L. Harrison 1997, Prater 1980, Walker 1975

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**Short – Nosed Fruit Bat *Cynopterus sphinx* Vahl**  
**Status : Common, Schedule V**

The species has an all India distribution. The fur is dense and the colour can be variable in some shade of olive brown. The white margined nearly naked ears, prominent almost tubular nostrils and distinctively grooved upper lip are pointers to identity. Males often have a bright rusty brown collar. This bat is not as commonly seen as the Flying Fox or the Fulvous Fruit bat. Roosts in small colonies of three to four individuals. Occurs in ACA, GCA, SCA and TCA

**ECOSYSTEMS USED**

Dry deciduous to tropical evergreen rain forests. Also amidst human settlements and partial to roosting in palm trees. Occurs in Rural and Urban areas outside the forests.

**HABITAT REQUIREMENTS**

**REARING :** Breeding period is variable by geographic location. In Central India sexual activity is observed during September- October, pups appear between December-January. The second period of sexual activity falls between February-March with the pups appearing between May and June. In south the well defined period commences in December-January and ends in August. Gestation period is estimated between 115 to 125 days. Usually a single pup is born. Outside the breeding period the males and females roost separately.

**FEEDING :** The bat feeds on a variety of wild fruits in addition to those cultivated. It mainly feeds on the juice, spitting out the pulp and seeds. This may be done while in flight It also very often plucks the fruit and carry it to a convenient point from where to hang and feed. If the seeds are small they pass through the feces. It also visits flowers to feed on nectar, or petals. Thus the species has a role to play in pollination and dispersal of seeds of several fruit bearing plants and their regeneration.

**COVER :** The diurnal roosting sites include crevices in the bole of Ficus species, palm or coconut trees, the underside of palm leaves. Snags and den trees seem important for the purpose.

**STRUCTURAL STAGES :** Nothing specific, apparently a mosaic of successional stages with the middle to late succession stages being important in context of fruit production and diversity of such fruit bearing tree and shrub species. Also higher incidence of occurrence of large trees capable of secreting hollows and crevices.

**REFERENCES :**

Bates J.J. and D.L.Harrison, Prater 1980, Walker 1975.

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**Indian False Vampire *Megaderma lyra* Geoffroy**  
**Status : Common (?), Does not appear in any Schedule.**

Geographically widely distributed with altitudinal range between about 1000m. to sea level. Probably common. Recent surveys in the Western Ghats indicate that the population has declined significantly. This could be due to disturbance to the roosting sites. No endemic sub-species. Its flapping and dipping flight allows ready identification.

**ECOSYSTEMS USED**

Adapted to a wide range of biotopes, rainforests to semi-arid forest types, in plains and hills.

**HABITAT REQUIREMENTS**

**REARING :** There is a single breeding period in a year and varies slightly between the north and south. In southern India mating takes place sometime in November with births during April. In the north it is about mid December and May respectively. The period of gestation is 145-150 days. A single pup is born, twins are rare. Young are carried by the mother for a month. Suckling may continue for another 3 weeks or so.

**FEEDING :** Leaves the roosting site late after sunset. It hunts close to the ground usually within a radius of 2km off its roosting/resting sites where it returns to feed on its prey. Its range of food includes mainly vertebrates such as wall and other lizards, fishes, frogs, toads and birds such as White-eyes, Sunbirds, Sparrows, Crag Martins. It also preys on other bats such as *Rhinopoma*, *Tapozous*, *Pipistrellus* spp. Among mammals the prey includes rats, mice, gerbils, and shrews. Among the insects it is partial to the group coleoptera, mainly scarabids, curculionids and carabids. Some of them being wood boring insects. During the rains the proportion of intake of beetles goes up significantly and will also feed on termites, ants and swarming wasps.

**COVER :** In the forest it roosts in caves, large crevasses in rocks, temples, forts, etc. Colony size may vary from a single individual to several hundred. Sexes mostly do not form separate colonies.

**STRUCTURAL STAGES :** In consideration to the range of food items a mosaic of early to late succession stages, old growth and riparian forests is necessary.

**REFERENCES :**

Bates J.J. and D.L. Harrison 1997, Prater 1980, Walker 1975.

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**Horseshoe Bat *Rhinolopus luctus* Temminck, 1835**  
**Status : Indeterminate. Does not appear in any Schedule**

It is a forest dwelling species little studied on the Indian sub-continent. Occurs in mountainous region. The only record in Central India is from the Pachmarhi WLS within the SCA. The location is between the *R. luctus* population in Nepal and *R. beddomi* in the Western Ghats. The geographical distribution may have significance for the **Satpura Hypothesis**. Occurs only in **SCA**.

**ECOSYSTEMS USED**

Dry and Moist Deciduous forests, Montane Hill forests on and around the Pachmarhi plateau and peaks.

**HABITAT REQUIREMENTS**

**REARING** : Nothing is known.

**FEEDING** : Flight is low, about 6 to 9 metres above ground around large trees. Recorded to be feeding on small beetles and insects.

**COVER** : Never found in colonies but roosts in pairs. A number of pairs may roost separately in a cave if it is large enough to allow this. Besides caves also roosts in tree hollows of snags and den trees.

**STRUCTURAL STAGES** : Nothing is known. Presumably a mosaic of succession stages.

**REFERENCES :**

Bates J.J. and D.L.Harris 1997, Blandford 1888-91, Prater 1980, Walker 1975.

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**Leaf-Nosed Bat *Hipposideros galeritus* Cantor, 1846**  
**Status : Rare. Does not appear in any Schedule**

A rare bat in India, only isolated individuals or very small colonies of few individuals have been encountered. Known to hang in a family group, adult male, female and a pup. Tends to avoid contact with other bat species. Among the four Project sites reported only from the **SCA**, the Chikalda ridge of the Melghat Tiger Reserve.

**ECOSYSTEMS USED**

Semi evergreen, Dry and the Moist Deciduous forests, in hilly terrain up to an altitude of 1100 metres.

**HABITAT REQUIREMENTS**

**REARING :** Little is known in India. In Sri Lanka pups were seen in the month of May.

**FEEDING :** Becomes active in the evening. Flies low around bushes and hunts its prey along edges and ecotones. Feeds on beetles and insects

**COVER :** In the forest the roosting sites include small caves, crevasses in rocks, rocky overhangs, spaces between aggregates of large boulders, dungeons in old forts, underneath large culverts.

**STRUCTURAL STAGES :** The edges and ecotones in a mix of succession stages and rocky outcrops. Interspersed shrubby growth is important.

**REFERENCES :**

Bates J.J. and D.L. Harris 1997, Brosset 1962, Khajuria 1980, Prater 1980, Walker 1975.

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**Evening Bat *Myotis longipes* (Dobson 1873)**  
**Status : Data Deficient. Does not appear in any Schedule**

The distribution range of this small bat is restricted to Afghanistan and India and is currently recorded from only nine localities within its limited geographical range of distribution. It has been recorded in the Siju cave in the Siju WLS in the GCA, the only project site. It is highly sensitive to disturbance to its roosting site.

**ECOSYSTEMS USED**

The highest altitude at which the species is recorded is 1754m. (5700 feet). Nothing is known of the ecosystems used, however by the localities reported, they appear to use the Moist Deciduous, Semi evergreen broad leaved forests as well as the conifer forest.

**HABITAT REQUIREMENTS**

**REARING :** The information is scanty. The young were observed born in June. Presumably a cave that they may use for roosting plays an important role in this.

**FEEDING :** What they feed on is not known.

**COVER :** The bat roosts in caves. Large colonies with hundreds of bats have been observed.

**STRUCTURAL STAGES :** Not known

**REFERENCES :**

Bates J.J. and Harris D.L. 1997, Sinha 1994, Walker 1975.

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## The Ratel, or Honey Badger *Mellivora capensis* (Schreber) Status : Endangered, Schedule I

It is a single species representing the sub-family *Mellivoranae*. Though widely distributed, it is nowhere common and easily sighted as the records of the 1930s may suggest. With the exception of the Northeast region of the country where records are not clear, and where the Hog Badger *Arctonyx collaris* is better known, the species range extends from the foot-hills of the Himalayas southward through the peninsula. Occurs in ACA, SCA, and TCA.

### ECOSYSTEMS USED

Semi-arid tracts to the Dry and the Moist deciduous forests. Also recorded in the Terai but in the upland forests and less wet grasslands. Avoids the higher rainfall areas of the semi-evergreen and the rain forests. Prefers the rolling, broken and hilly country. Does not seem to exist outside the forested tracts anymore due to the presence of human habitations and the immense pressure of grazing of livestock, and other biotic pressures to which the species is very sensitive.

### HABITAT REQUIREMENTS

**REARING :** Little is known of the breeding. By accounts of the well studied badgers in Europe, north Asia, and the US, peak cubbing seems to take place in India just before the onset of monsoon. Cubs are born in a system of below ground chambers dug by the species. Such burrows are called sett. The cubs do not venture above ground till they are about 10 weeks old. The opening to the sett is so located that vegetation or rocks may offer concealment. Choice of site for a sett is specific. Slopes which are drier, not directly exposed to moisture, steep to very steep are preferred. Substrate which is easier to dig but, without the possibility of the tunnel roof collapsing is chosen. Softer soils under harder soil strata are often chosen. Therefore the sett may be located just below a boulder. The site also needs to be secluded, for security and in proximity of a source of water. All such conditions are met with in the natural drainages. Especially seasonally dry washes with scattered perennial pools, small springs and seeps. The drier steeper southern slopes are better than the moister gentler slopes. The riparian zones therefore constitute a critical habitat.

**FEEDING :** The ratel is an omnivore and feeds on a wide variety of items. It has a sweet tooth, and sweet tasting pulpy fruits, and honey are favored. It can climb trees but seldom seems to do so. Large hives of the rock bee *Apis dorsata* hang high in the trees or along cliff faces. It appears that feeding on honey seems to be facilitated by the Crested Honey Buzzard *Pernis* which while getting at the wax and the larvae drops large chunks of combs to the ground as incidental to its feeding. Besides the ratel feeds on a variety of tubers, seeds and fungi. Among animal matter, earthworms, slugs, cockchafer grubs *Melolontha melolontha*. Among the insects, the important ones are from the families *Scarabaeidae*, *Vespidae*, *Apidae*, *Carabidae*, and *Cerambycidae*. Caterpillars of moths, especially those belonging to *Noctuidae* and the larvae of *Tipulidae*. Since a variety of life forms, harmful to the interest of forestry appear in its diet, it has the concerned significance. Ratel will hunt and eat birds, snakes and lizards, small tortoises, frogs and toads, hare, small porcupines and other rodents. Woody debris and decomposing down logs on the forest floor are important microhabitat elements as they are a repository of fungi and insects, which in turn attract birds, reptiles, and rodents.

**COVER :** Most requirements have already been cited. To sum up the cardinal requirements, the riparian zones are critically important. Large boulders, hollow down logs of large size are significant as hiding cover and temporary shelter. Such areas need to be free of human and cattle related disturbance.

**STRUCTURAL STAGES :** A combination of early to late succession stages and undisturbed riparian forests.

### REFERENCES :

Champion 1927, Prater 1980, Neal 1977, Schaller 1967

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## The Sloth Bear *Melursus ursinus ursinus* (Shaw) Status : Endangered, Schedule I

Widely distributed across the forested landscapes from the foot – hills of the Himalayas and south throughout the peninsula, except the semi – arid and arid tracts of Punjab, Haryana and Rajasthan. In the northeast to West Bengal and Assam. Prefers rolling, broken hilly country but also occurs in plains. Currently under great pressure of poaching and conflicts with people, because of the rapidly growing human population and extension of its activities in the habitat of the bears. In places the bears have been tragically marooned amidst encroaching cultivation and habitations leading to serious situation, both for the bears and the people. Occurs in ACA, SCA and TCA.

### ECOSYSTEMS USED

Dry and moist deciduous forests, semi – evergreen and broadleaf evergreen forests.

### HABITAT REQUIREMENTS

**REARING :** Cubs are met with in the winter as well as the summer. Two to three cubs may be seen. Cubs are dropped in secluded places, in depressions surrounded by thick vegetation. Caves are preferred. Thus drainages with large boulders are important. When very small the cubs sit tight on the mother's back, as she goes about searching for food. Females with cubs are extremely protective, and liable to attack an intruder on sight. Thickets constitute a significant hiding cover while the cubs are growing.

**FEEDING :** The sloth bear is an omnivore and feeds on a variety of insects. Termites are favorite, and the bear will break open and raid a termatorium, or dig deep into the ground looking for other ants which build sub-terrestrial chambers. Such craters will often be found on the dirt roads. A bear will dig for tubers, rhizomes, roots, and grubs. It feeds on a large variety of fruits and berries seasonally come across, and include the ripe berries of *Lantana camara*. It will climb trees to feed on figs *Ficus spp.*, fruits of wild mango *Mangifera indica*, *Syzygium cumini*, *Diospyros melanoxylon*, *Cassia fistula*, *Bridelia retusa*, *Buchanania lanzan* just to mention a few. It will pull down the wild banana *Musa superba*, feed on the fruit as well as the bast. The most attractive item is the flowers of *Madhuca latifolia* and these are sites of serious conflict with the local tribals who extensively collect the flower to derive food items and some excellent and potent liquor. People are liable to be seriously injured. A bear will climb into a mango or a Arjuna *Terminalia arjuna* tree which occur in the riparian forests in central India to get at the large hives of the rock bees. Opportunistically bears will raid agricultural crops such as maize. This particularly happens when bears are isolated in rapidly degrading habitats. Occasionally will feed on a carcass.

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**COVER :** Caves for shelter and breeding. Woodland with thickets of shrubs as escape cover and shelter. Lantana thickets are often used for all such purpose. Broken hilly country, with large size bouldery drainages.

**STUCTURAL STAGES :** A combination of mid to late succession stages with grassy openings. Riparian zones.

**REFERENCES :**

Champion 1927, Desai et.al 1997, Laurie and Seidensticker 1977, Krishnan 1972, 1985, Prater 1980,

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## **The Tiger *Panthera tigris tigris* (Linnaeus)** **Status : Endangered, Schedule I**

Once distributed widely in India from the Himalayas ( approximately 3050 m. above MSL) through to the tip of the peninsula, except the deserts, the tiger population is now locally extirpated over large tracts. Very few tigers are now left in the Himalayas. It is absent in Jammu and Kashmir, Himachal Pradesh, Nagaland, Manipur( ? ), Tripura, Punjab, Haryana, and Gujarat. Wherever the tigers exist they occur mostly in low to very low densities with the exception of several well managed tiger reserves, national parks and wildlife sanctuaries. Currently there are 25 Tiger Reserves, aggregating 32,995 sq.km. enjoying partly or wholly the substantive status of a PA. The threats confronting the species are many. Habitat fragmentation, a rapid decline of prey species and their densities, high human and cattle population, and a combination of a variety of factors of disturbance associated with these are among those that are serious. During the past decade and a half some very serious pressure of poaching for the illegal international trade in tiger bone has created a situation of great adversity for the survival of the species. Currently the population estimates vary between 3500 to 3750, which is between 60 – 70% of the world population of all the existing five sub-species put together. Tiger is present on all the four Project sites, ACA, GCA, SCA and the TCA.

### **ECOSYSTEMS USED**

Semi arid; Dry and Moist Deciduous forests; Semi Evergreen and broadleaf Evergreen or the Rain forests; coastal mangroves and the terai tall wet grasslands. Plains and hills.

### **HABITAT REQUIREMENTS**

**REARING :** The tigers breed throughout the year. Peak cubbing in the north appears to be in winter, while along the humid coast, and in central and south India it appears to be in summer. A tigress will seek secluded and safe sites such as a cave, a sheltered place among large boulders preferably well concealed by vegetation, an enormous size hollow at the base of a tree, or a hollow of appropriate size in a large fallen tree or a log to drop, hide and rear the cubs. The cubs may also be moved from place to place, especially in areas with some disturbance and insecurity. A tigress may leave the cubs for several hours at a time in search of a prey and during such times the cubs are most vulnerable to danger to their lives. Complete protection of such sites at all times is critically important. Upto five cubs may be born but fewer, 1 or 2 may survive to reach adulthood. The success is much higher in areas with favourably high densities of natural prey, which can happen only in well managed habitats. In prime habitats the percentage of females with cubs is recorded to vary between 40 to 87% and the interbirth interval could be as less as 20 months. The reproductive output can be significantly high if litters are large and survivorship is high. If a litter is lost early the interval between litters can be as short as 7 to 8 months. Thus given a good status of the prey, and large intact habitats the tiger population can recover rapidly from impacts of hunting and poaching. The mother – cub association is strong and may last for about 16 to 18 months in case of a male cub and 20 to 22 months in case of a female. The male leaves the natal area to establish a home range of his own at a distant location while female does so closer to the mother's home range. The study in Chitwan revealed the average distance of dispersal to be 33 km. with the maximum being 65km for the male. For the female it was a little less than 10 km. and 33km. respectively. However tigers are known to cover much greater distances. Little is known how the dispersing tigers move, especially through fragmented forests. Dispersal is male biased and therefore it is expected that mortality among males would be higher.

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**FEEDING :** Across the spectrum, a wide range of species has been recorded in the diet of the tiger that differ enormously in size and weight. These include small size mammals like the porcupine, pangolin, a small deer like the muntjak to a fully-grown bull gaur, elephant and rhino calves. Fish and crabs in the Sunderbans. However the large cervids and bovids are critical for the long-term survival. These make up approximately 75% of the contribution to the diet of the tiger over the greater part of its geographic range. The tiger has the ability to adjust to the changing landscapes provided the large forest ungulates persist. Various estimates have placed the annual dietary requirement of an adult tiger between 2500 to 3500 kg. of prey on the hoof. It is also estimated that a tiger is unable to crop more than 10 to 15% of the standing biomass of prey. Though domestic cattle may have a significant presence in the Indian forests and are preyed upon, it is not the same as the presence of large forest ungulates associated with the vital habitat attributes of the tiger. Predation on cattle has also led to the tragic consequences of tigers now popularly being poached on poisoned kills.

**COVER :** Well-wooded and well-watered forest with patches of dense cover provided by scrub level thickets and bamboo under tree canopy or tall grass patches. Riparian forests are important. The breeding and rearing cover requirement is as above. As the tiger hunts by stalking the prey with the vital associated element of surprise, thickets, bouldery or topographical features that provide concealment are necessary. The tiger is adept at using the available cover in a strategic manner to its advantage.

**STRUCTURAL STAGES :** A mosaic of early to late succession stages and old growth. Extensive late succession stages normally have lower densities of large forest ungulates which results in low tiger densities, especially in the primary rain forests.

**REFERENCES :**

McDougal Charles 1977; Sankhala Kailash 1978; Schaller George B 1967; Seidensticker John, Sarah Christie and Peter Jackson 1999; Tilson Ronald, Ulysses Seal 1987.

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## The Leopard *Panthera pardus* (Linnaeus) Status : Endangered

The leopard has an all India distribution, across the range of the tiger and the lion, in plains and hills ( 3000 meters msl ? Higher? ) except in the desert and the coastal mangrove forests. It is rare in the tall wet grasslands of terai. The highest known density of the species appears in the Gir forests of Gujarat that includes the only remaining habitat of the Asiatic lion in the world, the Gir national park and wildlife sanctuary along with the surrounding forests, in all 1882 sq.km. with a lion density of one per 6.3 sq.km. and a leopard per 7 sq.km. Although the leopard is a forest-associated species, it has an extraordinary capability to adapt to changing landscapes, landuses, habitat fragmentation and decline or loss of its natural prey. It can use minimal cover of any character for its survival and dispersal. Prey size varies from that of a small size domestic buffalo to a rodent. On virtue of such range of adjustments leopards are occasionally reported within metropolitan areas, cities and townships. It is under greatest conflict with humans among all the wild carnivores. Child lifting, mankillig, causing injury to humans and depredation of livestock are some of the issues attributed to the leopard. Even sighting of a leopard near habitations within the legitimate range of the species is now being flagged as a life threatening situation resulting in “ capture and release” operations being carried out in several areas of local protests. Large amounts of ex-gratia payments are made by the Forest Department to people for loss of livestock, injuries to and and loss of human life. This has created a general unsubstantiated impression that the leopard population is growing at an alarming rate. Thus though the leopard is still being reported from its known geographic range, it is under serious danger.

Four races are recognized from the Indian sub-continent. *P. p. fusca* ( Meyer 1794) the Indian leopard; *P. p. pennigra* Gray 1863, the leopard of Sikkim and Nepal; *P. p. sindica* Pocock 1930, Sind leopard; *P. p. millardi* Pocock 1930, the Kashmir leopard. The leopard occurs in ACA, GCA, SCA and TCA

### ECOSYSTEMS USED

Semi-arid forest types to evergreen coniferous and broad-leaved rainforests. Highest densities are attained in semi-arid, dry and moist deciduous forests. Absent in coastal mangroves, rare in the tall wet grasslands.

### HABITAT REQUIREMENTS

**REARING :** Leopard breeds throughout the year, with no discernible peak cubbing period. Females attain sexual maturity around 2.5 to 3 years of age. 2 to 4 cubs may be born after a short gestation period of 3 months. The rearing cover requirement is same as that for the tiger. However unlike the tiger the leopard is more versatile in accepting small sites offering concealment amidst otherwise disturbed tracts with limited cover. It may use spaces in a box culvert or a Hume pipe along roads. There is not enough information on the duration of the mother cub association, and the dispersal of the grownup cubs.

**FEEDING :** The versatility in terms of using cover types is matched by its catholic food habits. In the forest, hare, porcupine (favorite), other rodents, birds especially peafowl, all deers except sambar stags, wild pig, primates (favorite), and gaur calves etc. Among domestic stock, cattle of medium size, goat and sheep, poultry, and dogs (favorite). Often a leopard is found fallen in village wells that have either very low or no parapet walls while chasing dogs. Occasionally a leopard may opportunistically lift an unattended child, or those

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emboldened may take to man eating. But this is not common place. Most such events are accidental or under provocation. Leopard is adept at climbing trees and will often carry a kill into a tree and wedge it between branches, concealed under leaf cover for safety against vultures and other larger carnivores and solitary large boars.

**COVER :** As above.

**STRUCTURAL STAGES :** Early in some combination with mid to late succession stages. Mid to late succession stages either individually by themselves or as a mosaic.

**REFERENCES :**

Champion 1927, Daniel J.C. 1996; Krishnan 1985, Prater S.H. 1980; Schaller 1967, Singh H.S. and R.D.Kamboj 1996.

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## The Dhole or Indian Wild Dog *Cuon alpinus* (Pallas) Status : Vulnerable

The species was once widely distributed from the Trans-Himalayas and Himalayas, through the peninsula, in mountains and plains except the hot deserts. Three races are recognized in India, *primaevus* (Hodgson), *laniger* Pocock, and *dukhunensis* (Sykes), respectively from the Trans-Himalayas, Himalayas and rest of the country. Wild dogs no longer occur in the Himalayas or the Siwaliks and seem to have disappeared from the semi-arid habitats of western India and the terai as well. The highest densities are attained in the dry and moist deciduous forests of peninsular India where deer occur. Like the tiger it essentially is a forest dwelling species with the exception of the Trans-Himalayan cold desert. They have been persecuted for long by hunters due to a misplaced belief that their presence disturbed game and they were destructive predators! During the period of licensed hunting they carried a bounty on their head. Like the African Cape hunting dog, dholes are social and hunt in packs, chasing and running down their prey. Pack size may vary from a few to > 20 animals under the leadership of an older female. Mortality, emigration of a few members from a pack before the arrival of pups and a loosely displayed territoriality seem to be the mechanism controlling pack size. Dhole occurs in ACA, GCA, and SCA.

