ISSN 0973-6530

The Rhino Foundation

for nature in North East India

Newsletter & Journal No. 10 • December 2020

Amur Falcon
Pygmy hog
Balpakram
Narpuh

Silver Jubilee Issue

ISSN 978-93-80652-00-9

Newsletter & Journal of
THE **RHINO FOUNDATION** FOR NATURE IN NE INDIA
No. 10 • December 2020

ISSN 0973-6530

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COVER: Amur Falcon *Falco amurensis* in Umru II or Umrukhuti village, West Karbi Anglong district, Assam (also see pp. 63–75). (*Photo* : ANWARUDDIN CHOUDHURY)

The *Newsletter & Journal* of

THE RHINO FOUNDATION

FOR NATURE IN NORTH-EAST INDIA

No. 10 • December 2020 ***SILVER JUBILEE ISSUE***

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Newsletter & Journal of The Rhino Foundation for nature in NE India (2020) 10: 2–12. ISSN 0973-6530

The Rhino Foundation for nature in NE India, 2013–20

ANWARUDDIN CHOUDHURY and **ANIL KUMAR GOSWAMI**

The Rhino Foundation for Nature in North East India (herein after referred to as just Rhino Foundation) has completed 25 years (founded in 1994) as a leading non-governmental organisation (NGO) of the country. The organisation continued its conservation activities across North East India. The organisation has built up a good network with local community leaders, grassroot NGOs, government officials and politicians among others. It stuck to its main objective of maintaining sustainable use of natural resources for a healthy development of future generations and continued its appeal for support for this important cause from all concerned.

Projects

The projects undertaken and completed since its inception were explained and listed in details in the previous issues of this *newsletter & journal* (*No.*3, June 2001, pp. 1-5; *No.*4, June 2002, pp. 1-4; *No.*5, June 2003, pp. 1-4; *No.*6, December 2004, pp. 1-6; *No.*7, June 2007, pp. 1-9, *No.*8, December 2009, pp. 2-10 and *No.*9, June 2013) and are also summarised here in Table 1. During the last seven years, the Rhino Foundation had undertaken conservation and research projects in the protected areas and their fringes in Assam, Meghalaya, Mizoram and Arunachal Pradesh. Elsewhere in the region, the network, which was established with other NGOs as well as governmental agencies, has been maintained through regular contact.

Three-years monitoring of Amur Falcons

Major activities during the last nearly half a decade inlcuded three years monitoring, perhaps first of its kind was undertaken on the migrating Amur Falcons *Falco amurensis*. The site of this intensive study was Umru II or Umrukhuti, a village in West Karbi Anglong district, Assam. The Amur Falcon is a long-distance migrant, which breeds in the basin of the Amur River in eastern Siberia, Mongolia and adjacent areas and migrate to Africa for winter. The migrating falcons pass through north-eastern India and then fly over the peninsular India and Arabian Sea. Enroute these falcons roost at some select sites in Nagaland, Manipur, Assam and Meghalaya often in thousands and lakhs (one lakh= one-tenth of a million). A large number of 'bird-catchers'/ poachers used to catch them with bare hands (Karbi Anglong, Assam) or with nets (Nagaland) or shot them with guns/air guns/slingshots.

There are several sites in Assam, where Amur Falcons could be seen during their migration but it is only at a few sites that they roost overnight in large numbers which includes Habang (Umwang) (now abandoned) and Umru II or Umrukhuti in in West Karbi Anglong district and Umrangso in

Amur Falcons *Falco amurensis* in Umru II or Umrukhuti village, West Karbi Anglong district, Assam.

A mobile phone is being handed over to a key field person for smooth communication during counting and also for monitoring of Amur Falcons.

Dima Hasao (North Cachar Hills) district. An awareness drive was carried out in 1996 at Habang after which the catching/killing came down. A similar drive in Nagaland's Mokokchung district in 2004 resulted in reduction of hunting at Chongtongya where large numbers used to roost. Later on owing to loss of bamboos for commercial use the birds of Habang shifted to Umru II near Assam–Meghalaya border in about 2011–14.

The present study covered one site, i.e., Umru II or Umrukhuti in West Karbi Anglong district of Assam for a period of three seasons, 2017–19. In 2017, the falcons arrived on 4th October and by 4th December all birds had departed. The number of falcons kept on increasing every day till 8th November when the estimated number reached a staggering figure of about 210,000 (one-fifth of a million). The peak period was between 1st and 19th November when the daily estimates were 100,000 or more. In 2018, the falcons arrived on 6th October at Umru and departed by 28th November. The number of falcons kept on increasing till 7th November when the estimated number reached a high figure of about 105,000 (one-tenth of a million). The peak period was between 31st October and 19th November when the daily estimates were 50,000 or more.

In 2019, the falcons arrived on 8th October at Umru and departed by 28th November. The number of falcons kept on increasing every day till 12th November when the estimated number reached a staggering figure of about 318,000 (one-third of a million). The peak period was between 30th October and 22nd November when the daily estimates were 100,000 or more. It seems that in 2018, the number of birds was lowest and in 2019, it was highest.

The falcons roost in bamboo groves in Umru. Awareness meetings were held with the villagers, students, teachers, Forest Department officials and staff. Posters were released and distributed among the villagers and talks were delivered on Amur Falcons, their migration and significance of Umru in the falcon's conservation. There were no known killing or capture during the period.

The day by day estimate of falcons at a roosting site has been attempted for the first time, at least in India. To avoid over-estimation as far as possible, only the lower limits of estimates were accepted.

Posters on Amur falcon conservation being launched on 12 November 2017.

Conservation of Wild water buffalo

The first detailed census or population estimation of wild water buffalo *Bubalus arnee (=bubalis)*, a globaly threatened species, in Manas National Park was done in 2008 (a preliminary work was done in 2004) which was initiated by The Rhino Foundation in collaboration with the Field Directorate of Manas Tiger Reserve with partial support of Forestry Bureau, COA, Taiwan.

Wild water buffaloes *Bubalus arnee* in Manas National Park. (Photo: *Anwaruddin Choudhury*)

This exercise has been continued every year since 2015 in which the Green Heart Nature Club, Kokrajhar and the Forest Department took initiative. This species of buffalo is also the ancestor of all the domestic breeds anywhere. The wild water buffalo is listed as 'Endangered' by IUCN. Assam has around four-fifth of the world population. The estimate showed a gradual increase and the population of wild buffaloes is now more than 500. It was just 215 (230 estimated with some probable missing animals) in 2008, and hence it has more than doubled. It is a sign of better protection in the park.

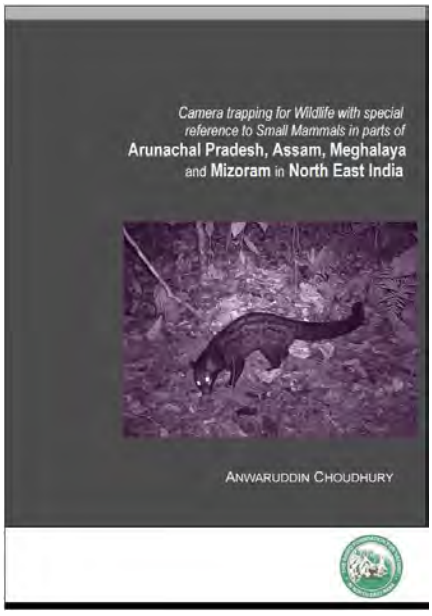
Camera-trapping

Camera trapping is now a major tool in wildlife conservation and research, which provides vital data on their presence/absence. With support from Forestry Bureau, COA, Taiwan, short programmes were undertaken in Meghalaya, Assam and Arunachl Pradesh and a report was produced in 2014. However, further trapping continued in Manas National Park, Assam (not included in the report) and in Nongkhyllem Wildlife Sanctuary without any support from other agencies except the reserve authorities. Some new sites in Assam such as Barail Wildlife Sanctuary in Cachar district, Katakhal Reserved Forest in Hailakandi district and in Hajong lake area of Langting Mupa Reserved Forest in Dima Hasao (North Cachar Hills) district was covered. The exercise completed in the spring of 2019 and the report will be produced in due course.