### ECOSYSTEMS USED

Trans-Himalayan cold deserts, semi-arid forest types, dry and moist deciduous forests, semi-evergreen forest types.

### HABITAT REQUIREMENTS

**REARING :** Pups are come across during all months, but there seems to be a peak during the months of January and February in the peninsular India. Pups are born in a den burrowed by the dogs. Sometimes porcupine burrows not in use are appropriated and enlarged to suit the requirement, or concealed sites under rocks may be used. Several females at times may establish a breeding colony. Four to six pups may be born which are nursed and reared in the den. Denning sites if left undisturbed may be used year after year. If there is disturbance pups may be shifted from one den site to another. The pups remain in the den till they are about 70 to 80 days old. The pups are looked after with special attention by the pack till they are 4 to 5 months old and are weaned on regurgitated meat. During this period the pack usually hunts during the early hours or late in the day to provide security to the pups. During such hunting the pups are kept in hiding. When they start following the hunts, some adults are in attendance to round up the stragglers. The pups are allowed to monopolize small kills, and when the food is insufficient, adults who might have eaten earlier will regurgitate meat for the pups. This activity seems to taper off when the cubs are between 7 to 8 months old. The pups grow rapidly and start moving with the pack as soon as they are able to keep up with the mother, and reach sexual maturity by the age of 1.5 years.

**FEEDING :** Dholes are diurnal coursing pack hunters and prefer open areas, and mosaics. They are equally adept at hunting on plains and hills. Dholes largely kill prey around 50 kg. in weight, but certainly the hunt is not limited by this, and a pack is capable of hunting adult sambar stags. Being a coursing predator, the dholes kill more young and old animals. The kill is consumed efficiently with hardly any remains in evidence of the

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small kills. In case of large prey, the bones are picked clean; even the skin on the skull is eaten. Scavenging tiger and leopard kills is not unknown. They share the entire spectrum of prey species of the tiger, and to a large extent that of the leopard. Mean prey size and habitat structure could vary. Several tribal cultures are associated with the dhole, in that they keep track of the pack movement, and are on the lookout for kills being made. Often they may drive away the dogs from the kill and appropriate the carcass, which in some localities may induce stress on the pack. Hunting domestic stock is not common, but the dhole sometimes is blamed for such activities, especially in their penumbral habitats, and the dens may be dug up and pups killed in retaliation.

**COVER :** Well wooded forests, with a mosaic of cover conditions and interspersed open areas, plains or hills. The breeding and rearing cover requirement are as above. Riparian zones and surrounds of water are important.

**STRUCTURAL STAGES :** Early to late succession stages, ideally a mix, also interspersed plantations. Extensive late succession stages are not suitable.

**REFERENCES :**

Cohen 1977, 1978, Davidar 1972, 1977, Fox M.W. (Ed) 1975, Fox M.W. 1984, Johnsingh AJT 1981, 1982, 1983, 1992 and 1997, Prater 1980, Sheldon J.W. 1992., Venkataraman et.al. 1995.

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**Small -Toothed Ferret Badger *Melogale moschata* Gray, 1831**  
**Status : Endangered, Schedule I**

Also known as the Chinese ferret badger, it is distributed throughout the northeast from West Bengal eastward. It is nocturnal, small in size colour varies from blackish grey to various shades of brown and overall a shiny appearance. The mask, cheeks and dorsal portions are yellowish to white. The sub-species *M.m.millsi* is reported from India. Expected to occur in GCA.

**ECOSYSTEMS USED**

Tropical and sub-tropical forests, evergreen, moist deciduous and also grasslands.

**HABITAT REQUIREMENTS**

**REARING :** Nothing specific is known. The young are born in burrows during May-June and the litter size varies from 1 to 3.

**FEEDING :** They are omnivorous, active at dusk and night. They feed on a variety of fruits, small animals, insects and earthworms. As they feed on insect pests some of the local inhabitants encourage them to enter their houses unmolested.

**COVER :** Like most other badgers they dig burrows for shelter. They may also choose suitable rock crevices for the purpose. They are good climbers and may sleep in branches of trees

**STRUCTURAL STAGES :** Presumably a combination of several, from early to late, typical of most small carnivores

**REFERENCES :**

Pocock 1941; Ramakantha 1992,1995; Choudhary 1997a,b, 1999; Datta 1999; Prater 1980; Anon1972; Anon1999.

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**Eurasian Otter *Lutra lutra*, Linn. 1758**  
**Status : Endangered, Part II of Schedule II**

The species is reported from Jammu and Kashmir, Himachal Pradesh, hills of Uttaranchal, Sikkim, West Bengal, Assam and Arunachal Pradesh. In southern India in Andhra Pradesh, Kerala, Tamil Nadu, Karnataka and Goa. Over the past several decades there appears to be a significant change in the pattern of distribution because of loss of habitat owing to reasons such as construction of dams, reclamation for paddy cultivation, aquaculture, poaching for pelt, killing and destruction of holts by fishermen, loss of forest cover along its riparian habitats, pesticides entering water or ingested toxins through prey consumed. Expected to occur in ACA.

**ECOSYSTEMS USED**

Occurs in a wide variety of aquatic habitats such as highland and lowland lakes, rivers, streams, marshes and coastal areas in forested tracts. Integrity of riparian forests is critical.

**HABITAT REQUIREMENT**

**REARING:** Males reach sexual maturity at the age of 18 months and females at 24. The period of gestation is approximately 65 days. The litter size varies between 1 to 5. Otters live in dens burrowed on sloping grounds, earth mounds called holts. These are normally in the vicinity of water. The female lines the wall and the floor of the holt with leaves, grass etc. The young remain in the holt for approximately 2-3 months and start accompanying the mother on hunting forays by the age of about 4 months. The female is polyoestrous which means that she can bear young at any time during the year. There however is some evidence of 'peaks' coinciding with the enhanced availability of food and feeding opportunities. The young remain with the mother for a period of about one year which means that inter-birth interval cannot be less than one year.

**FEEDING :** Fish constitute the main diet, eel being a favorite. However the range of prey is considerably diverse to include insects, reptiles, crabs, amphibians, small birds and mammals. An otter may swim under a shoal of fishes and catch the one which is slower. Hunting is preceded by intensive search among reed beds, under the roots of trees, behind and under rocks where fish tend to hide thus places of choice to catch a fish with least effort. Such in-stream habitat components are therefore very important and underscore the significance of riparian forests. Riparian forests also make a significant contribution of organic debris that plays a role in defining the aquatic faunal diversity.

**COVER :** Most requirements have already cited. Grooming areas are very important and the most preferred are sand banks and sand spits within a distance of 10 to 15 meters of water.

**STRUCTURAL STAGES :** Riparian forests that have retained its natural structural attributes and composition i.e. relatively undisturbed riparian vegetation. Other structural components that are in-stream need to include reed-beds, extending tree roots in the water, large woody debris, and rocks.

**REFERENCES :**

Anon 1992; Choudhury 1997a,b,1999; Hussain 1999a,b; Prater 1980.

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**Smooth – Coated Otter *Lutra perspicillata* Geoffroy, 1826**  
**Status : Endangered Part II of Schedule II**

The species is distributed throughout India except portions of Gujarat, Rajasthan, Haryana, Punjab and Himachal Pradesh. It occurs along large rivers, lakes, and reservoirs. Is found along coasts and estuaries in the mangrove forests. In the Terai it occurs along swamps and will also use flooded rice fields opportunistically. Occurs in ACA, GCA, SCA( in the MP portion, not Melghat) and TCA. The species has declined due to the reasons that have affected all the three otter species in India quoted under the profile of the Eurasian Otter. It occurred in Melghat along the large perennial pools of the ephemeral rivers, especially in the Koktu and Dolar valleys now in the core area of the Melghat tiger reserve, till the mid 1960s. By early 1970s the species became extinct in Melghat, evidently due to the emerging popular method of fishing the pools by using extremely dangerous pesticide such as Endrin that was adopted by the local forest inhabitants. No species profile is documented for the Small-Clawed Otter

**ECOSYSTEMS USED**

It occurs in hills and plains in a variety of aquatic situations described earlier, ranging from the dry deciduous forests to the rain forests, coastal mangroves, and the tall wet grasslands of terai.

**HABITAT REQUIREMENT**

**REARING :** Similar to the Eurasian Otter. Shows distinct preference to rocky stretches in all seasons for dening and resting. Gestation period varies from 60 to 62 days. The litter size varies from 1 to 5 cubs.

**FEEDING :** The prey predominantly consists of fish. Other items include shrimps, crabs, smaller vertebrates such as birds, rats, mud-skippers, and frogs. A typical group of smooth coated otters consists of a male, female and 3 to 5 young. Water areas with gradually sloping floor are preferred to those where the river bottom falls steeply. River/stream mouth areas are preferred for hunting as fish tend to congregate in such habitats. Other strategies and habitat elements similar to the Eurasian Otter.

**COVER :** Similar to the Eurasian Otter.

**STRUCTURAL STAGES :** Similar to the Eurasian Otter.

**REFERENCES :**

Anon 1992; Chaudhury 1997a,b; 1999; Hussain 1999a,b; Prater 1980.

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## **Indian Giant Squirrel *Ratufa indica* (McClelland)** **Status : Endangered, Schedule II, Part II**

There are seven races of the species in India of which *Ratufa indica centralis* occurs in SCA and *R.i.maxima* occurs in ACA. In SCA it occurs only in the Satpura national park, the Bori and Pachmarhi wildlife sanctuaries. In the teak plantation dominated tract of Kesla Project in Bori WLS the squirrel is conspicuously present only in the tall riparian mixed forest community. In the drier teak dominated forests of the Melghat tiger reserve with no perennial rivers the species is absent.

The Indian Giant Squirrel is essentially a forest dwelling species. Along its appropriate habitats it occurs south of the Ganges river. The species is essentially arboreal and is active in and along the top canopy of large old trees with spreading crowns. It leaps across gaps of up to four meters within the canopy. It is shy and wary. When danger is perceived a loud repeated rattling call is uttered that is taken up by other squirrels in the neighborhood. The squirrel may live alone or in pairs.

### **ECOSYSTEMS USED**

The dry and moist deciduous forests; the semi-evergreen and rain forests. In case of the first two types occurs as an obligate of the old riparian forests

### **HABITAT REQUIREMENTS**

**REARING :** The squirrel builds usually two or more nests globular in shape using twigs and leaves in the canopy of large tall trees. The nests are placed near the slender terminal portion of a branch as an anti predator strategy. The nests serve as resting places as well as for raising the young. Young have been recorded in central India during March- April and in southern India during November- December.

**FEEDING :** A wide range of wild fruits and seeds, small and large. Fruits and seeds are often carried from site to site. Partially eaten fruit and some seeds always reach the ground. Thus the squirrel helps in germination and regeneration of several forest plant species.

**COVER :** Canopy contiguity is extremely important to maintain populations since it is not only necessary for movement but for more number of breeding sites, food and security. When threatened the squirrel lies flat on large branches or hides within the massive fork of a tree. Such structures are also important for resting. All this points out to large tall trees with contiguous canopy.

**STRUCTURAL STAGES :** In the rain forest and semi-evergreen forest habitats, late succession and old growth forests. In the dry and moist deciduous forests the riparian tree community in the late succession stage and old growth is essential.

### **REFERENCES :**

Borges 1989; Prater 1980

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## Hispid Hare *Caprolagus hispidus* Status: Endangered, Schedule 1

Hispid hare (*Caprolagus hispidus*) was once widely distributed along the southern Himalayan foothills from Uttar Pradesh through Nepal and West Bengal to Assam, extending southwards as far as Dhaka in Bangladesh. Unrecorded for number of years, the last specimens were recorded from North Kheri, Uttar Pradesh/Nepal border Chuka Dhanga, Pillibhit Forest Division, Uttar Pradesh in 1951 and 1961 respectively.

Outside Assam, the species has been subsequently reported in Jaldapara Wildlife Sanctuary (Ghoshe, 1984) and Buxa Tiger Reserve (Oliver, 1985) in West Bengal; Valmiki WLS, West Champaran District; North West Bihar (Ghoshe, personal observation in 1986), Dudwa National Park in Kheri district of Uttar Pradesh (Oliver, 1985) and Royal Chitwan National Park, Royal Bardia Wildlife Reserve and Royal Shukla Phanta Wildlife Reserve in Terai area of southern and south – western Nepal.

### ECOSYSTEM USED

Thach scrub areas dominated by *Saccharum narenga*, *Themeda arundanaceae*, *Phragmites karka*, *Imperata cylindrica* and *Vetiveria zizanioides*. Hispid hare prefers 50 – 100 cm grass ht for resting and hiding COVER after grassland burning. The hispid hare use tussocks of *Saccharum narenga* as resting, hiding and FEEDING grounds.

### HABITAT REQUIREMENT

**REARING:** It is thought that 2 or 3 broods are produced in a year and litter-size consists of 2 to 5 young each time. Overlapping home ranges revealed from radio-tracking data in Nepal suggest that the hispids live in male/female pairs, although the total range of individual males were larger than those of individual females. Two of the three females captured were pregnant, showing that in Western Nepal Terai, *Caprolagus* breeds January and February. Mother has four nipples and feeds the babies.

**FEEDING:** The hispids feed chiefly on roots and soft pulp of the stem of tall grasses in their habitat. The greater development of their teeth, specially the incisors, helps them to devour this food. Hodgson (1847), however, reported that it also feeds on the bark of trees. The daily FEEDING activity, as observed in Rajagarh in Assam and Dudwa Tiger Reserve in Uttar Pradesh, primarily consists of cutting the bases of the thatch grass and eating of roots and pulp.

**COVER:** Hispid hare is a highly cryptic species. Sighting of the hispids are very rare. However species can be identified by the droppings for its presence and absence. During the course of study it has been found that hispids use all the areas for FEEDING but 50- 100 cm tall grassland areas as resting and hiding COVER. During the studies in Rajagarh forest it was noted that hispids are slow moving and do not dig burrows themselves (Ghose, 1978; Oliver, 1980). It is less endowed with the power of running, seeing and hearing in comparison to other rabbits and hares. The hispid is, therefore, dependent for its safety on concealment provided by the heavy forest undergrowth. The rough hair of its coat affords protection against contact with huge, serrated grasses, seeds and shrubs in midst of which it dwells.

**STRUCTURAL STAGES:** A mosaic of early to mid successional stages of the grasslands. However, the grasslands with late succession stages i.e. *Phragmites karka*, *Sclerostachya fusca* has low density of hispids.

### REFERENCES:

Hodgson, 1847, Ghoshe, 1981, Oliver, 1979. Oliver, 1985.

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## **Swamp Deer *Cervus duvauceli duvauceli*** **Status : Endangered Schedule 1**

The swamp deer was found along the foothills of Himalaya (from Ganges to Assam). It was distributed in the basins of Indus, Ganges and Brahmaputra rivers as well as in Central India as far as Godavari river. Three subspecies of swamp deer are known from the Indian Sub-continent. The marsh dwelling swamp deer (*Cervus duvauceli duvauceli*), and its eastern form *Cervus duvauceli ranjitsinhi* prefer marshes and alluvial grasslands that are found in the Indo-Gangetic plain and the Brahmaputra valley respectively, along the foothills of the Himalayas. The third from *Cervus duvauceli branderi* prefers drier ground and is the central Indian form. Schaller (1967) on the basis of his own study and investigations of Gee (1964), mentioned that swamp deer was seen since 1960 in Nepal: Kanchanpur, Bardia, Banke and Chitwan forest division; in India: Haldwani, Bijnore, South Kheri, North Kheri and Bahraich forest Division in Uttar Pradesh; in Jaldapara and surrounding forests in West Bengal; in Manas Sanctuary, Darrang Division and Kaziranga Sanctuary in Assam. The Central Indian race (*Cervus duvauceli branderi*) was found in Jagmandal and Banjor reserves of Mandla district and eastward to Amarkantak and Bilaspur. A few herds were also observed in Shanpura range, Balaghat, Raipur, Bastar estste, parts of Bandra and South Chanda.

Presently the north Indian race of the swamp deer (*Cervus duvauceli duvauceli*) has been only restricted to the Terai of Uttar Pradesh. Swamp deer is found in Dudwa National park, Kishanpur Wildlife Sanctuary and Katerniaghat WLS. In Nepal swamp deer is found in Royal Bardia Wildlife Reserve and Royal Shuklaphanta Wildlife Reserve. The largest congregation of about 1500 swamp deer in the north and north-eastern terai is found in Royal Shuklaphanta Wildlife Reserve. The potential threats to the swamp deer habitats are encroachment of the natural rutting and fawning grounds outside the protected areas, pressure from the thatch grass collection and cattle grazing. Due to the flooding and succession of the grassland community and encroachment of the marshy habitats with weeds i.e. *Sesbania sesban* are also some of factors affecting the swamp deer habitats.

### **ECOSYSTEM USED**

Swamp deer (*Cervus duvauceli duvauceli*) prefers shallow water bodies surrounded by mosaics of short and tall grassland areas. During early dry season animals prefer open short grasslands for food, resting, thermal and escape COVER while during monsoon prefer shallow marshes and tall grassland areas.

### **HABITAT REQUIREMENT**

**REARING:** Swamp deer is monotonous i.e. a single young one is born at a time. The fawns are delivered by the end of May or in June each year. The hind provide active protection to the baby as seen in other mammals. The male does not take part parental care. The mother keeps the young one remain hidden in grassy area during early period. The hiding behavior functions as a strategy for avoiding predation. The fawn is scentless, therefore the predator is not able to judge the presence of fawn in hidden condition. The hiding period of the fawn varies from 5 to 10 days depending upon the health of the fawn. The fawn suckles the mother five or six times during a day. During suckling the mother keeps an around watch for any danger. As soon as the fawn is able to follow the mother, she introduces the fawn in the herd for short duration. The mother remains busy with fawn for a year, till the onset of next breeding season and the old baby remains with the mother.

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**FEEDING:** The swamp deer feed mostly on grasses. They do not feed on leaves and fruits. They also feed on aquatic vegetation. The availability, palatability and nutritional value of different plants vary throughout the year. They prefer to feed on soft and new shoots of grasses which have higher nutritional value. Inside DNP, most common grass on which swamp deer feeds more or less throughout the year is *Imperata cylindrica*. The other grasses on which swamp deer generally feeds are: *Sacchrum bengalensis*, *Sacchrum sponteneum*, *Apluda mutica*, *Veteveria zizanoides*, and *Phragmites karka*. In the month of January, burning of grasses starts and these animals feed on the fresh shoots. In the month of February, March and April the food in bulk is available to the deer in the form of new shoots. In dry and hot part of the year there is shortage of food. The deer at that time concentrate around the ponds and lakes and feeds on *Cynodon dactylon* and floating and submerged hydrophytes. In rainy season most of the grazing grounds are flooded and grasses become dirt, as a result the deer mostly depend on cultivated crops of maize, sugarcane and paddy. Generally they feed on cultivated crops in two stages, one when the crop are in growing stages and new shoots are available , the other when flowering and fruiting starts.

**COVER:** Swamp deer prefers swampy or marshy open grassy forest. Mostly their concentration is high in the grassy patches near water holes (tals and lakes) or at the river banks, nalas and canals, where the soil is sandy or swampy. During dry season when wet soil is not available, they prefer sandy soil (soft soil). Their resting places are mostly sandy or moist where the shadow of the trees are available.

**STRUCTURAL STAGES:**

Early to late successional stages of the grasslands

**REFERENCES:**

Schaller, 1967, Gee, 1964, Gee, 1964.

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## Greater Indian Rhinoceros *Rhinoceros unicornis*

The greater Indian Rhinoceros *Rhinoceros unicornis* is distributed only a few isolated pockets along the floodplains of the Indus, Ganges, and Brahmutra rivers from the Hindu Kush in the west to the present Indi-Burmese border in the East. The one-horned rhinoceros is presently found in Nepal, Bengal and Assam. In TCA the animal was reintroduced in 1984.

### ECOSYSTEM USED

The rhinoceros use open tall grassland areas for foraging along with

### HABITAT REQUIREMENT

**REARING:** The primary mating season of rhinoceros is from February to June while the mating also occurs throughout the year. A female rhino is ready to reproduce five to six year old. The interval between her calving and her next breeding is approximately 28 months/ the gestation period is 18-19 months , and the period between births is 3-4 years (Mukherjee, 1966). Only one baby is born

**FEEDING:** Rhinos appear to be unselective in their FEEDING habitats, eating a variety of grasses, forbs and shrubs. Rhinos generally graze during the late afternoon, evening, night and morning.

**COVER:** Rhinos move to forest habitats when the short grass area is flooded, usually between July and September.

### REFERENCES:

Mukherjee, 1966, Sinha, 1990.

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## Swamp Partridge *Francolinus gularis*

The Swamp Francolin *Francolinus gularis* inhabits the tall wet grasslands of Terai of South Asia, which stretches from the western Uttar Pradesh eastward along the Indo-Nepal-border to Bangladesh and Assam in Northeast India

### **ECOSYSTEM USED**

Swamp partridge used low lying land which contains both wet and tall wet grasslands.

### **HABITAT REQUIREMENT**

#### **REARING:**

Nesting is February to May. A well built pads of weeds and grasses with a deep hollow for the eggs placed a few centimeters above water in dense COVER. Four to five eggs are laid and are pale buff or stone coloured. incubation is by hen.

**FEEDING:** Omnivores, Largely seeds and shoots.

**COVER:** Tall grasslands interspersed with swamps.

#### **REFERENCE:**

Iqbal, 1995, Javed, 1999

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## Black Partridge *Francolinus francolinus*

Distributed in North and NE India; Bangladesh (commonly up to 1500 m in the W. Himalayas) south roughly to a curve from Kutch through Gwalior to Chilka Lake (Orissa).

### ECOSYSTEM USED

Restricted to well-watered scrub, tamarisk and tall grass jungles. Millet and sugar cane fields in riverine or canal-irrigated country as favorite haunts, as well as tea gardens and their environs in the Outer Himalayas. Enters crops to feed in the mornings and evenings. Use open areas for FEEDING and tall grasses for hiding COVER.

### HABITAT REQUIREMENT

**REARING:** Nesting season is from April to July. A dhalow scrape lined with grass in tamarisk scrub, millet or cane fields. 6-8 pale olive brown to almost chocolate-brown colored eggs are laid.

**FEEDING:** Grain, grass seeds, green shoots, white ants and other insects.

**COVER:** Tall Grassland area

### STRUCTURAL STAGES:

### REFERENCES:

Salim Ali and Sidney Dillon Ripley 1983 "Handbook of the Birds of India and Pakistan" together with those of Bangladesh, Nepal, Bhutan and Sri Lanka (Compact Edition), Oxford University Press, Delhi, Oxford, New York.

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## Hog Deer *Axis Procinus*

Hog Deer is restricted to Sri Lanka and the low alluvial grasslands of Indus and Ganges valleys, where it range from sind in the West through UP, Bengal to Assam in the East and thence to Burma. The present ranges of the Indian subspecies is confind to the grasslands in Terai region of Uttar Pradesh and Assam i.e. the floodplains of Ganges and Brahmaputra (Spillet 1966).

### ECOSYSTEM USED

Hog deer preferred habitat is the reed beds and swampy meadows bordering streams (Peacock 1933), extensive forests being generally avoided (Schaller 1967, Mishra, 1982). In TCA they were common on the low lying marshy meadows boardering in Sal forests, in Kaziranga sanctuary they were abundant in vast grass thickets and in Corbett national Park they were observed occasionally in the valley of the Ramganga river (Schaller 1967).

### HABITAT REQUIREMENT

**REARING:** Breeding season is form July to November and peaked in September and October. Gestation period 8 months was reported by Brown (1936), Schaller (1967), Whitehead (1972), and Prater (1980). Fawning begins last week of January and extends tofebruary and March. Singh (1973) reported that fawns were born in India from the January through may, and Mishra and Wemmer (1987) reported that parturition occurred during april and may in Chitwan.

**FEEDING:** Hog deer grazed during morning and evening. Hog deer diets consists of grasses, forbs and fruits. Hog deer were seen eating *Bombax ceiba* and *Trewia nudiflora* fruits during hot and wet seasons (Dhungel *et al.* 1991).

**COVER:** Hog deer preferred short grasses as food COVER and tall grasses for hiding COVER

**STRUCTURAL STAGES:** Early to Mid successional stages.

### REFERENCES.

Spillet 1966, Schaller, 1967, Dhungel *et al.* 1991.

# Chapter 4

## Wildlife-Habitat Relationships (WHR) Matrix

Sajeev T.K., Shivaji G. Chavan, Vishwas B. Sawarkar, Anjana Pant, Harish Kumar & Ashish Kumar

1	Vernacular name	Nilgiri Pipit	Sri Lanka Frogmouth	White-bellied Shortwing	Little Ringed Plover	Indian Swiftlet	Nilgiri Wood Pigeon
2	Scientific name	<i>Anthus nilghirensis</i>	<i>Batrachos tomus moniliger</i>	<i>Brachypteryx major</i>	<i>Charadrius dubius</i>	<i>Collocalia unicolor</i>	<i>Columba elphinstoni</i>
3	Taxonomic class	B	B	B	B	B	B
4	Legal Status - Wildlife Protection Act	SIV	SI	SIV	SIV		SIV
5	Legal Status - CITES						III
6	Conservation status - IUCN						V
7	Endemism status	ER	No	ER	No	No	ER
8	Residency status	P	P	P	M	P	P
9	Conservation area	A	A	A	A	A	A
10	Abundance / distribution status	C	C	C	A	C	C
11	Conflict with humans						
12	<b>Champion and Seth Forest Types of India (to the group level):</b>						
13	Southern tropical wet evergreen forests	0	2	1	0	1	1
14	Tropical moist evergreen forest (GCA)						
15	Nilgiri sub-tropical evergreen forest	1	2	1	0	1	2
16	Tropical semi-evergreen forest (GCA, TCA)						
17	Northern tropical semi-evergreen forests						
18	Assam alluvial plain semi evergreen forests (GCA)						
19	Tropical moist deciduous forest (GCA, TCA)						
20	East Himalayan moist deciduous forests						
21	Southern tropical moist deciduous forest	0	1	0	0	1	1
22	South Indian tropical moist deciduous teak forests						
23	South Indian tropical moist deciduous mixed forests	0	1	0	0	1	1
24	Northern Indian tropical moist deciduous forests (TCA)						

25	Moist Bhabhar sal (TCA)						
26	Western light plain sal (TCA)						
27	Moist sal savannah (TCA)						
28	Alluvial sal – kamrup alluvial sal forests						
29	Low alluvial savannah woodland (TCA)						
30	Barringtonia swamp forests						
31	Eastern seasonal swamp low forests (Cephalanthus)						
32	Riparian fringing forests	0	2	1	0	1	1
33	Southern tropical dry deciduous forests	0	1	0	0	1	0
34	Southern tropical dry deciduous forests – dry teak forest	0	0	0	0	1	0
35	Dry peninsular sal forests						
36	Western light alluvium plains sal / dry sal forests (TCA)						
37	Dry sal forests						
38	Boswellia forests						
39	Southern catch thorn forests	0	0	0	0	1	0
40	Dry savannah forest						
41	Foot hill and plateau sal – eastern hill sal						
42	Central Indian subtropical hill forests						
43	Southern wet temperate forests (sholas, ACA)	1	2	2	0	1	2
44	Shola type of mixed evergreen forest (GCA)						
45	Wet grassland habitat on hill plateaus (ACA, GCA)	2	0	0	0	1	1
46	<b>Other, non-Champion and Seth types</b>						
47	Southern moist and wet bamboo brakes	0	1	1	0	1	0
48	Canebrakes (TCA)						
49	Extensive bamboo areas (GCA)						
50	Secondary moist bamboo brakes						
51	Dry tall grasslands on hill plateaus (SCA)						
52	Wet, tall grasslands interspersed with woodland and swamps (TCA)						
53	Swamp ('tals') interspersed (TCA)						

54	Rivers (by name, TCA, ACA & GCA)	0	0	0	?????	0	0
55	Catchment for tributaries to rivers (by name, SCA, TCA)						
56	Reservoirs (by name, TCA, SCA)	0	0	0	?????	0	0
57	Teak plantations (ACA, SCA)	0	0	0	0	1	0
58	Sal plantations (100 yrs old; GCA)						
59	Extensive plantation on grassland habitats of teak, shisham, and eucalyptus (TCA)						
60	Coffee and cardamom (ACA)	1	0	0	0	1	1
61	Tea (ACA)	1	0	0	0	1	0
62	Wattle (ACA)	1	0	1	0	1	1
63	Pinus (ACA)	1	0	1	0	1	1
64	Young jhum (<10 yrs; GCA)						
65	Middle jhum (10-20 yrs; GCA)						
66	Old jhum (>20 yrs; GCA)						
67	<b>Trophic category</b>	In	In	In		In	Fr
68	<b>Habitat elements/substrates</b>						
69	<b>Habitat elements of biotic origin (special habitats)</b>						
70	Snags						
71	Snag recruits (dying trees, live trees with dead portions)			F			
72	Hollow trees, chimney trees (living or dead)			F			
73	Tree cavities (natural or created)			F			
74	Large old trees (living)			F			B,F
75	Trees with fluting boles and buttresses			F			
76	Down wood			F			
77	Litter and duff layers	F		F			
78	Litter in streams			F			
79	Lianas		B	B,F			B,F
80	Fruit-bearing shrubs						F
81	Fruit bearing trees						F
82	Epiphyte patches		B	B,F			F
83	<b>Habitat elements of geomorphic origin</b>						
84	Cliffs, talus, and ledges	B				B	
85	Caves					B	
86	Overhangs					B	
87	Dens (existing burrows dug by animals)						
88	Sheet rocks						
89	Large bouldery aggregates						
90	Rock outcrops					F	

91	Sandy banks and sand spits	B			X		
92	Salt licks (exposed mineral soils)						
93	Earth cuttings	B					
94	Man-made (anthropogenic) structures						B
95	Additional / other (specify)	THICK UNDER GROWTH					
96	<b>Structural stage</b>						
97	Early stage	X			X		
98	Mid stage			X			
99	Late stage		X	X			X
100	Old-growth stage - unmanaged		X	X			X
101	Other - unmanaged			X			
102	<b>Key ecological functions</b>						B
103	<b>Sensitivity to anthropogenic disturbance</b>	A,I,L,W	B,D,M,I,U	B,D,I,S,U	R	H	D,G,I,K,S,U,X

1	<b>Vernacular name</b>	White-bellied Tree-pie	Nilgiri Flycatcher	Great Eared Nighthjar	Rusty Spotted Cat	Black-and-orange Flycatcher	Grey Junglefowl
2	<b>Scientific name</b>	<i>Dendrocitta leucogastra</i>	<i>Eumyias albicaudata</i>	<i>Eurostopodus macrotis</i>	<i>Felis rubiginosa</i>	<i>Ficedula nigrorufa</i>	<i>Gallus sonneratii</i>
3	<b>Taxonomic class</b>	B	B	B	M	B	B
4	<b>Legal Status - Wildlife Protection Act</b>	SIV	SIV	SIV	SI	SIV	SIV
5	<b>Legal Status - CITES</b>				I		
6	<b>Conservation status - IUCN</b>				K		
7	<b>Endemism status</b>	ER	ER	No	No	ER	No
8	<b>Residency status</b>	P	P	P	P	P	P
9	<b>Conservation area</b>	A	A	A	A	A	A
10	<b>Abundance / distribution status</b>	A	C	D	C	B	A
11	<b>Conflict with humans</b>						
12	<b>Champion and Seth Forest Types of India (to the group level):</b>						
13	Southern tropical wet evergreen forests	2	2	2	1	2	2
14	Tropical moist evergreen forest (GCA)						
15	Nilgiri sub-tropical evergreen forest	2	2	2		2	2
16	Tropical semi-evergreen forest (GCA, TCA)				1		
17	Northern tropical semi-evergreen forests				1		
18	Assam alluvial plain semi evergreen forests (GCA)						
19	Tropical moist deciduous forest (GCA, TCA)				1		
20	East Himalayan moist deciduous forests						
21	Southern tropical moist deciduous forest	2	2	1	1	1	2
22	South Indian tropical moist deciduous teak forests						
23	South Indian tropical moist deciduous mixed forests	2	2	1		1	2
24	Northern Indian tropical moist deciduous forests (TCA)						
25	Moist Bhabhar sal (TCA)						
26	Western light plain sal (TCA)						

27	Moist sal savannah (TCA)						
28	Alluvial sal – kamrup alluvial sal forests						
29	Low alluvial savannah woodland (TCA)						
30	Barringtonia swamp forests						
31	Eastern seasonal swamp low forests (Cephalanthus)						
32	Riparian fringing forests	2	2	1	1	0	2
33	Southern tropical dry deciduous forests	1	1	0		0	2
34	Southern tropical dry deciduous forests – dry teak forest	1	0	0		0	2
35	Dry peninsular sal forests						
36	Western light alluvium plains sal / dry sal forests (TCA)						
37	Dry sal forests						
38	Boswellia forests						
39	Southern cutch thorn forests	0	0	0		0	2
40	Dry savannah forest						
41	Foot hill and plateau sal – eastern hill sal						
42	Central Indian subtropical hill forests						
43	Southern wet temperate forests (sholas, ACA)	2	2	2		2	2
44	Shola type of mixed evergreen forest (GCA)						
45	Wet grassland habitat on hill plateaus (ACA, GCA)	0	0	0		0	2
46	<b>Other, non-Champion and Seth types</b>						
47	Southern moist and wet bamboo brakes	1	2	1		1	2
48	Canebrakes (TCA)						
49	Extensive bamboo areas (GCA)						
50	Secondary moist bamboo brakes						
51	Dry tall grasslands on hill plateaus (SCA)						
52	Wet, tall grasslands interspersed with woodland and swamps (TCA)						
53	Swamp ('tals') interspersed (TCA)						
54	Rivers (by name, TCA, ACA & GCA)	0	0	0		0	0
55	Catchment for tributaries to rivers (by name, SCA, TCA)						

56	Reservoirs (by name, TCA, SCA)	0	0	0		0	0
57	Teak plantations (ACA, SCA)	1	0	0	1	0	2
58	Sal plantations (100 yrs old; GCA)						
59	EXtensive plantation on grassland habitats of teak, shisham, and eucalyptus (TCA)						
60	Coffee and cardamom (ACA)	1	2	0		1	2
61	Tea (ACA)	1	1	0		0	2
62	Wattle (ACA)	1	2	0		0	2
63	Pinus (ACA)	1	2	0		0	2
64	Young jhum (<10 yrs; GCA)						
65	Middle jhum (10-20 yrs; GCA)						
66	Old jhum (>20 yrs; GCA)						
67	<b>Trophic category</b>	In	In	In	Ca	In	Ca
68	<b>Habitat elements/substrates</b>						
69	<b>Habitat elements of biotic origin (special habitats)</b>						
70	Snags						
71	Snag recruits (dying trees, live trees with dead portions)						
72	Hollow trees, chimney trees (living or dead)	F					
73	Tree cavities (natural or created)						
74	Large old trees (living)	B,F	F				
75	Trees with fluting boles and buttresses	F	F				B,F
76	Down wood	F					F
77	Litter and duff layers	F		B,F		F	B,F
78	Litter in streams						
79	Lianas	F	F				
80	Fruit-bearing shrubs	F	F			F	F
81	Fruit bearing trees	F	F				
82	Epiphyte patches	F	F			B,F	
83	<b>Habitat elements of geomorphic origin</b>						
84	Cliffs, talus, and ledges						
85	Caves						
86	Overhangs						
87	Dens (existing burrows dug by animals)						
88	Sheet rocks			F			
89	Large bouldery aggregates			F			
90	Rock outcrops			F			
91	Sandy banks and sand spits			F			
92	Salt licks (exposed mineral soils)						

93	Earth cuttings			F			
94	Man-made (anthropogenic) structures						
95	Additional / other (specify)				Thick undergrowth		
96	<b>Structural stage</b>						
97	Early stage	X			X		X
98	Mid stage	X	X		X		X
99	Late stage	X	X	X		X	X
100	Old-growth stage - unmanaged	X	X	X		X	X
101	Other - unmanaged	X					X
102	<b>Key ecological functions</b>						B
103	<b>Sensitivity to anthropogenic disturbance</b>	B,C,D,F,G ,I,M,S,U	B,D,I,M,U	I,R,W	X	A,B,D,I,U	B,G,I,K,M, R,U,X

1	<b>Vernacular name</b>	Nilgiri Laughing Thrush	Black-capped Kingfisher	Nilgiri Tahr	Travancore Tortoise	Kerala Warty Frog	Liontailed Macaque
2	<b>Scientific name</b>	<i>Garrulax cachinnans</i>	<i>Halcyon pileata</i>	<i>Hemitragus hylocrius</i>	<i>Indiotudo forstenri</i>	<i>Limnonectes keralensis</i>	<i>Macaca silenus</i>
3	<b>Taxonomic class</b>	B	B	M	R	A	M
4	<b>Legal Status - Wildlife Protection Act</b>	SIV	SIV	SI	SIV	SIV	SI
5	<b>Legal Status - CITES</b>				II		I
6	<b>Conservation status - IUCN</b>			V	R		E
7	<b>Endemism status</b>	ER	No	ER	ER	ER	ER
8	<b>Residency status</b>	P	P	P	P	P	P
9	<b>Conservation area</b>	A	A	A	A	A	A
10	<b>Abundance / distribution status</b>	D	C	C?	D	A	C
11	<b>Conflict with humans</b>						
12	<b>Champion and Seth Forest Types of India (to the group level):</b>						
13	Southern tropical wet evergreen forests	1	1	0		2	2
14	Tropical moist evergreen forest (GCA)		1				
15	Nilgiri sub-tropical evergreen forest	1		0		2	0
16	Tropical semi-evergreen forest (GCA, TCA)		1				
17	Northern tropical semi-evergreen forests		1				
18	Assam alluvial plain semi evergreen forests (GCA)		1				
19	Tropical moist deciduous forest (GCA, TCA)		1				
20	East Himalayan moist deciduous forests						
21	Southern tropical moist deciduous forest	0	1	0		2	1
22	South Indian tropical moist deciduous teak forests		1				
23	South Indian tropical moist deciduous mixed forests	1		0		2	1
24	Northern Indian tropical moist deciduous forests (TCA)						
25	Moist Bhabhar sal (TCA)						
26	Western light plain sal (TCA)						

27	Moist sal savannah (TCA)						
28	Alluvial sal – kamrup alluvial sal forests						
29	Low alluvial savannah woodland (TCA)						
30	Barringtonia swamp forests						
31	Eastern seasonal swamp low forests (Cephalanthus)						
32	Riparian fringing forests	2		0		2	1
33	Southern tropical dry deciduous forests	1		0		2	0
34	Southern tropical dry deciduous forests – dry teak forest	0		0		2	0
35	Dry peninsular sal forests						
36	Western light alluvium plains sal / dry sal forests (TCA)						
37	Dry sal forests						
38	Boswellia forests						
39	Southern cutch thorn forests	0		0	0	1	0
40	Dry savannah forest						
41	Foot hill and plateau sal – eastern hill sal						
42	Central Indian subtropical hill forests						
43	Southern wet temperate forests (sholas, ACA)	2		0		2	1
44	Shola type of mixed evergreen forest (GCA)						
45	Wet grassland habitat on hill plateaus (ACA, GCA)	0		2		1	0
46	<b>Other, non-Champion and Seth types</b>						
47	Southern moist and wet bamboo brakes	0		0		2	0
48	Canebrakes (TCA)						
49	Extensive bamboo areas (GCA)						
50	Secondary moist bamboo brakes						
51	Dry tall grasslands on hill plateaus (SCA)						
52	Wet, tall grasslands interspersed with woodland and swamps (TCA)						
53	Swamp ('tals') interspersed (TCA)						
54	Rivers (by name, TCA, ACA & GCA)	0		0		2	0
55	Catchment for tributaries to rivers (by name, SCA, TCA)						

56	Reservoirs (by name, TCA, SCA)	0		0		0	0
57	Teak plantations (ACA, SCA)	0	1	0		1	0
58	Sal plantations (100 yrs old; GCA)						
59	EXtensive plantation on grassland habitats of teak, shisham, and eucalyptus (TCA)						
60	Coffee and cardamom (ACA)	0		0		2	1
61	Tea (ACA)	0		0		1	0
62	Wattle (ACA)	0		0		1	0
63	Pinus (ACA)	0		0		1	0
64	Young jhum (<10 yrs; GCA)						
65	Middle jhum (10-20 yrs; GCA)						
66	Old jhum (>20 yrs; GCA)						
67	<b>Trophic category</b>	Mixed	Pi	He	He	In	Om
68	<b>Habitat elements/substrates</b>						
69	<b>Habitat elements of biotic origin (special habitats)</b>						
70	Snags						
71	Snag recruits (dying trees, live trees with dead portions)						
72	Hollow trees, chimney trees (living or dead)						
73	Tree cavities (natural or created)						
74	Large old trees (living)						B,F
75	Trees with fluting boles and buttresses						
76	Down wood						
77	Litter and duff layers	F				F	
78	Litter in streams					B,F	
79	Lianas	F					OTH
80	Fruit-bearing shrubs	F					
81	Fruit bearing trees	F					F
82	Epiphyte patches	B,F					
83	<b>Habitat elements of geomorphic origin</b>						
84	Cliffs, talus, and ledges			F			
85	Caves						
86	Overhangs						
87	Dens (existing burrows dug by animals)			X			
88	Sheet rocks						
89	Large bouldery aggregates						
90	Rock outcrops						
91	Sandy banks and sand spits					B,F	
92	Salt licks (exposed mineral soils)						

93	Earth cuttings						
94	Man-made (anthropogenic) structures						
95	Additional / other (specify)						
96	<b>Structural stage</b>						
97	Early stage	X				X	
98	Mid stage	X				X	
99	Late stage	X	X			X	X
100	Old-growth stage - unmanaged	X	X			X	X
101	Other - unmanaged	X				X	
102	<b>Key ecological functions</b>					Indicator	B
103	<b>Sensitivity to anthropogenic disturbance</b>	A,B,I,K,S, U	C,E,I,J,R, AA,BB,EE	A,B,J,M,O ,AA,CC		J,N,V,X	A,C,F,G,I, J,O,Q,DD

1	<b>Vernacular name</b>	Nilgiri Marten	Malabar black narrow mouthed frog	Large Wrinkled Frog	Large Wrinkled Frog	Nilgiri langur	Malabar Parakeet
2	<b>Scientific name</b>	<i>Martes gwatkinsi</i>	<i>Melanobatrachus indicus</i>	<i>Nyctibatrachus major</i>	<i>Nyctibatrachus major</i>	<i>Presbytis johni</i>	<i>Psittacula columboides</i>
3	<b>Taxonomic class</b>	M	A	A	A	M	B
4	<b>Legal Status - Wildlife Protection Act</b>	SII	SIV	SIV	SIV	SI	SIV
5	<b>Legal Status - CITES</b>					II	
6	<b>Conservation status - IUCN</b>	I	I				
7	<b>Endemism status</b>	ER	ER	ER	ER	ER	ER
8	<b>Residency status</b>	P	P	P	P	P	P
9	<b>Conservation area</b>	A	A	A	A	A	A
10	<b>Abundance / distribution status</b>	D	E	D	E	B	A
11	<b>Conflict with humans</b>					C	
12	<b>Champion and Seth Forest Types of India (to the group level):</b>						
13	Southern tropical wet evergreen forests	2	1	2	2	2	2
14	Tropical moist evergreen forest (GCA)						
15	Nilgiri sub-tropical evergreen forest	2	1	2	1	2	2
16	Tropical semi-evergreen forest (GCA, TCA)						
17	Northern tropical semi-evergreen forests						
18	Assam alluvial plain semi evergreen forests (GCA)						
19	Tropical moist deciduous forest (GCA, TCA)						
20	East Himalayan moist deciduous forests						
21	Southern tropical moist deciduous forest	2	0	2	2	2	2
22	South Indian tropical moist deciduous teak forests						
23	South Indian tropical moist deciduous mixed forests	2	1	2	1	2	2
24	Northern Indian tropical moist deciduous forests (TCA)						
25	Moist Bhabhar sal (TCA)						
26	Western light plain sal (TCA)						

27	Moist sal savannah (TCA)						
28	Alluvial sal – kamrup alluvial sal forests						
29	Low alluvial savannah woodland (TCA)						
30	Barringtonia swamp forests						
31	Eastern seasonal swamp low forests (Cephalanthus)						
32	Riparian fringing forests	2	2	2	2	1	2
33	Southern tropical dry deciduous forests	1	0	0	0	2	1
34	Southern tropical dry deciduous forests – dry teak forest	1	0	0	0	2	0
35	Dry peninsular sal forests						
36	Western light alluvium plains sal / dry sal forests (TCA)						
37	Dry sal forests						
38	Boswellia forests						
39	Southern cutch thorn forests	0	0	0	0	0	0
40	Dry savannah forest						
41	Foot hill and plateau sal – eastern hill sal						
42	Central Indian subtropical hill forests						
43	Southern wet temperate forests (sholas, ACA)	2	1	1	2	2	1
44	Shola type of mixed evergreen forest (GCA)						
45	Wet grassland habitat on hill plateaus (ACA, GCA)	0	0	1	0	0	0
46	<b>Other, non-Champion and Seth types</b>						
47	Southern moist and wet bamboo brakes	2	0	0	1	1	1
48	Canebrakes (TCA)						
49	Extensive bamboo areas (GCA)						
50	Secondary moist bamboo brakes						
51	Dry tall grasslands on hill plateaus (SCA)						
52	Wet, tall grasslands interspersed with woodland and swamps (TCA)						
53	Swamp ('tals') interspersed (TCA)						
54	Rivers (by name, TCA, ACA & GCA)	0	0	2	0	0	0
55	Catchment for tributaries to rivers (by name, SCA, TCA)						

56	Reservoirs (by name, TCA, SCA)	0	0	0	0	0	0
57	Teak plantations (ACA, SCA)	0	0	0	0	1	1
58	Sal plantations (100 yrs old; GCA)						
59	EXtensive plantation on grassland habitats of teak, shisham, and eucalyptus (TCA)						
60	Coffee and cardamom (ACA)	0	0	0	0	2	1
61	Tea (ACA)	0	0	0	0	0	0
62	Wattle (ACA)	0	0	0	0	1	0
63	Pinus (ACA)	0	0	0	0	1	0
64	Young jhum (<10 yrs; GCA)						
65	Middle jhum (10-20 yrs; GCA)						
66	Old jhum (>20 yrs; GCA)						
67	<b>Trophic category</b>	Ca	In	In	In	He	Fr
68	<b>Habitat elements/substrates</b>						
69	<b>Habitat elements of biotic origin (special habitats)</b>						
70	Snags	F					B
71	Snag recruits (dying trees, live trees with dead portions)	F					B
72	Hollow trees, chimney trees (living or dead)	B,F					B
73	Tree cavities (natural or created)	B,F					B
74	Large old trees (living)	F				B,F	B
75	Trees with fluting boles and buttresses	F					
76	Down wood	F	F				
77	Litter and duff layers	F	F	F	B,F		
78	Litter in streams	F	B		B,F		
79	Lianas	F				F	
80	Fruit-bearing shrubs	F					F
81	Fruit bearing trees	F				F	F
82	Epiphyte patches	F				F	F
83	<b>Habitat elements of geomorphic origin</b>						
84	Cliffs, talus, and ledges						
85	Caves						
86	Overhangs						
87	Dens (existing burrows dug by animals)						
88	Sheet rocks						
89	Large bouldery aggregates						
90	Rock outcrops						
91	Sandy banks and sand spits		B,F	B,F	B,F		
92	Salt licks (exposed mineral soils)						

93	Earth cuttings						
94	Man-made (anthropogenic) structures						
95	Additional / other (specify)		boulders, pools in streams				
96	<b>Structural stage</b>						
97	Early stage		X			X	
98	Mid stage		X		X	X	
99	Late stage	X	X		X	X	X
100	Old-growth stage - unmanaged	X	X		X	X	X
101	Other - unmanaged		X				
102	<b>Key ecological functions</b>					A,B	B
103	<b>Sensitivity to anthropogenic disturbance</b>	A,B,D,F,G ,I,S,T,U,X		S,U		A,C,E,F,G ,I,M,Q	F,G,U,X

1	<b>Vernacular name</b>	Grizzled Giant Squirrel	Anaimalai salea	Broad-tailed Grassbird	Burrowing Frog	Pompadour Green Pigeon	Bamboo Pit Viper
2	<b>Scientific name</b>	<i>Ratufa macroura</i>	<i>Salea anamallayana</i>	<i>Schoenicola platyura</i>	<i>Tomopterna parambikulamana</i>	<i>Treron pompadora</i>	<i>Trimeresurus gramineus</i>
3	<b>Taxonomic class</b>	M	A	B	A	B	R
4	<b>Legal Status - Wildlife Protection Act</b>	SI	NOT ASSIGNED??	SIV	SIV	SIV	SIV
5	<b>Legal Status - CITES</b>	II				III	
6	<b>Conservation status - IUCN</b>						
7	<b>Endemism status</b>	ER	ER	ER	ER	No	No
8	<b>Residency status</b>	P	P	P	P	P	P
9	<b>Conservation area</b>	A	A	A	A	A	A
10	<b>Abundance / distribution status</b>	D	D	C	D	C	B
11	<b>Conflict with humans</b>						
12	<b>Champion and Seth Forest Types of India (to the group level):</b>						
13	Southern tropical wet evergreen forests	0	0	0	2	2	2
14	Tropical moist evergreen forest (GCA)						
15	Nilgiri sub-tropical evergreen forest	0	0	1	2	2	2
16	Tropical semi-evergreen forest (GCA, TCA)						
17	Northern tropical semi-evergreen forests						
18	Assam alluvial plain semi evergreen forests (GCA)						
19	Tropical moist deciduous forest (GCA, TCA)						
20	East Himalayan moist deciduous forests						
21	Southern tropical moist deciduous forest	1	0	0	2	1	1
22	South Indian tropical moist deciduous teak forests						
23	South Indian tropical moist deciduous mixed forests	1	0	0	2	1	1
24	Northern Indian tropical moist deciduous forests (TCA)						
25	Moist Bhabhar sal (TCA)						
26	Western light plain sal (TCA)						

27	Moist sal savannah (TCA)						
28	Alluvial sal – kamrup alluvial sal forests						
29	Low alluvial savannah woodland (TCA)						
30	Barringtonia swamp forests						
31	Eastern seasonal swamp low forests (Cephalanthus)						
32	Riparian fringing forests	2	0	0	2	2	2
33	Southern tropical dry deciduous forests	2	0	0	1	0	0
34	Southern tropical dry deciduous forests – dry teak forest	2	0	0	1	0	0
35	Dry peninsular sal forests						
36	Western light alluvium plains sal / dry sal forests (TCA)						
37	Dry sal forests						
38	Boswellia forests						
39	Southern cutch thorn forests	2	0	0	0	0	0
40	Dry savannah forest						
41	Foot hill and plateau sal – eastern hill sal						
42	Central Indian subtropical hill forests						
43	Southern wet temperate forests (sholas, ACA)	0	2	1	2	2	2
44	Shola type of mixed evergreen forest (GCA)						
45	Wet grassland habitat on hill plateaus (ACA, GCA)	0	0	2	0	0	0
46	<b>Other, non-Champion and Seth types</b>						
47	Southern moist and wet bamboo brakes	0	0	0	2	1	2
48	Canebrakes (TCA)						
49	Extensive bamboo areas (GCA)						
50	Secondary moist bamboo brakes						
51	Dry tall grasslands on hill plateaus (SCA)						
52	Wet, tall grasslands interspersed with woodland and swamps (TCA)						
53	Swamp ('tals') interspersed (TCA)						
54	Rivers (by name, TCA, ACA & GCA)	0	0	0	0	0	0
55	Catchment for tributaries to rivers (by name, SCA, TCA)						

56	Reservoirs (by name, TCA, SCA)	0	0	0	0	0	0
57	Teak plantations (ACA, SCA)	0	0	0	1	0	0
58	Sal plantations (100 yrs old; GCA)						
59	EXtensive plantation on grassland habitats of teak, shisham, and eucalyptus (TCA)						
60	Coffee and cardamom (ACA)	0	0	0	0	1	0
61	Tea (ACA)	0	0	0	0	0	0
62	Wattle (ACA)	0	0	0	0	1	0
63	Pinus (ACA)	0	0	0	0	1	0
64	Young jhum (<10 yrs; GCA)						
65	Middle jhum (10-20 yrs; GCA)						
66	Old jhum (>20 yrs; GCA)						
67	<b>Trophic category</b>		In	In	In	Fr	Ca
68	<b>Habitat elements/substrates</b>						
69	<b>Habitat elements of biotic origin (special habitats)</b>						
70	Snags				B,F		F
71	Snag recruits (dying trees, live trees with dead portions)						F
72	Hollow trees, chimney trees (living or dead)				B,F		B,F
73	Tree cavities (natural or created)						B,F
74	Large old trees (living)					F	F
75	Trees with fluting boles and buttresses						F
76	Down wood				F		
77	Litter and duff layers				B,F		
78	Litter in streams						
79	Lianas						B,F
80	Fruit-bearing shrubs					F	
81	Fruit bearing trees					F	
82	Epiphyte patches						F
83	<b>Habitat elements of geomorphic origin</b>			?			
84	Cliffs, talus, and ledges			?			
85	Caves			?			
86	Overhangs			?			
87	Dens (existing burrows dug by animals)			?			
88	Sheet rocks			?			
89	Large bouldery aggregates			?			
90	Rock outcrops			?			
91	Sandy banks and sand spits			?			
92	Salt licks (exposed mineral soils)			?			

93	Earth cuttings			?			
94	Man-made (anthropogenic) structures			?			
95	Additional / other (specify)			?	ermite mounts		
96	<b>Structural stage</b>			?			
97	Early stage			?	X		
98	Mid stage			?	X		
99	Late stage			?	X	X	
100	Old-growth stage - unmanaged			?	X	X	X
101	Other - unmanaged			?	X		
102	<b>Key ecological functions</b>			?		B	
103	<b>Sensitivity to anthropogenic disturbance</b>		A,E,I,	?		D,G,I,S,U, X	B,D,K,S,T, U

1	<b>Vernacular name</b>	White-browed Bulbul	Green Imperial Pigeon	Dollarbird	Blue-bearded Bee-eater	Manipur Bush Quail	Bank Myna
2	<b>Scientific name</b>	<i>Pycnonotus luteolus</i>	<i>Ducula aenea</i>	<i>Eurystomus orientalis</i>	<i>Nyctyornis athertoni</i>	<i>Perdica manipurensis</i>	<i>Acridotheres ginginianus</i>
3	<b>Taxonomic class</b>	B	B	B	B	B	B
4	<b>Legal Status - Wildlife Protection Act</b>	SIV	SIV	SIV	SIV	SIV	SIV
5	<b>Legal Status - CITES</b>		III				
6	<b>Conservation status - IUCN</b>					R	
7	<b>Endemism status</b>	ER	No	No	No	No	No
8	<b>Residency status</b>	P	P	C	P	P	P
9	<b>Conservation area</b>	A	A,G	A,G	A,G	A,G	A,S
10	<b>Abundance / distribution status</b>	C	B	C	B	C	A
11	<b>Conflict with humans</b>						
12	<b>Champion and Seth Forest Types of India (to the group level):</b>						
13	Southern tropical wet evergreen forests	0	2	2	2	0	
14	Tropical moist evergreen forest (GCA)						
15	Nilgiri sub-tropical evergreen forest	0	2	2	1	0	
16	Tropical semi-evergreen forest (GCA, TCA)						
17	Northern tropical semi-evergreen forests						
18	Assam alluvial plain semi evergreen forests (GCA)						
19	Tropical moist deciduous forest (GCA, TCA)						
20	East Himalayan moist deciduous forests						
21	Southern tropical moist deciduous forest	1	2	2	2	0	
22	South Indian tropical moist deciduous teak forests						
23	South Indian tropical moist deciduous mixed forests	0	2	0	2	0	
24	Northern Indian tropical moist deciduous forests (TCA)						
25	Moist Bhabhar sal (TCA)						
26	Western light plain sal (TCA)						

27	Moist sal savannah (TCA)						
28	Alluvial sal – kamrup alluvial sal forests						
29	Low alluvial savannah woodland (TCA)						
30	Barringtonia swamp forests						
31	Eastern seasonal swamp low forests (Cephalanthus)						
32	Riparian fringing forests	0	2	2	2	0	
33	Southern tropical dry deciduous forests	2	1	0	1	1	1
34	Southern tropical dry deciduous forests – dry teak forest	2	0	0	1	1	1
35	Dry peninsular sal forests						
36	Western light alluvium plains sal / dry sal forests (TCA)						
37	Dry sal forests						
38	Boswellia forests						
39	Southern cutch thorn forests	2	0	0	1	2	
40	Dry savannah forest						
41	Foot hill and plateau sal – eastern hill sal						
42	Central Indian subtropical hill forests						
43	Southern wet temperate forests (sholas, ACA)	0	2	0	1	0	
44	Shola type of mixed evergreen forest (GCA)						
45	Wet grassland habitat on hill plateaus (ACA, GCA)	0		0	0	2	
46	<b>Other, non-Champion and Seth types</b>						
47	Southern moist and wet bamboo brakes	0	1	0	1	0	2
48	Canebrakes (TCA)						
49	Extensive bamboo areas (GCA)						
50	Secondary moist bamboo brakes						
51	Dry tall grasslands on hill plateaus (SCA)						2
52	Wet, tall grasslands interspersed with woodland and swamps (TCA)						
53	Swamp ('tals') interspersed (TCA)						
54	Rivers (by name, TCA, ACA & GCA)	0		1	0	0	
55	Catchment for tributaries to rivers (by name, SCA, TCA)						

56	Reservoirs (by name, TCA, SCA)	0		0	0	0	
57	Teak plantations (ACA, SCA)	1	1	1	1	1	1
58	Sal plantations (100 yrs old; GCA)						
59	EXtensive plantation on grassland habitats of teak, shisham, and eucalyptus (TCA)						
60	Coffee and cardamom (ACA)	1	1	1	1	0	
61	Tea (ACA)	0		0	0	0	
62	Wattle (ACA)	0		0	0	0	
63	Pinus (ACA)	0		0	0	0	
64	Young jhum (<10 yrs; GCA)						
65	Middle jhum (10-20 yrs; GCA)						
66	Old jhum (>20 yrs; GCA)						
67	<b>Trophic category</b>	He	Fr	In	In	Gr	Om
68	<b>Habitat elements/substrates</b>						
69	<b>Habitat elements of biotic origin (special habitats)</b>						
70	Snags			B,F	F		
71	Snag recruits (dying trees, live trees with dead portions)			B,F	F		
72	Hollow trees, chimney trees (living or dead)				F		B
73	Tree cavities (natural or created)			B			B
74	Large old trees (living)		B,F				
75	Trees with fluting boles and buttresses						
76	Down wood					F	
77	Litter and duff layers	F				F	F
78	Litter in streams					F	
79	Lianas		F				
80	Fruit-bearing shrubs	F	F			F	F
81	Fruit bearing trees	F	F				F
82	Epiphyte patches	B					
83	<b>Habitat elements of geomorphic origin</b>						
84	Cliffs, talus, and ledges						
85	Caves						
86	Overhangs						
87	Dens (existing burrows dug by animals)						
88	Sheet rocks						
89	Large bouldery aggregates					F	
90	Rock outcrops					F	
91	Sandy banks and sand spits				B		
92	Salt licks (exposed mineral soils)						

93	Earth cuttings				B		
94	Man-made (anthropogenic) structures						B
95	Additional / other (specify)						
96	<b>Structural stage</b>						
97	Early stage	X			X	X	X
98	Mid stage	X			X		X
99	Late stage		X	X	X		
100	Old-growth stage - unmanaged		X	X	X		
101	Other - unmanaged				X		X
102	<b>Key ecological functions</b>	B	B				
103	<b>Sensitivity to anthropogenic disturbance</b>	B,G,I,R,U	G,S,X	C,D,H,	R,W,DD	B,I,R,U,X	

1	<b>Vernacular name</b>	Rufous Woodpecker	White-bellied Woodpecker	Dusky Crag Martin	Hyena	Malabar Whistling Thrush	Osprey
2	<b>Scientific name</b>	<i>Celeus brachyurus</i>	<i>Dryocopus javensis</i>	<i>Hirundo concolor</i>	<i>Hyaena hyaena</i>	<i>Myiophonus horsfieldii</i>	<i>Pandion haliaetus</i>
3	<b>Taxonomic class</b>	B	B	B	M	B	B
4	<b>Legal Status - Wildlife Protection Act</b>	SIV	SIV	SIV	SIII	SIV	SI
5	<b>Legal Status - CITES</b>		I		III		II
6	<b>Conservation status - IUCN</b>						E
7	<b>Endemism status</b>	No	No	No	No	ER	No
8	<b>Residency status</b>	P	P	P	P	P	P
9	<b>Conservation area</b>	A,S	A,S	A,S	A,S	A,S	A,S
10	<b>Abundance / distribution status</b>	A	D	B	C	B	B
11	<b>Conflict with humans</b>						
12	<b>Champion and Seth Forest Types of India (to the group level):</b>						
13	Southern tropical wet evergreen forests		2	1	2	1	
14	Tropical moist evergreen forest (GCA)			2	2	2	2
15	Nilgiri sub-tropical evergreen forest		1	2	2	2	2
16	Tropical semi-evergreen forest (GCA, TCA)			1	2	1	1
17	Northern tropical semi-evergreen forests			1	2	1	
18	Assam alluvial plain semi evergreen forests (GCA)			1	2	1	1
19	Tropical moist deciduous forest (GCA, TCA)			2	2	2	2
20	East Himalayan moist deciduous forests			1	0		
21	Southern tropical moist deciduous forest		1	1	2	1	
22	South Indian tropical moist deciduous teak forests			2	2	2	2
23	South Indian tropical moist deciduous mixed forests	2	2	2	2		1
24	Northern Indian tropical moist deciduous forests (TCA)			2	2	2	2
25	Moist Bhabhar sal (TCA)				2		
26	Western light plain sal (TCA)				2		

27	Moist sal savannah (TCA)				2		
28	Alluvial sal – kamrup alluvial sal forests				2		
29	Low alluvial savannah woodland (TCA)				2		
30	Barringtonia swamp forests				2		
31	Eastern seasonal swamp low forests (Cephalanthus)				2		
32	Riparian fringing forests		2		2		
33	Southern tropical dry deciduous forests	2	0				
34	Southern tropical dry deciduous forests – dry teak forest	2	0				
35	Dry peninsular sal forests						
36	Western light alluvium plains sal / dry sal forests (TCA)						
37	Dry sal forests						
38	Boswellia forests						
39	Southern catch thorn forests	2	0				
40	Dry savannah forest						
41	Foot hill and plateau sal – eastern hill sal						
42	Central Indian subtropical hill forests						
43	Southern wet temperate forests (sholas, ACA)		1				
44	Shola type of mixed evergreen forest (GCA)						
45	Wet grassland habitat on hill plateaus (ACA, GCA)		0				
46	<b>Other, non-Champion and Seth types</b>						
47	Southern moist and wet bamboo brakes		0				
48	Canebrakes (TCA)						
49	Extensive bamboo areas (GCA)						
50	Secondary moist bamboo brakes						
51	Dry tall grasslands on hill plateaus (SCA)						
52	Wet, tall grasslands interspersed with woodland and swamps (TCA)						
53	Swamp ('tals') interspersed (TCA)						
54	Rivers (by name, TCA, ACA & GCA)		0				
55	Catchment for tributaries to rivers (by name, SCA, TCA)						

56	Reservoirs (by name, TCA, SCA)		0				
57	Teak plantations (ACA, SCA)	1	1		2		
58	Sal plantations (100 yrs old; GCA)				2		
59	EXtensive plantation on grassland habitats of teak, shisham, and eucalyptus (TCA)						
60	Coffee and cardamom (ACA)		1				
61	Tea (ACA)		0				
62	Wattle (ACA)		0				
63	Pinus (ACA)		0				
64	Young jhum (<10 yrs; GCA)						
65	Middle jhum (10-20 yrs; GCA)						
66	Old jhum (>20 yrs; GCA)						
67	<b>Trophic category</b>	In	In	In	Ca	In	Pi
68	<b>Habitat elements/substrates</b>						
69	<b>Habitat elements of biotic origin (special habitats)</b>						
70	Snags	B,F	B,F				
71	Snag recruits (dying trees, live trees with dead portions)	B,F	B,F				
72	Hollow trees, chimney trees (living or dead)	B,F	B,F				
73	Tree cavities (natural or created)	B,F	B,F				
74	Large old trees (living)	F	B,F				
75	Trees with fluting boles and buttresses	F	F				
76	Down wood	F	F				
77	Litter and duff layers						
78	Litter in streams						
79	Lianas						
80	Fruit-bearing shrubs						
81	Fruit bearing trees						
82	Epiphyte patches		F				
83	<b>Habitat elements of geomorphic origin</b>						
84	Cliffs, talus, and ledges						
85	Caves						
86	Overhangs						
87	Dens (existing burrows dug by animals)						
88	Sheet rocks						
89	Large bouldery aggregates						
90	Rock outcrops						
91	Sandy banks and sand spits						
92	Salt licks (exposed mineral soils)						

93	Earth cuttings						
94	Man-made (anthropogenic) structures						
95	Additional / other (specify)						
96	<b>Structural stage</b>						
97	Early stage			X			
98	Mid stage	X		X		X	X
99	Late stage	X	X	X		X	X
100	Old-growth stage - unmanaged	X	X	X		X	X
101	Other - unmanaged			X			X
102	<b>Key ecological functions</b>	C	C				
103	<b>Sensitivity to anthropogenic disturbance</b>	K,M,S,T,U	K,S			B,C,D,E,I, K,R,U,AA	E,J,N,AA

1	<b>Vernacular name</b>	Painted Bush Quail	Indian Giant Squirrel	Indian Chevrotain. Mouse Deer	Gaur	Wild Dog	Perigrine Falcon
2	<b>Scientific name</b>	<i>Perdula erythrorhyncha</i>	<i>Ratufa indica</i>	<i>Tragulus meminna</i>	<i>Bos gaurus</i>	<i>Cuon alpinus</i>	<i>Falco peregrinus japonensis</i>
3	<b>Taxonomic class</b>	B	M	M	M	M	B
4	<b>Legal Status - Wildlife Protection Act</b>	SIV	SII	SI	SI	SII	SI
5	<b>Legal Status - CITES</b>		II		I	II	I
6	<b>Conservation status - IUCN</b>		E		V	V	E
7	<b>Endemism status</b>	No	No	No	No	No	No
8	<b>Residency status</b>	P	P	P	P	P	C
9	<b>Conservation area</b>	A,S	A,S	A,S	A,S,G	A,S,G	A,S,G,T
10	<b>Abundance / distribution status</b>	B	A	C	A	B	A*
11	<b>Conflict with humans</b>						
12	<b>Champion and Seth Forest Types of India (to the group level):</b>						
13	Southern tropical wet evergreen forests	1	1	2		1	1
14	Tropical moist evergreen forest (GCA)		1	1		1	
15	Nilgiri sub-tropical evergreen forest		2			2	1
16	Tropical semi-evergreen forest (GCA, TCA)		1	2		1	
17	Northern tropical semi-evergreen forests		1	1		1	
18	Assam alluvial plain semi evergreen forests (GCA)		1	1		1	
19	Tropical moist deciduous forest (GCA, TCA)		1			2	
20	East Himalayan moist deciduous forests		2				
21	Southern tropical moist deciduous forest	1		2		1	1
22	South Indian tropical moist deciduous teak forests		1	1		2	
23	South Indian tropical moist deciduous mixed forests	1	1			1	1
24	Northern Indian tropical moist deciduous forests (TCA)		1			2	
25	Moist Bhabhar sal (TCA)						
26	Western light plain sal (TCA)						

27	Moist sal savannah (TCA)						
28	Alluvial sal – kamrup alluvial sal forests						
29	Low alluvial savannah woodland (TCA)						
30	Barringtonia swamp forests						
31	Eastern seasonal swamp low forests (Cephalanthus)						
32	Riparian fringing forests	1					2
33	Southern tropical dry deciduous forests	1					1
34	Southern tropical dry deciduous forests – dry teak forest	1					1
35	Dry peninsular sal forests						
36	Western light alluvium plains sal / dry sal forests (TCA)						
37	Dry sal forests						
38	Boswellia forests						
39	Southern catch thorn forests	1					1
40	Dry savannah forest						
41	Foot hill and plateau sal – eastern hill sal						
42	Central Indian subtropical hill forests	1					
43	Southern wet temperate forests (sholas, ACA)						2
44	Shola type of mixed evergreen forest (GCA)						
45	Wet grassland habitat on hill plateaus (ACA, GCA)						2
46	<b>Other, non-Champion and Seth types</b>						
47	Southern moist and wet bamboo brakes	1					1
48	Canebrakes (TCA)						
49	Extensive bamboo areas (GCA)						
50	Secondary moist bamboo brakes						
51	Dry tall grasslands on hill plateaus (SCA)	1					
52	Wet, tall grasslands interspersed with woodland and swamps (TCA)						
53	Swamp ('tals') interspersed (TCA)						
54	Rivers (by name, TCA, ACA & GCA)						2
55	Catchment for tributaries to rivers (by name, SCA, TCA)	1					

56	Reservoirs (by name, TCA, SCA)	1					2
57	Teak plantations (ACA, SCA)			2			1
58	Sal plantations (100 yrs old; GCA)		2				
59	EXtensive plantation on grassland habitats of teak, shisham, and eucalyptus (TCA)						
60	Coffee and cardamom (ACA)						1
61	Tea (ACA)						1
62	Wattle (ACA)						1
63	Pinus (ACA)						1
64	Young jhum (<10 yrs; GCA)						
65	Middle jhum (10-20 yrs; GCA)						
66	Old jhum (>20 yrs; GCA)						
67	<b>Trophic category</b>	Gr	He	He	He	Ca	Ca
68	<b>Habitat elements/substrates</b>						
69	<b>Habitat elements of biotic origin (special habitats)</b>						
70	Snags				Oth		F
71	Snag recruits (dying trees, live trees with dead portions)						F
72	Hollow trees, chimney trees (living or dead)				Oth		
73	Tree cavities (natural or created)						
74	Large old trees (living)						
75	Trees with fluting boles and buttresses						
76	Down wood						
77	Litter and duff layers	B,F			F		
78	Litter in streams						
79	Lianas				F		
80	Fruit-bearing shrubs	F			F		
81	Fruit bearing trees				F		
82	Epiphyte patches						
83	<b>Habitat elements of geomorphic origin</b>						
84	Cliffs, talus, and ledges						B,F
85	Caves						
86	Overhangs						
87	Dens (existing burrows dug by animals)						
88	Sheet rocks						
89	Large bouldery aggregates				Oth		
90	Rock outcrops						
91	Sandy banks and sand spits				Oth		
92	Salt licks (exposed mineral soils)				F		

93	Earth cuttings						
94	Man-made (anthropogenic) structures						
95	Additional / other (specify)						
96	<b>Structural stage</b>						
97	Early stage	X			X		
98	Mid stage				X		
99	Late stage				X		
100	Old-growth stage - unmanaged				X		
101	Other - unmanaged				X		
102	<b>Key ecological functions</b>	B			B,H		
103	<b>Sensitivity to anthropogenic disturbance</b>	B,G,I,K,U, X			B,E,F,G,I, L,R,X		M,V,X

1	<b>Vernacular name</b>	Bonellis Eagle	Great Hornbill	Eurasian Cuckoo	Brown-capped Pygmy Woodpecker	Streak-throated Swallow	Southern Grey Shrike
2	<b>Scientific name</b>	<i>Heiraaetus fasciatus</i>	<i>Buceros bicornis</i>	<i>Cuculus canorus</i>	<i>Dendrocopos nanus</i>	<i>Hirundo fluviicola</i>	<i>Lanius meridionalis</i>
3	<b>Taxonomic class</b>	B	B	B	B	B	B
4	<b>Legal Status - Wildlife Protection Act</b>	SI	SI	SIV	SIV	SIV	SIV
5	<b>Legal Status - CITES</b>	III	I				
6	<b>Conservation status - IUCN</b>						
7	<b>Endemism status</b>	No	No	No	No	No	No
8	<b>Residency status</b>	P	P	P	P	P	P
9	<b>Conservation area</b>	A,S,G,T	A,S,T	A,S,T	A,S,T	A,S,T	A,S,T
10	<b>Abundance / distribution status</b>	B	C	B	B	B	B
11	<b>Conflict with humans</b>						
12	<b>Champion and Seth Forest Types of India (to the group level):</b>						
13	Southern tropical wet evergreen forests	2	1	2	0		
14	Tropical moist evergreen forest (GCA)		1	2			
15	Nilgiri sub-tropical evergreen forest	2	2	2	0		
16	Tropical semi-evergreen forest (GCA, TCA)		1	2			
17	Northern tropical semi-evergreen forests		1	2			
18	Assam alluvial plain semi evergreen forests (GCA)		1	2			
19	Tropical moist deciduous forest (GCA, TCA)		2	2			
20	East Himalayan moist deciduous forests						
21	Southern tropical moist deciduous forest	2		1	1		1
22	South Indian tropical moist deciduous teak forests		1	2			
23	South Indian tropical moist deciduous mixed forests	2	1	1	1	1	1
24	Northern Indian tropical moist deciduous forests (TCA)		2	2			
25	Moist Bhabhar sal (TCA)						
26	Western light plain sal (TCA)						

27	Moist sal savannah (TCA)						
28	Alluvial sal – kamrup alluvial sal forests						
29	Low alluvial savannah woodland (TCA)						
30	Barringtonia swamp forests						
31	Eastern seasonal swamp low forests (Cephalanthus)						
32	Riparian fringing forests	2			1		1
33	Southern tropical dry deciduous forests	2			2	2	2
34	Southern tropical dry deciduous forests – dry teak forest	2			2	2	2
35	Dry peninsular sal forests						
36	Western light alluvium plains sal / dry sal forests (TCA)						
37	Dry sal forests						
38	Boswellia forests					1	
39	Southern cutch thorn forests	1			2	2	2
40	Dry savannah forest						
41	Foot hill and plateau sal – eastern hill sal						
42	Central Indian subtropical hill forests					1	1
43	Southern wet temperate forests (sholas, ACA)	2			0		
44	Shola type of mixed evergreen forest (GCA)						
45	Wet grassland habitat on hill plateaus (ACA, GCA)	1			0		
46	<b>Other, non-Champion and Seth types</b>						
47	Southern moist and wet bamboo brakes	1			0	1	
48	Canebrakes (TCA)						
49	Extensive bamboo areas (GCA)						
50	Secondary moist bamboo brakes						
51	Dry tall grasslands on hill plateaus (SCA)					1	1
52	Wet, tall grasslands interspersed with woodland and swamps (TCA)						
53	Swamp ('tals') interspersed (TCA)						
54	Rivers (by name, TCA, ACA & GCA)	0			0		
55	Catchment for tributaries to rivers (by name, SCA, TCA)						

56	Reservoirs (by name, TCA, SCA)	0			0		
57	Teak plantations (ACA, SCA)	2			1	1	1
58	Sal plantations (100 yrs old; GCA)						
59	EXtensive plantation on grassland habitats of teak, shisham, and eucalyptus (TCA)						
60	Coffee and cardamom (ACA)	2			1		
61	Tea (ACA)	1			0		
62	Wattle (ACA)	1			0		
63	Pinus (ACA)	1			0		
64	Young jhum (<10 yrs; GCA)						
65	Middle jhum (10-20 yrs; GCA)						
66	Old jhum (>20 yrs; GCA)						
67	<b>Trophic category</b>	Ca	Fr	In	In	In	In
68	<b>Habitat elements/substrates</b>						
69	<b>Habitat elements of biotic origin (special habitats)</b>						
70	Snags		F		B,F		F
71	Snag recruits (dying trees, live trees with dead portions)		F		B,F		F
72	Hollow trees, chimney trees (living or dead)		B		B,F		
73	Tree cavities (natural or created)		B		B,F		
74	Large old trees (living)	F	F		B,F		B,F
75	Trees with fluting boles and buttresses		F		F		F
76	Down wood						
77	Litter and duff layers						F
78	Litter in streams						
79	Lianas		F				F
80	Fruit-bearing shrubs		F				
81	Fruit bearing trees		F				
82	Epiphyte patches		F				B,F
83	<b>Habitat elements of geomorphic origin</b>						
84	Cliffs, talus, and ledges					B	
85	Caves					B	
86	Overhangs					B	
87	Dens (existing burrows dug by animals)						
88	Sheet rocks					F	
89	Large bouldery aggregates					F	
90	Rock outcrops					F	
91	Sandy banks and sand spits					F	
92	Salt licks (exposed mineral soils)						

93	Earth cuttings						
94	Man-made (anthropogenic) structures					B	
95	Additional / other (specify)						
96	<b>Structural stage</b>						
97	Early stage					X	X
98	Mid stage	X		X		X	X
99	Late stage	X	X	X	X	X	
100	Old-growth stage - unmanaged	X	X	X	X	X	
101	Other - unmanaged			X	X	X	
102	<b>Key ecological functions</b>		B				
103	<b>Sensitivity to anthropogenic disturbance</b>	C,I,Q	B,C,F,G,I, K,S,T,U,X, AA				

1	<b>Vernacular name</b>	Brown-headed Barbet	Honey Badger or Ratel	Sloth bear	Mottled Wood Owl	Yellow-wattled Lapwing	Spotted Deer
2	<b>Scientific name</b>	<i>Megalaima zeylanica</i>	<i>Mellivora capensis</i>	<i>Melursus urcinus</i>	<i>Strix ocellata</i>	<i>Vanelus malabaricus</i>	<i>Axis axis</i>
3	<b>Taxonomic class</b>	B	M	M	B	B	M
4	<b>Legal Status - Wildlife Protection Act</b>	SIV	SI	SI	SIV	SIV	SIII
5	<b>Legal Status - CITES</b>		II		II		
6	<b>Conservation status - IUCN</b>			V			
7	<b>Endemism status</b>	No	No	No	No	No	No
8	<b>Residency status</b>	P	P	P	P	P	P
9	<b>Conservation area</b>	A,S,T	A,S,T	A,S,T	A,S,T	A,S,T	A,S,T,G
10	<b>Abundance / distribution status</b>	A	C	B	B	A	A
11	<b>Conflict with humans</b>						
12	<b>Champion and Seth Forest Types of India (to the group level):</b>						
13	Southern tropical wet evergreen forests	2	2	2			
14	Tropical moist evergreen forest (GCA)		2	2			
15	Nilgiri sub-tropical evergreen forest	1	2	2			
16	Tropical semi-evergreen forest (GCA, TCA)		2	2			
17	Northern tropical semi-evergreen forests		2	2			
18	Assam alluvial plain semi evergreen forests (GCA)		2	2			
19	Tropical moist deciduous forest (GCA, TCA)		2	2			
20	East Himalayan moist deciduous forests						
21	Southern tropical moist deciduous forest	1	2	2			
22	South Indian tropical moist deciduous teak forests		2	2			
23	South Indian tropical moist deciduous mixed forests	2	2	2			
24	Northern Indian tropical moist deciduous forests (TCA)			2			
25	Moist Bhabhar sal (TCA)						
26	Western light plain sal (TCA)						

27	Moist sal savannah (TCA)						
28	Alluvial sal – kamrup alluvial sal forests						
29	Low alluvial savannah woodland (TCA)						
30	Barringtonia swamp forests						
31	Eastern seasonal swamp low forests (Cephalanthus)						
32	Riparian fringing forests	2					
33	Southern tropical dry deciduous forests	1					
34	Southern tropical dry deciduous forests – dry teak forest	1					
35	Dry peninsular sal forests						
36	Western light alluvium plains sal / dry sal forests (TCA)						
37	Dry sal forests						
38	Boswellia forests						
39	Southern catch thorn forests	1					
40	Dry savannah forest						
41	Foot hill and plateau sal – eastern hill sal						
42	Central Indian subtropical hill forests						
43	Southern wet temperate forests (sholas, ACA)	2					
44	Shola type of mixed evergreen forest (GCA)						
45	Wet grassland habitat on hill plateaus (ACA, GCA)	0					
46	<b>Other, non-Champion and Seth types</b>						
47	Southern moist and wet bamboo brakes	0					
48	Canebrakes (TCA)						
49	Extensive bamboo areas (GCA)						
50	Secondary moist bamboo brakes						
51	Dry tall grasslands on hill plateaus (SCA)						
52	Wet, tall grasslands interspersed with woodland and swamps (TCA)						
53	Swamp ('tals') interspersed (TCA)						
54	Rivers (by name, TCA, ACA & GCA)	0					
55	Catchment for tributaries to rivers (by name, SCA, TCA)						

56	Reservoirs (by name, TCA, SCA)	0					
57	Teak plantations (ACA, SCA)	0	1	2			
58	Sal plantations (100 yrs old; GCA)						
59	EXtensive plantation on grassland habitats of teak, shisham, and eucalyptus (TCA)						
60	Coffee and cardamom (ACA)	1					
61	Tea (ACA)	1					
62	Wattle (ACA)	0					
63	Pinus (ACA)	0					
64	Young jhum (<10 yrs; GCA)						
65	Middle jhum (10-20 yrs; GCA)						
66	Old jhum (>20 yrs; GCA)						
67	<b>Trophic category</b>	Fr	Om	Om			He
68	<b>Habitat elements/substrates</b>						
69	<b>Habitat elements of biotic origin (special habitats)</b>						
70	Snags	B,F					
71	Snag recruits (dying trees, live trees with dead portions)	B,F					
72	Hollow trees, chimney trees (living or dead)	B					
73	Tree cavities (natural or created)	B					
74	Large old trees (living)	F					
75	Trees with fluting boles and buttresses						
76	Down wood						
77	Litter and duff layers						F
78	Litter in streams						
79	Lianas		F				F
80	Fruit-bearing shrubs	F	F				F
81	Fruit bearing trees	F	F				F
82	Epiphyte patches	F					
83	<b>Habitat elements of geomorphic origin</b>						
84	Cliffs, talus, and ledges						
85	Caves						
86	Overhangs						
87	Dens (existing burrows dug by animals)						
88	Sheet rocks						
89	Large bouldery aggregates						
90	Rock outcrops						
91	Sandy banks and sand spits						
92	Salt licks (exposed mineral soils)						F

93	Earth cuttings						
94	Man-made (anthropogenic) structures						
95	Additional / other (specify)						
96	<b>Structural stage</b>						
97	Early stage	X	X			X	X
98	Mid stage	X	X		X	X	X
99	Late stage	X	X		X		
100	Old-growth stage - unmanaged	X	X		X		
101	Other - unmanaged	X	X				
102	<b>Key ecological functions</b>	B					B,H
103	<b>Sensitivity to anthropogenic disturbance</b>	F,I,K,S,U				E,I,L,N,R	B,E,F,G,I, L,R,X

1	<b>Vernacular name</b>	Eurasian Eagle Owl	Eurasian Thick-knee	Sambar	Marsh Crocodile	Indian Cuckoo	Short-nosed Fruit Bat
2	<b>Scientific name</b>	<i>Bubo bubo</i>	<i>Burhinus oedicnemus</i>	<i>Cervus unicorn</i>	<i>Crocodilus palustris</i>	<i>Cuculus micropterus</i>	<i>Cynopterus sphinx</i>
3	<b>Taxonomic class</b>	B	B	M	R	B	M
4	<b>Legal Status - Wildlife Protection Act</b>	SIV	SIV	SIII	SI	SIV	SV
5	<b>Legal Status - CITES</b>	II			I		
6	<b>Conservation status - IUCN</b>				V		
7	<b>Endemism status</b>	No	No	No	No	No	No
8	<b>Residency status</b>	P	P	P	P	P	P
9	<b>Conservation area</b>	A,S,T,G	A,S,T,G	A,S,T,G	A,S,T,G	A,S,T,G	A,S,T,G
10	<b>Abundance / distribution status</b>	B	B	A	C	B	B
11	<b>Conflict with humans</b>						
12	<b>Champion and Seth Forest Types of India (to the group level):</b>						
13	Southern tropical wet evergreen forests	1	1		2	1	
14	Tropical moist evergreen forest (GCA)		1		2	1	
15	Nilgiri sub-tropical evergreen forest		2		2	2	
16	Tropical semi-evergreen forest (GCA, TCA)	1	1		2	1	
17	Northern tropical semi-evergreen forests		2		2	1	
18	Assam alluvial plain semi evergreen forests (GCA)	1	2		2	1	
19	Tropical moist deciduous forest (GCA, TCA)		2		2	1	
20	East Himalayan moist deciduous forests	1	2			2	
21	Southern tropical moist deciduous forest	2	2		2	1	
22	South Indian tropical moist deciduous teak forests		2		2	1	
23	South Indian tropical moist deciduous mixed forests		1		2	1	
24	Northern Indian tropical moist deciduous forests (TCA)		0		2	1	
25	Moist Bhabhar sal (TCA)		0				
26	Western light plain sal (TCA)		1				

27	Moist sal savannah (TCA)		1				
28	Alluvial sal – kamrup alluvial sal forests		0				
29	Low alluvial savannah woodland (TCA)		1				
30	Barringtonia swamp forests						
31	Eastern seasonal swamp low forests (Cephalanthus)						
32	Riparian fringing forests						
33	Southern tropical dry deciduous forests						
34	Southern tropical dry deciduous forests – dry teak forest						
35	Dry peninsular sal forests						
36	Western light alluvium plains sal / dry sal forests (TCA)						
37	Dry sal forests						
38	Boswellia forests						
39	Southern catch thorn forests						
40	Dry savannah forest						
41	Foot hill and plateau sal – eastern hill sal						
42	Central Indian subtropical hill forests						
43	Southern wet temperate forests (sholas, ACA)						
44	Shola type of mixed evergreen forest (GCA)						
45	Wet grassland habitat on hill plateaus (ACA, GCA)						
46	<b>Other, non-Champion and Seth types</b>						
47	Southern moist and wet bamboo brakes						
48	Canebrakes (TCA)						
49	Extensive bamboo areas (GCA)						
50	Secondary moist bamboo brakes						
51	Dry tall grasslands on hill plateaus (SCA)						
52	Wet, tall grasslands interspersed with woodland and swamps (TCA)						
53	Swamp ('tals') interspersed (TCA)						
54	Rivers (by name, TCA, ACA & GCA)						
55	Catchment for tributaries to rivers (by name, SCA, TCA)						

56	Reservoirs (by name, TCA, SCA)						
57	Teak plantations (ACA, SCA)	1				1	
58	Sal plantations (100 yrs old; GCA)					2	
59	EXtensive plantation on grassland habitats of teak, shisham, and eucalyptus (TCA)						
60	Coffee and cardamom (ACA)						
61	Tea (ACA)						
62	Wattle (ACA)						
63	Pinus (ACA)						
64	Young jhum (<10 yrs; GCA)						
65	Middle jhum (10-20 yrs; GCA)						
66	Old jhum (>20 yrs; GCA)						
67	<b>Trophic category</b>			He		In	Fr
68	<b>Habitat elements/substrates</b>						
69	<b>Habitat elements of biotic origin (special habitats)</b>						
70	Snags						
71	Snag recruits (dying trees, live trees with dead portions)						
72	Hollow trees, chimney trees (living or dead)						B,F
73	Tree cavities (natural or created)						B,F
74	Large old trees (living)						B,F
75	Trees with fluting boles and buttresses						
76	Down wood						
77	Litter and duff layers			F			
78	Litter in streams						
79	Lianas			F			
80	Fruit-bearing shrubs			F			F
81	Fruit bearing trees			F			F
82	Epiphyte patches						
83	<b>Habitat elements of geomorphic origin</b>						
84	Cliffs, talus, and ledges						
85	Caves						Oth
86	Overhangs						Oth
87	Dens (existing burrows dug by animals)						
88	Sheet rocks						
89	Large bouldery aggregates			Oth			
90	Rock outcrops						
91	Sandy banks and sand spits						
92	Salt licks (exposed mineral soils)			F			

93	Earth cuttings						
94	Man-made (anthropogenic) structures						
95	Additional / other (specify)						
96	<b>Structural stage</b>						
97	Early stage					X	X
98	Mid stage			X		X	X
99	Late stage			X		X	X
100	Old-growth stage - unmanaged			X		X	X
101	Other - unmanaged					X	X
102	<b>Key ecological functions</b>			B,H			B
103	<b>Sensitivity to anthropogenic disturbance</b>			B,E,F,G,I, L,R,X			K,M,S,T,U

1	<b>Vernacular name</b>	Tickell's Blue Flycatcher	Lesser Whistling Duck	Thickbilled Flowerpecker	Greater Racket-tailed Drongo	Verditer Flycatcher	Leopard Cat
2	<b>Scientific name</b>	<i>Cyornis tickelliae</i>	<i>Dendrocygna javanica</i>	<i>Dicaeum agile</i>	<i>Dicrurus paradiseus</i>	<i>Eumyias thalassina</i>	<i>Felis bengalensis bengalensis</i>
3	<b>Taxonomic class</b>	B	B	B	B	B	M
4	<b>Legal Status - Wildlife Protection Act</b>	SIV	SIV	SIV	SIV	SIV	SI
5	<b>Legal Status - CITES</b>						I
6	<b>Conservation status - IUCN</b>						
7	<b>Endemism status</b>	No	No	No	No	No	No
8	<b>Residency status</b>	P	P	P	P	P	P
9	<b>Conservation area</b>	A,S,T,G	A,S,T,G	A,S,T,G	A,S,T,G	A,S,T,G	A,S,T,G
10	<b>Abundance / distribution status</b>	A	A	A	A	B	B
11	<b>Conflict with humans</b>						
12	<b>Champion and Seth Forest Types of India (to the group level):</b>						
13	Southern tropical wet evergreen forests	1			2	2	2
14	Tropical moist evergreen forest (GCA)						
15	Nilgiri sub-tropical evergreen forest			1	2		
16	Tropical semi-evergreen forest (GCA, TCA)						
17	Northern tropical semi-evergreen forests						
18	Assam alluvial plain semi evergreen forests (GCA)						
19	Tropical moist deciduous forest (GCA, TCA)						
20	East Himalayan moist deciduous forests			1			
21	Southern tropical moist deciduous forest	1	1		2	2	2
22	South Indian tropical moist deciduous teak forests						
23	South Indian tropical moist deciduous mixed forests	1			2	2	
24	Northern Indian tropical moist deciduous forests (TCA)						
25	Moist Bhabhar sal (TCA)						
26	Western light plain sal (TCA)						

27	Moist sal savannah (TCA)						
28	Alluvial sal – kamrup alluvial sal forests						
29	Low alluvial savannah woodland (TCA)						
30	Barringtonia swamp forests						
31	Eastern seasonal swamp low forests (Cephalanthus)						
32	Riparian fringing forests	2			2	2	
33	Southern tropical dry deciduous forests	1	2		2	2	
34	Southern tropical dry deciduous forests – dry teak forest	1	2		2	2	
35	Dry peninsular sal forests						
36	Western light alluvium plains sal / dry sal forests (TCA)						
37	Dry sal forests						
38	Boswellia forests	1			1	2	
39	Southern cutch thorn forests				1	2	
40	Dry savannah forest						
41	Foot hill and plateau sal – eastern hill sal						
42	Central Indian subtropical hill forests				2	2	
43	Southern wet temperate forests (sholas, ACA)				2		2
44	Shola type of mixed evergreen forest (GCA)						
45	Wet grassland habitat on hill plateaus (ACA, GCA)						
46	<b>Other, non-Champion and Seth types</b>						
47	Southern moist and wet bamboo brakes		1		1	2	
48	Canebrakes (TCA)						
49	Extensive bamboo areas (GCA)						
50	Secondary moist bamboo brakes						
51	Dry tall grasslands on hill plateaus (SCA)		2			1	
52	Wet, tall grasslands interspersed with woodland and swamps (TCA)						
53	Swamp ('tals') interspersed (TCA)						
54	Rivers (by name, TCA, ACA & GCA)						
55	Catchment for tributaries to rivers (by name, SCA, TCA)						

56	Reservoirs (by name, TCA, SCA)	1					
57	Teak plantations (ACA, SCA)	1	1	1	1	2	
58	Sal plantations (100 yrs old; GCA)						
59	EXtensive plantation on grassland habitats of teak, shisham, and eucalyptus (TCA)						
60	Coffee and cardamom (ACA)						
61	Tea (ACA)						
62	Wattle (ACA)						
63	Pinus (ACA)						
64	Young jhum (<10 yrs; GCA)						
65	Middle jhum (10-20 yrs; GCA)						
66	Old jhum (>20 yrs; GCA)						
67	<b>Trophic category</b>	In	He	Om	In	In	Ca
68	<b>Habitat elements/substrates</b>						
69	<b>Habitat elements of biotic origin (special habitats)</b>						
70	Snags				F	F	
71	Snag recruits (dying trees, live trees with dead portions)				F	F	
72	Hollow trees, chimney trees (living or dead)						B
73	Tree cavities (natural or created)		B			B	B
74	Large old trees (living)	F			B,F	F	
75	Trees with fluting boles and buttresses				F	F	
76	Down wood						
77	Litter and duff layers	F			F	F	
78	Litter in streams		F				
79	Lianas	F			F	F	
80	Fruit-bearing shrubs	F			F	F	
81	Fruit bearing trees				F	F	
82	Epiphyte patches	F			B,F	F	
83	<b>Habitat elements of geomorphic origin</b>						
84	Cliffs, talus, and ledges						
85	Caves						
86	Overhangs						
87	Dens (existing burrows dug by animals)						
88	Sheet rocks						
89	Large bouldery aggregates						
90	Rock outcrops		F				
91	Sandy banks and sand spits		F				
92	Salt licks (exposed mineral soils)						

93	Earth cuttings						
94	Man-made (anthropogenic) structures	B					
95	Additional / other (specify)						
96	<b>Structural stage</b>						
97	Early stage	X		X	X		
98	Mid stage	X		X	X	X	
99	Late stage	X	X	X	X	X	X
100	Old-growth stage - unmanaged	X	X	X	X	X	X
101	Other - unmanaged	X		X	X		
102	<b>Key ecological functions</b>		Agri Pest				
103	<b>Sensitivity to anthropogenic disturbance</b>		E,X			B,D,I,K,S, U	X

1	<b>Vernacular name</b>	Pintail Snipe	Hill Myna	White-rumped Vulture	Heart-spotted Woodpecker	Bonelli's Eagle	Indian Porcupine
2	<b>Scientific name</b>	<i>Gallinago stenura</i>	<i>Gracula religiosa</i>	<i>Gyps bengalensis</i>	<i>Hemicircus canente</i>	<i>Hieraetus fasciatus</i>	<i>Hystrix indica</i>
3	<b>Taxonomic class</b>	B	B	B	B	B	M
4	<b>Legal Status - Wildlife Protection Act</b>	SIV	SIV	SIV	SIV	SI	SIV
5	<b>Legal Status - CITES</b>			II			III
6	<b>Conservation status - IUCN</b>						
7	<b>Endemism status</b>	No	No	No	No	No	No
8	<b>Residency status</b>	M	P	P	P	P	P
9	<b>Conservation area</b>	A,S,T,G	A,S,T,G	A,S,T,G	A,S,T,G	A,S,T,G	A,S,T,G
10	<b>Abundance / distribution status</b>	A	A	B	C	B	A
11	<b>Conflict with humans</b>						C
12	<b>Champion and Seth Forest Types of India (to the group level):</b>						
13	Southern tropical wet evergreen forests	2			1	2	
14	Tropical moist evergreen forest (GCA)		2			2	
15	Nilgiri sub-tropical evergreen forest	2			1	2	
16	Tropical semi-evergreen forest (GCA, TCA)		2			2	
17	Northern tropical semi-evergreen forests					2	
18	Assam alluvial plain semi evergreen forests (GCA)		2			2	
19	Tropical moist deciduous forest (GCA, TCA)		2			2	
20	East Himalayan moist deciduous forests						
21	Southern tropical moist deciduous forest	2			2	1	
22	South Indian tropical moist deciduous teak forests					2	
23	South Indian tropical moist deciduous mixed forests	2			2	1	
24	Northern Indian tropical moist deciduous forests (TCA)					2	
25	Moist Bhabhar sal (TCA)						
26	Western light plain sal (TCA)						

27	Moist sal savannah (TCA)						
28	Alluvial sal – kamrup alluvial sal forests						
29	Low alluvial savannah woodland (TCA)						
30	Barringtonia swamp forests						
31	Eastern seasonal swamp low forests (Cephalanthus)						
32	Riparian fringing forests	2	2		1		
33	Southern tropical dry deciduous forests	1		1	2		
34	Southern tropical dry deciduous forests – dry teak forest	1		2	2		
35	Dry peninsular sal forests						
36	Western light alluvium plains sal / dry sal forests (TCA)						
37	Dry sal forests						
38	Boswellia forests	1					
39	Southern cutch thorn forests	1		1	1		
40	Dry savannah forest						
41	Foot hill and plateau sal – eastern hill sal						
42	Central Indian subtropical hill forests	2					
43	Southern wet temperate forests (sholas, ACA)	1			1		
44	Shola type of mixed evergreen forest (GCA)		2				
45	Wet grassland habitat on hill plateaus (ACA, GCA)				0		
46	<b>Other, non-Champion and Seth types</b>						
47	Southern moist and wet bamboo brakes	2			2		
48	Canebrakes (TCA)						
49	Extensive bamboo areas (GCA)		1				
50	Secondary moist bamboo brakes						
51	Dry tall grasslands on hill plateaus (SCA)			1			
52	Wet, tall grasslands interspersed with woodland and swamps (TCA)						
53	Swamp ('tals') interspersed (TCA)						
54	Rivers (by name, TCA, ACA & GCA)				0		
55	Catchment for tributaries to rivers (by name, SCA, TCA)						

56	Reservoirs (by name, TCA, SCA)				0		
57	Teak plantations (ACA, SCA)	1			1	1	
58	Sal plantations (100 yrs old; GCA)		1				
59	EXtensive plantation on grassland habitats of teak, shisham, and eucalyptus (TCA)						
60	Coffee and cardamom (ACA)				2		
61	Tea (ACA)				0		
62	Wattle (ACA)				0		
63	Pinus (ACA)				0		
64	Young jhum (<10 yrs; GCA)						
65	Middle jhum (10-20 yrs; GCA)		1				
66	Old jhum (>20 yrs; GCA)		1				
67	<b>Trophic category</b>	Ca	He	Cn	In	Ca	
68	<b>Habitat elements/substrates</b>						
69	<b>Habitat elements of biotic origin (special habitats)</b>						
70	Snags			Oth			
71	Snag recruits (dying trees, live trees with dead portions)			Oth			
72	Hollow trees, chimney trees (living or dead)		B	Oth			
73	Tree cavities (natural or created)		B	Oth			B
74	Large old trees (living)		F	B			
75	Trees with fluting boles and buttresses			Oth			
76	Down wood						F
77	Litter and duff layers						
78	Litter in streams	F					
79	Lianas						
80	Fruit-bearing shrubs		F				F
81	Fruit bearing trees		F				
82	Epiphyte patches						
83	<b>Habitat elements of geomorphic origin</b>						
84	Cliffs, talus, and ledges						
85	Caves						B
86	Overhangs						B
87	Dens (existing burrows dug by animals)						B
88	Sheet rocks						
89	Large bouldery aggregates						B
90	Rock outcrops						B
91	Sandy banks and sand spits	F					B
92	Salt licks (exposed mineral soils)						

93	Earth cuttings						B
94	Man-made (anthropogenic) structures						
95	Additional / other (specify)	Marshy area					
96	<b>Structural stage</b>						
97	Early stage	X		X		X	X
98	Mid stage		X	X		X	X
99	Late stage		X			X	X
100	Old-growth stage - unmanaged		X			X	X
101	Other - unmanaged			X		X	X
102	<b>Key ecological functions</b>			Scavenger			D
103	<b>Sensitivity to anthropogenic disturbance</b>		X			E,J,S,T,U,	

1	<b>Vernacular name</b>	Grey-headed Fish-Eagle	Brown Fish Owl	Vernal Hanging Parrot	Smooth Coated Otter	Indian Pangolin	Indian/Great False Vampire Bat
2	<b>Scientific name</b>	<i>Ichthyophaga ichthyaetus</i>	<i>Ketupa zeylonensis</i>	<i>Loriculus vernalis</i>	<i>Lutra perspicillata</i>	<i>Manis crassicaudata</i>	<i>Megaderma lyra</i>
3	<b>Taxonomic class</b>	B	B	B	M	M	M
4	<b>Legal Status - Wildlife Protection Act</b>	SIV	SIV	SIV	SII	SI	SV
5	<b>Legal Status - CITES</b>	II	II		II	II	
6	<b>Conservation status - IUCN</b>				K		
7	<b>Endemism status</b>	No	No	No	No	No	No
8	<b>Residency status</b>	P	P	P	P	P	P
9	<b>Conservation area</b>	A,S,T,G	A,S,T,G	A,S,T,G	A,S,T,G	A,S,T,G	A,S,T,G
10	<b>Abundance / distribution status</b>	C	B	A	C	B	B
11	<b>Conflict with humans</b>						
12	<b>Champion and Seth Forest Types of India (to the group level):</b>						
13	Southern tropical wet evergreen forests	1	2	2	2	2	2
14	Tropical moist evergreen forest (GCA)		2			2	2
15	Nilgiri sub-tropical evergreen forest	1	2	2	1	2	2
16	Tropical semi-evergreen forest (GCA, TCA)		2		2	2	2
17	Northern tropical semi-evergreen forests		1		1	1	2
18	Assam alluvial plain semi evergreen forests (GCA)		1		2		2
19	Tropical moist deciduous forest (GCA, TCA)		2			2	2
20	East Himalayan moist deciduous forests						
21	Southern tropical moist deciduous forest	1	1	1	2	1	2
22	South Indian tropical moist deciduous teak forests		2			2	2
23	South Indian tropical moist deciduous mixed forests	1		1	1		1
24	Northern Indian tropical moist deciduous forests (TCA)		2			2	2
25	Moist Bhabhar sal (TCA)					2	
26	Western light plain sal (TCA)					2	

27	Moist sal savannah (TCA)					1	
28	Alluvial sal – kamrup alluvial sal forests						
29	Low alluvial savannah woodland (TCA)						
30	Barringtonia swamp forests						
31	Eastern seasonal swamp low forests (Cephalanthus)						
32	Riparian fringing forests	2		2			
33	Southern tropical dry deciduous forests	1		1			
34	Southern tropical dry deciduous forests – dry teak forest	1		0			
35	Dry peninsular sal forests						
36	Western light alluvium plains sal / dry sal forests (TCA)						
37	Dry sal forests						
38	Boswellia forests						
39	Southern cutch thorn forests	1		0			
40	Dry savannah forest						
41	Foot hill and plateau sal – eastern hill sal						
42	Central Indian subtropical hill forests						
43	Southern wet temperate forests (sholas, ACA)	1		2			
44	Shola type of mixed evergreen forest (GCA)						
45	Wet grassland habitat on hill plateaus (ACA, GCA)	0		0			
46	<b>Other, non-Champion and Seth types</b>						
47	Southern moist and wet bamboo brakes	1		1			
48	Canebrakes (TCA)						
49	Extensive bamboo areas (GCA)						
50	Secondary moist bamboo brakes						
51	Dry tall grasslands on hill plateaus (SCA)						
52	Wet, tall grasslands interspersed with woodland and swamps (TCA)						
53	Swamp ('tals') interspersed (TCA)						
54	Rivers (by name, TCA, ACA & GCA)	2		0			
55	Catchment for tributaries to rivers (by name, SCA, TCA)						

56	Reservoirs (by name, TCA, SCA)	2		0			
57	Teak plantations (ACA, SCA)	1		0	2		1
58	Sal plantations (100 yrs old; GCA)						
59	EXtensive plantation on grassland habitats of teak, shisham, and eucalyptus (TCA)						
60	Coffee and cardamom (ACA)	1		1			
61	Tea (ACA)	0		0			
62	Wattle (ACA)	0		0			
63	Pinus (ACA)	0		0			
64	Young jhum (<10 yrs; GCA)						
65	Middle jhum (10-20 yrs; GCA)						
66	Old jhum (>20 yrs; GCA)						
67	<b>Trophic category</b>	Pi	Ca	He			Ca
68	<b>Habitat elements/substrates</b>						
69	<b>Habitat elements of biotic origin (special habitats)</b>						
70	Snags	F					
71	Snag recruits (dying trees, live trees with dead portions)	F		B			
72	Hollow trees, chimney trees (living or dead)			B			
73	Tree cavities (natural or created)			B			
74	Large old trees (living)	B		F			
75	Trees with fluting boles and buttresses						
76	Down wood						
77	Litter and duff layers						
78	Litter in streams	F					
79	Lianas						
80	Fruit-bearing shrubs			F			
81	Fruit bearing trees			F			
82	Epiphyte patches			F			
83	<b>Habitat elements of geomorphic origin</b>						
84	Cliffs, talus, and ledges						
85	Caves						
86	Overhangs						
87	Dens (existing burrows dug by animals)						
88	Sheet rocks						
89	Large bouldery aggregates	F					
90	Rock outcrops						
91	Sandy banks and sand spits						
92	Salt licks (exposed mineral soils)						

93	Earth cuttings						
94	Man-made (anthropogenic) structures						
95	Additional / other (specify)						
96	<b>Structural stage</b>						
97	Early stage		X				
98	Mid stage		X	X			
99	Late stage	X	X	X			
100	Old-growth stage - unmanaged	X	X	X			
101	Other - unmanaged		X				
102	<b>Key ecological functions</b>			A,B			
103	<b>Sensitivity to anthropogenic disturbance</b>	J,K,N,T,U, AA		F,K,T,X			

1	<b>Vernacular name</b>	Barking Deer	Purple Sunbird	Brown Hawk Owl	Leopard	Tiger	Peafowl
2	<b>Scientific name</b>	<i>Muntiacus muntjak</i>	<i>Nectarinia asiatica</i>	<i>Ninox scutulata</i>	<i>Panthera pardus</i>	<i>Panthera tigris</i>	<i>Pavo cristatus</i>
3	<b>Taxonomic class</b>	M	B	B	M	M	B
4	<b>Legal Status - Wildlife Protection Act</b>	SIII	SIV	SIV	SI	SI	SI
5	<b>Legal Status - CITES</b>			II	I	I	
6	<b>Conservation status - IUCN</b>				T	E	
7	<b>Endemism status</b>	No	No	No	No	No	No
8	<b>Residency status</b>	P	P	P	P	P	P
9	<b>Conservation area</b>	A,S,T,G	A,S,T,G	A,S,T,G	A,S,T,G	A,S,T,G	A,S,T,G
10	<b>Abundance / distribution status</b>	B	A	A	B	C	A
11	<b>Conflict with humans</b>				K,H	K,H	
12	<b>Champion and Seth Forest Types of India (to the group level):</b>						
13	Southern tropical wet evergreen forests	1	1	1	2		0
14	Tropical moist evergreen forest (GCA)	1			2		
15	Nilgiri sub-tropical evergreen forest	2			2		0
16	Tropical semi-evergreen forest (GCA, TCA)	1			2		
17	Northern tropical semi-evergreen forests	1			1		
18	Assam alluvial plain semi evergreen forests (GCA)	1			1		
19	Tropical moist deciduous forest (GCA, TCA)	1			2		
20	East Himalayan moist deciduous forests	2					
21	Southern tropical moist deciduous forest	1	2	1	2		1
22	South Indian tropical moist deciduous teak forests	1			2		
23	South Indian tropical moist deciduous mixed forests	1	2	1	2		1
24	Northern Indian tropical moist deciduous forests (TCA)	1			2		
25	Moist Bhabhar sal (TCA)				2		
26	Western light plain sal (TCA)						

27	Moist sal savannah (TCA)					
28	Alluvial sal – kamrup alluvial sal forests					
29	Low alluvial savannah woodland (TCA)					
30	Barringtonia swamp forests					
31	Eastern seasonal swamp low forests (Cephalanthus)					
32	Riparian fringing forests		2	1		1
33	Southern tropical dry deciduous forests		1	1		2
34	Southern tropical dry deciduous forests – dry teak forest		1	1		2
35	Dry peninsular sal forests					
36	Western light alluvium plains sal / dry sal forests (TCA)					
37	Dry sal forests					
38	Boswellia forests		1	1		
39	Southern cutch thorn forests		2	1		2
40	Dry savannah forest					
41	Foot hill and plateau sal – eastern hill sal					
42	Central Indian subtropical hill forests		2	1		
43	Southern wet temperate forests (sholas, ACA)					0
44	Shola type of mixed evergreen forest (GCA)					
45	Wet grassland habitat on hill plateaus (ACA, GCA)					0
46	<b>Other, non-Champion and Seth types</b>					
47	Southern moist and wet bamboo brakes		1	1		1
48	Canebrakes (TCA)					
49	Extensive bamboo areas (GCA)					
50	Secondary moist bamboo brakes					
51	Dry tall grasslands on hill plateaus (SCA)			1		
52	Wet, tall grasslands interspersed with woodland and swamps (TCA)					
53	Swamp ('tals') interspersed (TCA)					
54	Rivers (by name, TCA, ACA & GCA)					0
55	Catchment for tributaries to rivers (by name, SCA, TCA)					

56	Reservoirs (by name, TCA, SCA)			1			0
57	Teak plantations (ACA, SCA)		1	1	2		1
58	Sal plantations (100 yrs old; GCA)				2		
59	EXtensive plantation on grassland habitats of teak, shisham, and eucalyptus (TCA)						
60	Coffee and cardamom (ACA)						0
61	Tea (ACA)						0
62	Wattle (ACA)						0
63	Pinus (ACA)						0
64	Young jhum (<10 yrs; GCA)						
65	Middle jhum (10-20 yrs; GCA)						
66	Old jhum (>20 yrs; GCA)						
67	<b>Trophic category</b>	He	Om	Ca	Ca	Ca	Ca
68	<b>Habitat elements/substrates</b>						
69	<b>Habitat elements of biotic origin (special habitats)</b>						
70	Snags			F			F
71	Snag recruits (dying trees, live trees with dead portions)			F			F
72	Hollow trees, chimney trees (living or dead)	B		B,F	B	B	
73	Tree cavities (natural or created)	B		B,F	B	B	
74	Large old trees (living)	F	F	F			
75	Trees with fluting boles and buttresses						
76	Down wood	B					F
77	Litter and duff layers	F					B,F
78	Litter in streams						
79	Lianas		B,F	F			
80	Fruit-bearing shrubs	F					F
81	Fruit bearing trees	F					
82	Epiphyte patches		B				
83	<b>Habitat elements of geomorphic origin</b>						
84	Cliffs, talus, and ledges						
85	Caves				B	B	
86	Overhangs				B	B	
87	Dens (existing burrows dug by animals)				B	B	
88	Sheet rocks						
89	Large bouldery aggregates						
90	Rock outcrops						
91	Sandy banks and sand spits						
92	Salt licks (exposed mineral soils)				F	F	

93	Earth cuttings						
94	Man-made (anthropogenic) structures		F		B,F	B,F	
95	Additional / other (specify)						
96	<b>Structural stage</b>						
97	Early stage		X	X	X	X	X
98	Mid stage	X	X	X	X	X	X
99	Late stage	X	X	X	X	X	
100	Old-growth stage - unmanaged	X	X	X	X	X	
101	Other - unmanaged		X	X	X	X	X
102	<b>Key ecological functions</b>	G	A				
103	<b>Sensitivity to anthropogenic disturbance</b>	B,C,D,F,G ,H,I,K,L,M, O,R,U,X,B B,EE					B,I,K,R,S, U,X

1	<b>Vernacular name</b>	Oriental Honey Buzzard	Scaly-bellied Woodpecker	Streak-throated Woodpecker	Baya Weaver	Indian Scimitar Babbler	Flying Fox
2	<b>Scientific name</b>	<i>Pernis ptilorhynchus</i>	<i>Picus squamatus</i>	<i>Picus xanthopygaeus</i>	<i>Ploceus philippinus</i>	<i>Pomatorhinus horsfieldii</i>	<i>Pteropus giganteus</i>
3	<b>Taxonomic class</b>	B	B	B	B	B	M
4	<b>Legal Status - Wildlife Protection Act</b>	SI	SIV	SIV	SIV	SIV	SV
5	<b>Legal Status - CITES</b>		II				
6	<b>Conservation status - IUCN</b>						
7	<b>Endemism status</b>	No	No	No	No	No	No
8	<b>Residency status</b>	P	P	P	P	P	P
9	<b>Conservation area</b>	A,S,T,G	A,S,T,G	A,S,T,G	A,S,T,G	A,S,T,G	A,S,T,G
10	<b>Abundance / distribution status</b>	B	B	B	A	B	A
11	<b>Conflict with humans</b>						
12	<b>Champion and Seth Forest Types of India (to the group level):</b>						
13	Southern tropical wet evergreen forests	1	1		1		2
14	Tropical moist evergreen forest (GCA)	1	2				2
15	Nilgiri sub-tropical evergreen forest	2	2				2
16	Tropical semi-evergreen forest (GCA, TCA)	1	1				2
17	Northern tropical semi-evergreen forests	1	1				1
18	Assam alluvial plain semi evergreen forests (GCA)	1	1				1
19	Tropical moist deciduous forest (GCA, TCA)	2	2				2
20	East Himalayan moist deciduous forests						
21	Southern tropical moist deciduous forest	1	1	1	1		
22	South Indian tropical moist deciduous teak forests	2	2				
23	South Indian tropical moist deciduous mixed forests	1	2	1	1		2
24	Northern Indian tropical moist deciduous forests (TCA)	2	2				
25	Moist Bhabhar sal (TCA)						
26	Western light plain sal (TCA)						

27	Moist sal savannah (TCA)						
28	Alluvial sal – kamrup alluvial sal forests						
29	Low alluvial savannah woodland (TCA)						
30	Barringtonia swamp forests						
31	Eastern seasonal swamp low forests (Cephalanthus)						
32	Riparian fringing forests			1	1		
33	Southern tropical dry deciduous forests			2	2		
34	Southern tropical dry deciduous forests – dry teak forest			2	2		
35	Dry peninsular sal forests						
36	Western light alluvium plains sal / dry sal forests (TCA)						
37	Dry sal forests						
38	Boswellia forests			1	2		
39	Southern cutch thorn forests			1	2		
40	Dry savannah forest						
41	Foot hill and plateau sal – eastern hill sal						
42	Central Indian subtropical hill forests			2	1		
43	Southern wet temperate forests (sholas, ACA)						
44	Shola type of mixed evergreen forest (GCA)						
45	Wet grassland habitat on hill plateaus (ACA, GCA)						
46	<b>Other, non-Champion and Seth types</b>						
47	Southern moist and wet bamboo brakes			1	1		
48	Canebrakes (TCA)						
49	Extensive bamboo areas (GCA)						
50	Secondary moist bamboo brakes						
51	Dry tall grasslands on hill plateaus (SCA)						
52	Wet, tall grasslands interspersed with woodland and swamps (TCA)						
53	Swamp ('tals') interspersed (TCA)						
54	Rivers (by name, TCA, ACA & GCA)						
55	Catchment for tributaries to rivers (by name, SCA, TCA)						

56	Reservoirs (by name, TCA, SCA)						
57	Teak plantations (ACA, SCA)			1	2		1
58	Sal plantations (100 yrs old; GCA)						
59	EXtensive plantation on grassland habitats of teak, shisham, and eucalyptus (TCA)						
60	Coffee and cardamom (ACA)						
61	Tea (ACA)						
62	Wattle (ACA)						
63	Pinus (ACA)						
64	Young jhum (<10 yrs; GCA)						
65	Middle jhum (10-20 yrs; GCA)						
66	Old jhum (>20 yrs; GCA)						
67	<b>Trophic category</b>	Ca	In	In	Gr		Fr
68	<b>Habitat elements/substrates</b>						
69	<b>Habitat elements of biotic origin (special habitats)</b>						
70	Snags			F			
71	Snag recruits (dying trees, live trees with dead portions)			F			
72	Hollow trees, chimney trees (living or dead)			B,F			
73	Tree cavities (natural or created)			B,F			
74	Large old trees (living)			F			
75	Trees with fluting boles and buttresses			F			
76	Down wood						
77	Litter and duff layers				F		
78	Litter in streams						
79	Lianas						
80	Fruit-bearing shrubs						
81	Fruit bearing trees						
82	Epiphyte patches						
83	<b>Habitat elements of geomorphic origin</b>						
84	Cliffs, talus, and ledges						
85	Caves						
86	Overhangs						
87	Dens (existing burrows dug by animals)						
88	Sheet rocks						
89	Large bouldery aggregates						
90	Rock outcrops						
91	Sandy banks and sand spits						
92	Salt licks (exposed mineral soils)						

93	Earth cuttings						
94	Man-made (anthropogenic) structures						
95	Additional / other (specify)				Marshy areas		
96	<b>Structural stage</b>						
97	Early stage				X		
98	Mid stage	X	X		X	X	
99	Late stage	X	X	X		X	
100	Old-growth stage - unmanaged	X	X	X		X	
101	Other - unmanaged				X		
102	<b>Key ecological functions</b>			C			
103	<b>Sensitivity to anthropogenic disturbance</b>			K,M,S,T,U	I,X	A,B,D,I,K, M,R,S,U	

1	<b>Vernacular name</b>	Indian Rock Python	White-throated Fantail	Fulvous Fruit Bat	Crested Serpent Eagle	Brown Wood Owl	Asian Paradise-Flycatcher
2	<b>Scientific name</b>	<i>Python molurus</i>	<i>Rhipidura albicollis</i>	<i>Rousettus lechnautii</i>	<i>Spilornis cheela</i>	<i>Strix leptogrammica</i>	<i>Terpsiphone paradisi</i>
3	<b>Taxonomic class</b>	R	B	M	B	B	B
4	<b>Legal Status - Wildlife Protection Act</b>	SI	SIV	SV	SI	SIV	SIV
5	<b>Legal Status - CITES</b>	I			II	II	
6	<b>Conservation status - IUCN</b>	V					
7	<b>Endemism status</b>	No	No	No	No	No	No
8	<b>Residency status</b>	P	P	P	P	P	P
9	<b>Conservation area</b>	A,S,T,G	A,S,T,G	A,S,T,G	A,S,T,G	A,S,T,G	A,S,T,G
10	<b>Abundance / distribution status</b>	A	B	C	A	B	A
11	<b>Conflict with humans</b>						
12	<b>Champion and Seth Forest Types of India (to the group level):</b>						
13	Southern tropical wet evergreen forests		1			2	1
14	Tropical moist evergreen forest (GCA)			1		2	
15	Nilgiri sub-tropical evergreen forest			2		2	
16	Tropical semi-evergreen forest (GCA, TCA)					2	
17	Northern tropical semi-evergreen forests					2	
18	Assam alluvial plain semi evergreen forests (GCA)					2	
19	Tropical moist deciduous forest (GCA, TCA)			2		2	
20	East Himalayan moist deciduous forests						
21	Southern tropical moist deciduous forest		1			2	1
22	South Indian tropical moist deciduous teak forests			1		2	
23	South Indian tropical moist deciduous mixed forests		1	2		2	1
24	Northern Indian tropical moist deciduous forests (TCA)			2		2	
25	Moist Bhabhar sal (TCA)						
26	Western light plain sal (TCA)						

27	Moist sal savannah (TCA)						
28	Alluvial sal – kamrup alluvial sal forests						
29	Low alluvial savannah woodland (TCA)						
30	Barringtonia swamp forests						
31	Eastern seasonal swamp low forests (Cephalanthus)						
32	Riparian fringing forests		1				2
33	Southern tropical dry deciduous forests		1				1
34	Southern tropical dry deciduous forests – dry teak forest		1				1
35	Dry peninsular sal forests						
36	Western light alluvium plains sal / dry sal forests (TCA)						
37	Dry sal forests						
38	Boswellia forests		1				1
39	Southern catch thorn forests		1				1
40	Dry savannah forest						
41	Foot hill and plateau sal – eastern hill sal						
42	Central Indian subtropical hill forests		1				1
43	Southern wet temperate forests (sholas, ACA)						
44	Shola type of mixed evergreen forest (GCA)						
45	Wet grassland habitat on hill plateaus (ACA, GCA)						
46	<b>Other, non-Champion and Seth types</b>						
47	Southern moist and wet bamboo brakes		1				
48	Canebrakes (TCA)						
49	Extensive bamboo areas (GCA)						
50	Secondary moist bamboo brakes						
51	Dry tall grasslands on hill plateaus (SCA)						2
52	Wet, tall grasslands interspersed with woodland and swamps (TCA)						
53	Swamp ('tals') interspersed (TCA)						
54	Rivers (by name, TCA, ACA & GCA)						
55	Catchment for tributaries to rivers (by name, SCA, TCA)						

56	Reservoirs (by name, TCA, SCA)						
57	Teak plantations (ACA, SCA)		1			1	1
58	Sal plantations (100 yrs old; GCA)						
59	EXtensive plantation on grassland habitats of teak, shisham, and eucalyptus (TCA)						
60	Coffee and cardamom (ACA)						
61	Tea (ACA)						
62	Wattle (ACA)						
63	Pinus (ACA)						
64	Young jhum (<10 yrs; GCA)						
65	Middle jhum (10-20 yrs; GCA)						
66	Old jhum (>20 yrs; GCA)						
67	<b>Trophic category</b>		In	Fr	Ca		In
68	<b>Habitat elements/substrates</b>						
69	<b>Habitat elements of biotic origin (special habitats)</b>						
70	Snags						
71	Snag recruits (dying trees, live trees with dead portions)						
72	Hollow trees, chimney trees (living or dead)						
73	Tree cavities (natural or created)						
74	Large old trees (living)		F				
75	Trees with fluting boles and buttresses		F				
76	Down wood						
77	Litter and duff layers		F				
78	Litter in streams						
79	Lianas		F				
80	Fruit-bearing shrubs		F				
81	Fruit bearing trees		F				
82	Epiphyte patches		B,F				
83	<b>Habitat elements of geomorphic origin</b>						
84	Cliffs, talus, and ledges						
85	Caves						
86	Overhangs						
87	Dens (existing burrows dug by animals)						
88	Sheet rocks						
89	Large bouldery aggregates						
90	Rock outcrops						
91	Sandy banks and sand spits						
92	Salt licks (exposed mineral soils)						

93	Earth cuttings						
94	Man-made (anthropogenic) structures						
95	Additional / other (specify)						
96	<b>Structural stage</b>						
97	Early stage				X		X
98	Mid stage		X		X	X	X
99	Late stage		X		X	X	X
100	Old-growth stage - unmanaged		X		X	X	X
101	Other - unmanaged				X		X
102	<b>Key ecological functions</b>						
103	<b>Sensitivity to anthropogenic disturbance</b>		B,D,I,S,U		D,F,G,H,K ,S,T,U		B,D,I,R,S, U

1	<b>Vernacular name</b>	Yellow-footed Green Pigeon	Green Sandpiper	Small Indian Civet	Wild Pig	Slender Loris	King Cobra
2	<b>Scientific name</b>	<i>Treron phoenicoptera</i>	<i>Tringa ochropus</i>	<i>Viverricula indica</i>	<i>Sus scrofa</i>	<i>Loris tardigradus</i>	<i>Ophiophagus hanna</i>
3	<b>Taxonomic class</b>	B	B	M	M	M	R
4	<b>Legal Status - Wildlife Protection Act</b>	SIV	SIV	SII		SI	SII
5	<b>Legal Status - CITES</b>	III				II	
6	<b>Conservation status - IUCN</b>					V	
7	<b>Endemism status</b>	No	No	No	No	ER	No
8	<b>Residency status</b>	P	P	P	P	P	P
9	<b>Conservation area</b>	A,S,T,G	A,S,T,G	A,S,T,G	A,S,TG	A,S?	A,S?
10	<b>Abundance / distribution status</b>	A	A	A	A	D	C
11	<b>Conflict with humans</b>						
12	<b>Champion and Seth Forest Types of India (to the group level):</b>						
13	Southern tropical wet evergreen forests			?	1	1	2
14	Tropical moist evergreen forest (GCA)			?	1		
15	Nilgiri sub-tropical evergreen forest	1		?		?	2
16	Tropical semi-evergreen forest (GCA, TCA)	1		?	2		
17	Northern tropical semi-evergreen forests			?	1		
18	Assam alluvial plain semi evergreen forests (GCA)			?	1		
19	Tropical moist deciduous forest (GCA, TCA)			?			
20	East Himalayan moist deciduous forests	1		?			
21	Southern tropical moist deciduous forest	1		?	2	1	1
22	South Indian tropical moist deciduous teak forests			?			
23	South Indian tropical moist deciduous mixed forests			?	2	1	1
24	Northern Indian tropical moist deciduous forests (TCA)			?	2		
25	Moist Bhabhar sal (TCA)			?	2		
26	Western light plain sal (TCA)			?	2		

27	Moist sal savannah (TCA)			?	2		
28	Alluvial sal – kamrup alluvial sal forests						
29	Low alluvial savannah woodland (TCA)						
30	Barringtonia swamp forests						
31	Eastern seasonal swamp low forests (Cephalanthus)						
32	Riparian fringing forests					0	0
33	Southern tropical dry deciduous forests					1	0
34	Southern tropical dry deciduous forests – dry teak forest					1	0
35	Dry peninsular sal forests						
36	Western light alluvium plains sal / dry sal forests (TCA)						
37	Dry sal forests						
38	Boswellia forests						
39	Southern cutch thorn forests					2	0
40	Dry savannah forest						
41	Foot hill and plateau sal – eastern hill sal						
42	Central Indian subtropical hill forests						
43	Southern wet temperate forests (sholas, ACA)					0	0
44	Shola type of mixed evergreen forest (GCA)						
45	Wet grassland habitat on hill plateaus (ACA, GCA)					0	0
46	<b>Other, non-Champion and Seth types</b>						
47	Southern moist and wet bamboo brakes					1	1
48	Canebrakes (TCA)						
49	Extensive bamboo areas (GCA)						
50	Secondary moist bamboo brakes						
51	Dry tall grasslands on hill plateaus (SCA)						
52	Wet, tall grasslands interspersed with woodland and swamps (TCA)						
53	Swamp ('tals') interspersed (TCA)						
54	Rivers (by name, TCA, ACA & GCA)					0	0
55	Catchment for tributaries to rivers (by name, SCA, TCA)						

56	Reservoirs (by name, TCA, SCA)					0	0
57	Teak plantations (ACA, SCA)	2				1	0
58	Sal plantations (100 yrs old; GCA)						
59	EXtensive plantation on grassland habitats of teak, shisham, and eucalyptus (TCA)						
60	Coffee and cardamom (ACA)					0	0
61	Tea (ACA)					0	0
62	Wattle (ACA)					0	0
63	Pinus (ACA)					0	0
64	Young jhum (<10 yrs; GCA)						
65	Middle jhum (10-20 yrs; GCA)						
66	Old jhum (>20 yrs; GCA)						
67	<b>Trophic category</b>		Om	Om	Om	In	Ca
68	<b>Habitat elements/substrates</b>						
69	<b>Habitat elements of biotic origin (special habitats)</b>						
70	Snags						
71	Snag recruits (dying trees, live trees with dead portions)						
72	Hollow trees, chimney trees (living or dead)						
73	Tree cavities (natural or created)					F	
74	Large old trees (living)					small trees, shrubs	
75	Trees with fluting boles and buttresses						
76	Down wood					F	
77	Litter and duff layers					F	X
78	Litter in streams						
79	Lianas					F	
80	Fruit-bearing shrubs					F	
81	Fruit bearing trees					F	
82	Epiphyte patches						
83	<b>Habitat elements of geomorphic origin</b>						
84	Cliffs, talus, and ledges				B		
85	Caves				B		
86	Overhangs				B		
87	Dens (existing burrows dug by animals)				B		
88	Sheet rocks				B		
89	Large bouldery aggregates				F		
90	Rock outcrops		F	B			
91	Sandy banks and sand spits		F				
92	Salt licks (exposed mineral soils)					F	

93	Earth cuttings						
94	Man-made (anthropogenic) structures						
95	Additional / other (specify)		Marshes		Swampy areas		
96	<b>Structural stage</b>						
97	Early stage	X	X	X	X		
98	Mid stage	X	X	X	X		
99	Late stage	X	X	X	X	X	X
100	Old-growth stage - unmanaged	X	X	X	X	X	X
101	Other - unmanaged	X	X	X			
102	<b>Key ecological functions</b>				E,F,G		
103	<b>Sensitivity to anthropogenic disturbance</b>		E,N,R,AA,DD	B,C,D,F,G,H,J,K,M,R,U,V,Z,BB		A,E,H,I,M,O,	A,B,C,E,M,Q

1	<b>Vernacular name</b>	Little Spiderhunter	Indian Elephant	Wood Sandpiper	Golden Cat	Hoolock Gibbon	Stumptail Macaque
2	<b>Scientific name</b>	<i>Arachnothera longirostra</i>	<i>Elephas maximus</i>	<i>Tringa glareola</i>	<i>Felis temmincki</i>	<i>Hylobates hoolock</i>	<i>Macaca arctoides</i>
3	<b>Taxonomic class</b>	B	M	B	M	M	M
4	<b>Legal Status - Wildlife Protection Act</b>	SIV	SI	SIV	SI	SI	SI
5	<b>Legal Status - CITES</b>		I		I	I	II
6	<b>Conservation status - IUCN</b>		E		I	V	E
7	<b>Endemism status</b>	No	No	No	No	No	No
8	<b>Residency status</b>	P	P	M	P	P	P
9	<b>Conservation area</b>	A,T,G	A,T,G	A,T,S,G	G	G	G
10	<b>Abundance / distribution status</b>	B	A	A	D	C	B
11	<b>Conflict with humans</b>		K,H,C				
12	<b>Champion and Seth Forest Types of India (to the group level):</b>						
13	Southern tropical wet evergreen forests	2	2	1	2		
14	Tropical moist evergreen forest (GCA)				1	2	2
15	Nilgiri sub-tropical evergreen forest	1	2	1	1		
16	Tropical semi-evergreen forest (GCA, TCA)				2	2	2
17	Northern tropical semi-evergreen forests				1		
18	Assam alluvial plain semi evergreen forests (GCA)					2	2
19	Tropical moist deciduous forest (GCA, TCA)				1	1	1
20	East Himalayan moist deciduous forests						
21	Southern tropical moist deciduous forest	2	2	1	2		
22	South Indian tropical moist deciduous teak forests				1		
23	South Indian tropical moist deciduous mixed forests	1	2	1	1		
24	Northern Indian tropical moist deciduous forests (TCA)						
25	Moist Bhabhar sal (TCA)						
26	Western light plain sal (TCA)						

27	Moist sal savannah (TCA)						
28	Alluvial sal – kamrup alluvial sal forests						
29	Low alluvial savannah woodland (TCA)						
30	Barringtonia swamp forests						
31	Eastern seasonal swamp low forests (Cephalanthus)						
32	Riparian fringing forests	1	2	1		2	2
33	Southern tropical dry deciduous forests	1	2	1			
34	Southern tropical dry deciduous forests – dry teak forest	0	2	1			
35	Dry peninsular sal forests						
36	Western light alluvium plains sal / dry sal forests (TCA)						
37	Dry sal forests						
38	Boswellia forests						
39	Southern catch thorn forests	0	2	1			
40	Dry savannah forest						
41	Foot hill and plateau sal – eastern hill sal						
42	Central Indian subtropical hill forests						
43	Southern wet temperate forests (sholas, ACA)	1	2	1	1		
44	Shola type of mixed evergreen forest (GCA)					2	1
45	Wet grassland habitat on hill plateaus (ACA, GCA)	0	2	1			
46	<b>Other, non-Champion and Seth types</b>						
47	Southern moist and wet bamboo brakes	2	2	1			
48	Canebrakes (TCA)						
49	Extensive bamboo areas (GCA)						1
50	Secondary moist bamboo brakes						
51	Dry tall grasslands on hill plateaus (SCA)						
52	Wet, tall grasslands interspersed with woodland and swamps (TCA)						
53	Swamp ('tals') interspersed (TCA)						
54	Rivers (by name, TCA, ACA & GCA)	0	1	1			
55	Catchment for tributaries to rivers (by name, SCA, TCA)						

56	Reservoirs (by name, TCA, SCA)	0	1	1			
57	Teak plantations (ACA, SCA)	0	2	1			
58	Sal plantations (100 yrs old; GCA)						1
59	EXtensive plantation on grassland habitats of teak, shisham, and eucalyptus (TCA)						
60	Coffee and cardamom (ACA)	1	1	1			
61	Tea (ACA)	0	1	1			
62	Wattle (ACA)	0	1	1			
63	Pinus (ACA)	0	1	1			
64	Young jhum (<10 yrs; GCA)						
65	Middle jhum (10-20 yrs; GCA)						1
66	Old jhum (>20 yrs; GCA)						1
67	<b>Trophic category</b>	In	He	Ca	Ca	Fr	Ca
68	<b>Habitat elements/substrates</b>						
69	<b>Habitat elements of biotic origin (special habitats)</b>						
70	Snags						
71	Snag recruits (dying trees, live trees with dead portions)						
72	Hollow trees, chimney trees (living or dead)				B		
73	Tree cavities (natural or created)				B		
74	Large old trees (living)	B,F	F			B,F	B,F
75	Trees with fluting boles and buttresses	F				B,F	B,F
76	Down wood						
77	Litter and duff layers			F			
78	Litter in streams			F			
79	Lianas	B,F	F				
80	Fruit-bearing shrubs		F			F	F
81	Fruit bearing trees		F			F	F
82	Epiphyte patches	B,F	F			F	
83	<b>Habitat elements of geomorphic origin</b>						
84	Cliffs, talus, and ledges						
85	Caves				B		
86	Overhangs				B		
87	Dens (existing burrows dug by animals)				B		
88	Sheet rocks						
89	Large bouldery aggregates						
90	Rock outcrops						
91	Sandy banks and sand spits			F			
92	Salt licks (exposed mineral soils)		F				

93	Earth cuttings						
94	Man-made (anthropogenic) structures						
95	Additional / other (specify)						
96	<b>Structural stage</b>						
97	Early stage		X	X			
98	Mid stage		X	X			X
99	Late stage	X	X	X		X	X
100	Old-growth stage - unmanaged	X	X	X		X	X
101	Other - unmanaged	X	X	X			
102	<b>Key ecological functions</b>	A	B			B	
103	<b>Sensitivity to anthropogenic disturbance</b>	B,D,I,M,S, U	A,B,C,D,E ,F,G,I,L,M, O,R,S,U,X ,Y	E,J,N,R,W		D,F,G,H,I, K,S,T,U,X	C,D,F,G,H ,K,P,R,S, U,X

1	<b>Vernacular name</b>	Pigtail Macaque	Clouded Leopard	Slow Loris	Capped Langur	Chestnut-fronted Shrike Babbler	Green Avadavat
2	<b>Scientific name</b>	<i>Macaca nemestrina leonina</i>	<i>Neofelis nebulosa</i>	<i>Nycticebus coucang bengalensis</i>	<i>Presbytis pileatus</i>	<i>Pteruthius aenobarbus</i>	<i>Amandava formosa</i>
3	<b>Taxonomic class</b>	M	M	M	M	B	B
4	<b>Legal Status - Wildlife Protection Act</b>	SI	SI	SI	SI	SIV	SIV
5	<b>Legal Status - CITES</b>	II	II		I		
6	<b>Conservation status - IUCN</b>	E	V	E			R
7	<b>Endemism status</b>	No	No	No	No	ER	No
8	<b>Residency status</b>	P	P	P	P	P	P
9	<b>Conservation area</b>	G	G	G	G	G	S
10	<b>Abundance / distribution status</b>	B	C	C	B	B	C
11	<b>Conflict with humans</b>						
12	<b>Champion and Seth Forest Types of India (to the group level):</b>						
13	Southern tropical wet evergreen forests					1	
14	Tropical moist evergreen forest (GCA)	2	2	1	2	1	
15	Nilgiri sub-tropical evergreen forest					2	
16	Tropical semi-evergreen forest (GCA, TCA)	2	2	1	2	1	
17	Northern tropical semi-evergreen forests					1	
18	Assam alluvial plain semi evergreen forests (GCA)	1	2	1	2	1	
19	Tropical moist deciduous forest (GCA, TCA)	1	1	1	1	1	
20	East Himalayan moist deciduous forests						
21	Southern tropical moist deciduous forest					1	
22	South Indian tropical moist deciduous teak forests					2	
23	South Indian tropical moist deciduous mixed forests					1	2
24	Northern Indian tropical moist deciduous forests (TCA)					2	
25	Moist Bhabhar sal (TCA)						
26	Western light plain sal (TCA)						

27	Moist sal savannah (TCA)						
28	Alluvial sal – kamrup alluvial sal forests						
29	Low alluvial savannah woodland (TCA)						
30	Barringtonia swamp forests						
31	Eastern seasonal swamp low forests (Cephalanthus)						
32	Riparian fringing forests	2	2	1	2		1
33	Southern tropical dry deciduous forests						2
34	Southern tropical dry deciduous forests – dry teak forest						2
35	Dry peninsular sal forests						
36	Western light alluvium plains sal / dry sal forests (TCA)						
37	Dry sal forests						
38	Boswellia forests						
39	Southern catch thorn forests						2
40	Dry savannah forest						
41	Foot hill and plateau sal – eastern hill sal						
42	Central Indian subtropical hill forests						1
43	Southern wet temperate forests (sholas, ACA)						
44	Shola type of mixed evergreen forest (GCA)	2	2	1	2		
45	Wet grassland habitat on hill plateaus (ACA, GCA)						
46	<b>Other, non-Champion and Seth types</b>						
47	Southern moist and wet bamboo brakes						
48	Canebrakes (TCA)						
49	Extensive bamboo areas (GCA)	1	1	2	1		
50	Secondary moist bamboo brakes						
51	Dry tall grasslands on hill plateaus (SCA)						
52	Wet, tall grasslands interspersed with woodland and swamps (TCA)						
53	Swamp ('tals') interspersed (TCA)						
54	Rivers (by name, TCA, ACA & GCA)						
55	Catchment for tributaries to rivers (by name, SCA, TCA)						

56	Reservoirs (by name, TCA, SCA)						
57	Teak plantations (ACA, SCA)					1	1
58	Sal plantations (100 yrs old; GCA)	1		1	2		
59	EXtensive plantation on grassland habitats of teak, shisham, and eucalyptus (TCA)						
60	Coffee and cardamom (ACA)						
61	Tea (ACA)						
62	Wattle (ACA)						
63	Pinus (ACA)						
64	Young jhum (<10 yrs; GCA)	1					
65	Middle jhum (10-20 yrs; GCA)	1		2	1		
66	Old jhum (>20 yrs; GCA)	2		2	2		
67	<b>Trophic category</b>	He	Ca	In	Fr		Gr
68	<b>Habitat elements/substrates</b>						
69	<b>Habitat elements of biotic origin (special habitats)</b>						
70	Snags						
71	Snag recruits (dying trees, live trees with dead portions)			F			
72	Hollow trees, chimney trees (living or dead)	B		F			
73	Tree cavities (natural or created)	B		F			
74	Large old trees (living)	B		F			
75	Trees with fluting boles and buttresses	F		F			
76	Down wood						
77	Litter and duff layers						F
78	Litter in streams						
79	Lianas	F		F			
80	Fruit-bearing shrubs	F					F
81	Fruit bearing trees	F					F
82	Epiphyte patches	F					
83	<b>Habitat elements of geomorphic origin</b>						
84	Cliffs, talus, and ledges						
85	Caves						
86	Overhangs						
87	Dens (existing burrows dug by animals)						
88	Sheet rocks						
89	Large bouldery aggregates						
90	Rock outcrops						
91	Sandy banks and sand spits						
92	Salt licks (exposed mineral soils)						

93	Earth cuttings						
94	Man-made (anthropogenic) structures						
95	Additional / other (specify)						
96	<b>Structural stage</b>						
97	Early stage	X					X
98	Mid stage	X	X	X	X	?	X
99	Late stage		X	X	X	?	
100	Old-growth stage - unmanaged		X	X	X	?	
101	Other - unmanaged				X		
102	<b>Key ecological functions</b>						
103	<b>Sensitivity to anthropogenic disturbance</b>	B,D,F,G,M ,R,P,S,U, X,BB		B,D,M,P,U ,X	D,F,G,I,K, M,R,S,U,X		X

1	<b>Vernacular name</b>	Cantro's Leaf-nosed Bat	Peninsular Mud Turtle	Woolly Horse-shoe Bat	Four-homed Antelope	Demoiselle Crane	Nilgai
2	<b>Scientific name</b>	<i>Hipposideros galeritus</i>	<i>Lessimys punctata granosa</i>	<i>Rhinolopus luctus</i>	<i>Tetraceros quadricornis</i>	<i>Grus virgo</i>	<i>Boselaphus tragocamelus</i>
3	<b>Taxonomic class</b>	M	R	M	M	B	M
4	<b>Legal Status - Wildlife Protection Act</b>	SV		SV	SI	SIV	SIII
5	<b>Legal Status - CITES</b>		II		III		
6	<b>Conservation status - IUCN</b>						
7	<b>Endemism status</b>			ER	No	No	No
8	<b>Residency status</b>	P		P	P	M	P
9	<b>Conservation area</b>	S	S	S	S	S,T	S,T,G
10	<b>Abundance / distribution status</b>	D	C	C	B	C	A
11	<b>Conflict with humans</b>						C
12	<b>Champion and Seth Forest Types of India (to the group level):</b>						
13	Southern tropical wet evergreen forests			2	2	1	1
14	Tropical moist evergreen forest (GCA)			2	2	1	1
15	Nilgiri sub-tropical evergreen forest			2	2	2	1
16	Tropical semi-evergreen forest (GCA, TCA)			2	2	1	1
17	Northern tropical semi-evergreen forests			1	2		1
18	Assam alluvial plain semi evergreen forests (GCA)			1	2		1
19	Tropical moist deciduous forest (GCA, TCA)			2	2		1
20	East Himalayan moist deciduous forests					2	
21	Southern tropical moist deciduous forest			2	2		1
22	South Indian tropical moist deciduous teak forests			2	2	1	1
23	South Indian tropical moist deciduous mixed forests			2	2		1
24	Northern Indian tropical moist deciduous forests (TCA)			2	2	2	1
25	Moist Bhabhar sal (TCA)			2			1
26	Western light plain sal (TCA)						

27	Moist sal savannah (TCA)						1
28	Alluvial sal – kamrup alluvial sal forests						
29	Low alluvial savannah woodland (TCA)						
30	Barringtonia swamp forests						
31	Eastern seasonal swamp low forests (Cephalanthus)						
32	Riparian fringing forests						
33	Southern tropical dry deciduous forests						
34	Southern tropical dry deciduous forests – dry teak forest						
35	Dry peninsular sal forests						
36	Western light alluvium plains sal / dry sal forests (TCA)						
37	Dry sal forests						
38	Boswellia forests						
39	Southern catch thorn forests						
40	Dry savannah forest						
41	Foot hill and plateau sal – eastern hill sal						
42	Central Indian subtropical hill forests						
43	Southern wet temperate forests (sholas, ACA)						
44	Shola type of mixed evergreen forest (GCA)						
45	Wet grassland habitat on hill plateaus (ACA, GCA)						
46	<b>Other, non-Champion and Seth types</b>						
47	Southern moist and wet bamboo brakes						
48	Canebrakes (TCA)						
49	Extensive bamboo areas (GCA)						
50	Secondary moist bamboo brakes						
51	Dry tall grasslands on hill plateaus (SCA)						
52	Wet, tall grasslands interspersed with woodland and swamps (TCA)						
53	Swamp ('tals') interspersed (TCA)						
54	Rivers (by name, TCA, ACA & GCA)						
55	Catchment for tributaries to rivers (by name, SCA, TCA)						

56	Reservoirs (by name, TCA, SCA)						
57	Teak plantations (ACA, SCA)			2	2		
58	Sal plantations (100 yrs old; GCA)			2			
59	EXtensive plantation on grassland habitats of teak, shisham, and eucalyptus (TCA)						
60	Coffee and cardamom (ACA)						
61	Tea (ACA)						
62	Wattle (ACA)						
63	Pinus (ACA)						
64	Young jhum (<10 yrs; GCA)						
65	Middle jhum (10-20 yrs; GCA)						
66	Old jhum (>20 yrs; GCA)						
67	<b>Trophic category</b>	In		In	He	Ca	
68	<b>Habitat elements/substrates</b>						
69	<b>Habitat elements of biotic origin (special habitats)</b>						
70	Snags			B			
71	Snag recruits (dying trees, live trees with dead portions)			B			
72	Hollow trees, chimney trees (living or dead)	B,F		B			
73	Tree cavities (natural or created)	B,F		B			
74	Large old trees (living)	F		F			
75	Trees with fluting boles and buttresses						
76	Down wood						
77	Litter and duff layers						
78	Litter in streams						
79	Lianas						
80	Fruit-bearing shrubs	F					
81	Fruit bearing trees	F					
82	Epiphyte patches						
83	<b>Habitat elements of geomorphic origin</b>						
84	Cliffs, talus, and ledges	B					
85	Caves	B		B			
86	Overhangs	B		B			
87	Dens (existing burrows dug by animals)						
88	Sheet rocks						
89	Large bouldery aggregates						
90	Rock outcrops						
91	Sandy banks and sand spits						
92	Salt licks (exposed mineral soils)						

93	Earth cuttings						
94	Man-made (anthropogenic) structures						
95	Additional / other (specify)						
96	<b>Structural stage</b>						
97	Early stage	X		X		X	
98	Mid stage	X		X			
99	Late stage	X		X			
100	Old-growth stage - unmanaged	X		X			
101	Other - unmanaged	X		X			
102	<b>Key ecological functions</b>						
103	<b>Sensitivity to anthropogenic disturbance</b>	B,I,U				E,J,N,R,X	

1	<b>Vernacular name</b>	Painted Francolin	Red Junglefowl	Stork-billed Kingfisher	Pallas's Fish-Eagle	Red-headed Vulture	Hog Deer
2	<b>Scientific name</b>	<i>Francolinus pictus</i>	<i>Gallus gallus</i>	<i>Halcyon capensis</i>	<i>Haliaeetus leucorhynchus</i>	<i>Sarcogyps calvus</i>	<i>Axis porcinus</i>
3	<b>Taxonomic class</b>	B	B	B	B	B	M
4	<b>Legal Status - Wildlife Protection Act</b>	SIV	SIV	SIV	SIV?	SIV	
5	<b>Legal Status - CITES</b>				II	II	
6	<b>Conservation status - IUCN</b>				R		
7	<b>Endemism status</b>	ER	No	No	No	No	No
8	<b>Residency status</b>	P	P	P	P	P	P
9	<b>Conservation area</b>	S,T,G	S,T,G	S,T,G	S,T,G	S,T,G	T
10	<b>Abundance / distribution status</b>	B	A	B	B	D	C
11	<b>Conflict with humans</b>						
12	<b>Champion and Seth Forest Types of India (to the group level):</b>						
13	Southern tropical wet evergreen forests			1	1		
14	Tropical moist evergreen forest (GCA)				1		
15	Nilgiri sub-tropical evergreen forest			1	2		
16	Tropical semi-evergreen forest (GCA, TCA)				1		1
17	Northern tropical semi-evergreen forests						
18	Assam alluvial plain semi evergreen forests (GCA)						
19	Tropical moist deciduous forest (GCA, TCA)				2		1
20	East Himalayan moist deciduous forests						
21	Southern tropical moist deciduous forest			1			
22	South Indian tropical moist deciduous teak forests				1		
23	South Indian tropical moist deciduous mixed forests			1	1		
24	Northern Indian tropical moist deciduous forests (TCA)				2		1
25	Moist Bhabhar sal (TCA)						1
26	Western light plain sal (TCA)						1

27	Moist sal savannah (TCA)						2
28	Alluvial sal – kamrup alluvial sal forests						
29	Low alluvial savannah woodland (TCA)						2
30	Barringtonia swamp forests						
31	Eastern seasonal swamp low forests (Cephalanthus)						
32	Riparian fringing forests			2		1	
33	Southern tropical dry deciduous forests	2	1	1		1	
34	Southern tropical dry deciduous forests – dry teak forest	2	2	1		1	
35	Dry peninsular sal forests						
36	Western light alluvium plains sal / dry sal forests (TCA)						1
37	Dry sal forests						
38	Boswellia forests						
39	Southern cutch thorn forests	2	2	1		1	
40	Dry savannah forest						
41	Foot hill and plateau sal – eastern hill sal						
42	Central Indian subtropical hill forests	1					
43	Southern wet temperate forests (sholas, ACA)			1			
44	Shola type of mixed evergreen forest (GCA)						
45	Wet grassland habitat on hill plateaus (ACA, GCA)			1			
46	<b>Other, non-Champion and Seth types</b>						
47	Southern moist and wet bamboo brakes	1		1		1	
48	Canebrakes (TCA)						1
49	Extensive bamboo areas (GCA)						
50	Secondary moist bamboo brakes						
51	Dry tall grasslands on hill plateaus (SCA)	2	1			1	2
52	Wet, tall grasslands interspersed with woodland and swamps (TCA)						2
53	Swamp ('tals') interspersed (TCA)						2
54	Rivers (by name, TCA, ACA & GCA)			2			1
55	Catchment for tributaries to rivers (by name, SCA, TCA)						

56	Reservoirs (by name, TCA, SCA)			2		1	
57	Teak plantations (ACA, SCA)	1		1	1	1	
58	Sal plantations (100 yrs old; GCA)				2		
59	EXtensive plantation on grassland habitats of teak, shisham, and eucalyptus (TCA)						1
60	Coffee and cardamom (ACA)			1			
61	Tea (ACA)			0			
62	Wattle (ACA)			1			
63	Pinus (ACA)			1			
64	Young jhum (<10 yrs; GCA)						
65	Middle jhum (10-20 yrs; GCA)						
66	Old jhum (>20 yrs; GCA)						
67	<b>Trophic category</b>	Gr	In	Pi	Pi	Cn	He
68	<b>Habitat elements/substrates</b>						
69	<b>Habitat elements of biotic origin (special habitats)</b>						
70	Snags		F	F		Oth	
71	Snag recruits (dying trees, live trees with dead portions)					Oth	
72	Hollow trees, chimney trees (living or dead)		B			Oth	
73	Tree cavities (natural or created)					Oth	
74	Large old trees (living)					B	
75	Trees with fluting boles and buttresses		F			Oth	
76	Down wood	F	F				
77	Litter and duff layers	B,F	B,F				
78	Litter in streams						
79	Lianas	F	F				
80	Fruit-bearing shrubs	F	F				
81	Fruit bearing trees		F				
82	Epiphyte patches						
83	<b>Habitat elements of geomorphic origin</b>						
84	Cliffs, talus, and ledges						
85	Caves						
86	Overhangs						
87	Dens (existing burrows dug by animals)			B			
88	Sheet rocks						
89	Large bouldery aggregates						
90	Rock outcrops						
91	Sandy banks and sand spits						F
92	Salt licks (exposed mineral soils)						

93	Earth cuttings						
94	Man-made (anthropogenic) structures			B			
95	Additional / other (specify)						
96	<b>Structural stage</b>						
97	Early stage	X	X	X	X	X	X
98	Mid stage	X	X	X	X	X	X
99	Late stage			X	X		
100	Old-growth stage - unmanaged			X	X		
101	Other - unmanaged			X	X	X	
102	<b>Key ecological functions</b>		H			Scavenger	
103	<b>Sensitivity to anthropogenic disturbance</b>	B,I,U,X	B,I,K,L,U, X		E,J,N,AA		E,I,J,L,N, R,X,AA

1	<b>Vernacular name</b>	Hispid Hare	Swamp deer	Swamp Francolin	Great Indian One-horned Rhinoceros	Indian Chameleon	Brahminy Terrapin
2	<b>Scientific name</b>	<i>Caprolagus hispidus</i>	<i>Cervus duvauceli duvauceli</i>	<i>Francolinus gularis</i>	<i>Rhinoceros unicornis</i>	<i>Chamaeleon zeylanicus</i>	<i>Hardella thurgii</i>
3	<b>Taxonomic class</b>	M	M	B	M	R	R
4	<b>Legal Status - Wildlife Protection Act</b>	SI	SI	SI	SI	SII	
5	<b>Legal Status - CITES</b>	I	I		I		II
6	<b>Conservation status - IUCN</b>	E	E	R	E		
7	<b>Endemism status</b>	ER	ER	ER	No	No	
8	<b>Residency status</b>	P	P	P	P	P	
9	<b>Conservation area</b>	T	T	T	T		
10	<b>Abundance / distribution status</b>	D	C	C	C	B	
11	<b>Conflict with humans</b>						
12	<b>Champion and Seth Forest Types of India (to the group level):</b>						
13	Southern tropical wet evergreen forests						
14	Tropical moist evergreen forest (GCA)						
15	Nilgiri sub-tropical evergreen forest						
16	Tropical semi-evergreen forest (GCA, TCA)						
17	Northern tropical semi-evergreen forests						
18	Assam alluvial plain semi evergreen forests (GCA)						
19	Tropical moist deciduous forest (GCA, TCA)						
20	East Himalayan moist deciduous forests						
21	Southern tropical moist deciduous forest						
22	South Indian tropical moist deciduous teak forests						
23	South Indian tropical moist deciduous mixed forests						
24	Northern Indian tropical moist deciduous forests (TCA)	1					
25	Moist Bhabhar sal (TCA)	1	1				
26	Western light plain sal (TCA)	1	1	1	1		

27	Moist sal savannah (TCA)	1	2	2	2		
28	Alluvial sal – kamrup alluvial sal forests						
29	Low alluvial savannah woodland (TCA)	2	2	2	2		
30	Barringtonia swamp forests						
31	Eastern seasonal swamp low forests (Cephalanthus)						
32	Riparian fringing forests		1				
33	Southern tropical dry deciduous forests						
34	Southern tropical dry deciduous forests – dry teak forest						
35	Dry peninsular sal forests						
36	Western light alluvium plains sal / dry sal forests (TCA)	1	1	1	1		
37	Dry sal forests						
38	Boswellia forests						
39	Southern catch thorn forests						
40	Dry savannah forest						
41	Foot hill and plateau sal – eastern hill sal						
42	Central Indian subtropical hill forests						
43	Southern wet temperate forests (sholas, ACA)						
44	Shola type of mixed evergreen forest (GCA)						
45	Wet grassland habitat on hill plateaus (ACA, GCA)						
46	<b>Other, non-Champion and Seth types</b>						
47	Southern moist and wet bamboo brakes						
48	Canebrakes (TCA)	1	1	2	1		
49	Extensive bamboo areas (GCA)						
50	Secondary moist bamboo brakes						
51	Dry tall grasslands on hill plateaus (SCA)		2				
52	Wet, tall grasslands interspersed with woodland and swamps (TCA)	2	2	2	2		
53	Swamp ('tals') interspersed (TCA)	2	2	2	2		
54	Rivers (by name, TCA, ACA & GCA)		1		1		
55	Catchment for tributaries to rivers (by name, SCA, TCA)		1		1		

56	Reservoirs (by name, TCA, SCA)						
57	Teak plantations (ACA, SCA)						
58	Sal plantations (100 yrs old; GCA)						
59	EXtensive plantation on grassland habitats of teak, shisham, and eucalyptus (TCA)	1	2	2	2		
60	Coffee and cardamom (ACA)						
61	Tea (ACA)						
62	Wattle (ACA)						
63	Pinus (ACA)						
64	Young jhum (<10 yrs; GCA)						
65	Middle jhum (10-20 yrs; GCA)						
66	Old jhum (>20 yrs; GCA)						
67	<b>Trophic category</b>	He	He	He	He		
68	<b>Habitat elements/substrates</b>						
69	<b>Habitat elements of biotic origin (special habitats)</b>						
70	Snags						
71	Snag recruits (dying trees, live trees with dead portions)						
72	Hollow trees, chimney trees (living or dead)	B					
73	Tree cavities (natural or created)	B					
74	Large old trees (living)						
75	Trees with fluting boles and buttresses						
76	Down wood	B					
77	Litter and duff layers	F					
78	Litter in streams						
79	Lianas						
80	Fruit-bearing shrubs	F					
81	Fruit bearing trees						
82	Epiphyte patches						
83	<b>Habitat elements of geomorphic origin</b>						
84	Cliffs, talus, and ledges						
85	Caves						
86	Overhangs						
87	Dens (existing burrows dug by animals)	B					
88	Sheet rocks						
89	Large bouldery aggregates						
90	Rock outcrops						
91	Sandy banks and sand spits	F	F	F	F		
92	Salt licks (exposed mineral soils)						

93	Earth cuttings						
94	Man-made (anthropogenic) structures						
95	Additional / other (specify)						
96	<b>Structural stage</b>						
97	Early stage	X	X	X	X		
98	Mid stage	X	X	X	X		
99	Late stage					X	
100	Old-growth stage - unmanaged					X	
101	Other - unmanaged	X				X	
102	<b>Key ecological functions</b>						
103	<b>Sensitivity to anthropogenic disturbance</b>	C,E,I,L,N, X	E,I,J,L,N, R,X,AA	E,I,J,L,N, R,X,AA	C,E,I,J,L, N,R,X,AA		

1	<b>Vernacular name</b>	Indian Pond Terrapin	Large Brown Flying Squirrel	Common Indian Monitor
2	<b>Scientific name</b>	<i>Melanochelys trijuga</i>	<i>Petaurista petaurista</i>	<i>Varanus benghalensis</i>
3	<b>Taxonomic class</b>	R	M	R
4	<b>Legal Status - Wildlife Protection Act</b>		SII	SIII
5	<b>Legal Status - CITES</b>	II		I
6	<b>Conservation status - IUCN</b>			
7	<b>Endemism status</b>	No	No	No
8	<b>Residency status</b>	P	P	P
9	<b>Conservation area</b>			
10	<b>Abundance / distribution status</b>	A	C	A
11	<b>Conflict with humans</b>			
12	<b>Champion and Seth Forest Types of India (to the group level):</b>			
13	Southern tropical wet evergreen forests		2	
14	Tropical moist evergreen forest (GCA)		2	
15	Nilgiri sub-tropical evergreen forest		2	
16	Tropical semi-evergreen forest (GCA, TCA)		2	
17	Northern tropical semi- evergreen forests		2	
18	Assam alluvial plain semi evergreen forests (GCA)		2	
19	Tropical moist deciduous forest (GCA, TCA)		2	
20	East Himalayan moist deciduous forests			
21	Southern tropical moist deciduous forest		2	
22	South Indian tropical moist deciduous teak forests		2	
23	South Indian tropical moist deciduous mixed forests		2	
24	Northern Indian tropical moist deciduous forests (TCA)		2	
25	Moist Bhabhar sal (TCA)		2	
26	Western light plain sal (TCA)		2	

27	Moist sal savannah (TCA)		2	
28	Alluvial sal – kamrup alluvial sal forests			
29	Low alluvial savannah woodland (TCA)			
30	Barringtonia swamp forests			
31	Eastern seasonal swamp low forests (Cephalanthus)			
32	Riparian fringing forests			
33	Southern tropical dry deciduous forests			
34	Southern tropical dry deciduous forests – dry teak forest			
35	Dry peninsular sal forests			
36	Western light alluvium plains sal / dry sal forests (TCA)			
37	Dry sal forests			
38	Boswellia forests			
39	Southern cutch thorn forests			
40	Dry savannah forest			
41	Foot hill and plateau sal – eastern hill sal			
42	Central Indian subtropical hill forests			
43	Southern wet temperate forests (sholas, ACA)			
44	Shola type of mixed evergreen forest (GCA)			
45	Wet grassland habitat on hill plateaus (ACA, GCA)			
46	<b>Other, non-Champion and Seth types</b>			
47	Southern moist and wet bamboo brakes			
48	Canebrakes (TCA)			
49	Extensive bamboo areas (GCA)			
50	Secondary moist bamboo brakes			
51	Dry tall grasslands on hill plateaus (SCA)			
52	Wet, tall grasslands interspersed with woodland and swamps (TCA)			
53	Swamp ('tals') interspersed (TCA)			
54	Rivers (by name, TCA, ACA & GCA)			
55	Catchment for tributaries to rivers (by name, SCA, TCA)			

56	Reservoirs (by name, TCA, SCA)			
57	Teak plantations (ACA, SCA)		1	
58	Sal plantations (100 yrs old; GCA)			
59	EXTensive plantation on grassland habitats of teak, shisham, and eucalyptus (TCA)			
60	Coffee and cardamom (ACA)			
61	Tea (ACA)			
62	Wattle (ACA)			
63	Pinus (ACA)			
64	Young jhum (<10 yrs; GCA)			
65	Middle jhum (10-20 yrs; GCA)			
66	Old jhum (>20 yrs; GCA)			
67	<b>Trophic category</b>		He	Om
68	<b>Habitat elements/substrates</b>			
69	<b>Habitat elements of biotic origin (special habitats)</b>			
70	Snags			
71	Snag recruits (dying trees, live trees with dead portions)			
72	Hollow trees, chimney trees (living or dead)			
73	Tree cavities (natural or created)			
74	Large old trees (living)			
75	Trees with fluting boles and buttresses			
76	Down wood			
77	Litter and duff layers			
78	Litter in streams			
79	Lianas			
80	Fruit-bearing shrubs			
81	Fruit bearing trees			
82	Epiphyte patches			
83	<b>Habitat elements of geomorphic origin</b>			
84	Cliffs, talus, and ledges			
85	Caves			
86	Overhangs			
87	Dens (existing burrows dug by animals)			
88	Sheet rocks			
89	Large bouldery aggregates			
90	Rock outcrops			
91	Sandy banks and sand spits			
92	Salt licks (exposed mineral soils)			

93	Earth cuttings			
94	Man-made (anthropogenic) structures			
95	Additional / other (specify)			
96	<b>Structural stage</b>			
97	Early stage			
98	Mid stage			
99	Late stage			
100	Old-growth stage - unmanaged			
101	Other - unmanaged			
102	<b>Key ecological functions</b>			
103	<b>Sensitivity to anthropogenic disturbance</b>			