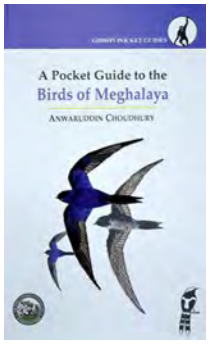
IUCN/SSC Asian Elephant Specialist Group and other meetings

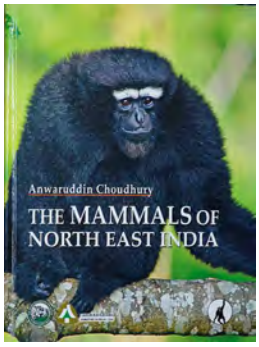
Dr Anwaruddin Choudhury, who is a member of Asian Elephant Specialist Group, has attended the meeting of the group held at Kota Kinabalu in Sabah province of Malaysia on 4–6 December, 2019. He also attended and delivered lecture in "Himalaya Matters in a Changing World", a *Conference to Celebrate the International Mountain Day* held at G.B. Pant National Institute of Himalayan Environment & Sustainable Development (GBPNIHESD), Almora on 9–11 December 2019. He was also an Invitated Speaker in the National Seminar on "Eastern Himalayas and its Ecological Trends", organised by the Institute of Social and Cultural Studies at Darjeeling on 19 February 2020.

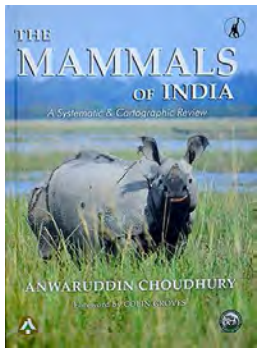
Earlier, Dr Choudhury attended a national workshop on Development of Guidelines for

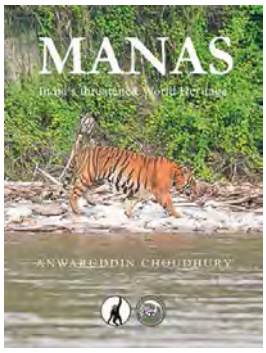


Report on camera trapping published in 2014.









Human Wildlife Conflict Mitigation in India was organized at Hotel Aloha on the Ganges, Rishikesh on September 18–19, 2019. It was organized by Ministry of Environment & Forest and Climate Change and GIZ. This was followed by another meeting of coordinators and authors of the Gaur SOP Group at SACON, Coimbatore on 29th October 2019.

Books and reports

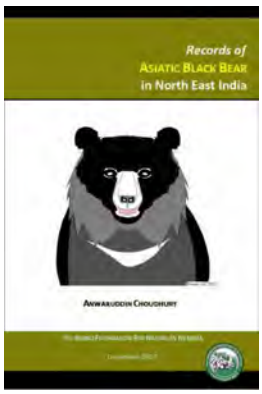
During this period four books and five technical reports were produced. *The mammals of North East India* was published in 2013 in collaboration with Gibbon Books and with support from Forestry Bureau (COA), Taiwan (432 pp. ISBN 978-93-80652-02-3). It was launched at NeDfi House, Guwahati by J.N. Choudhury, then Director General of Police, Assam at a function organised by Balipara Foundation under the Chairmanship of Prof. Anil Goswami.

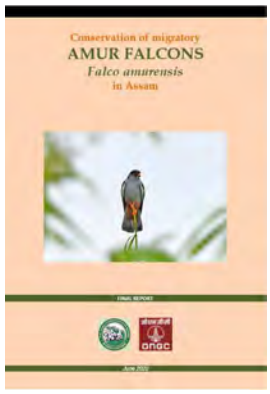
The second book was *A pocket guide to the birds of Meghalaya,* also published in collaboration with Gibbon Books and with support from Oriental Bird Club, UK (160pp. ISBN 978-93-80652-03-0) in 2014. It was launched at the Secretariat at Shillong by P.B.O. Warjri, then Chief Secretary, Maghalaya.

The third book was *The mammals of India: a systematic and cartographic review* published in 2016 in collaboration with Gibbon Books and with support from Forestry Bureau (COA), Taiwan. (328pp. ISBN 978-93-80652-04-7). It was launched at Guwahati Press Club by Ranjit Barthakur, Chairman of Balipara Foundation who is also a conservationist.

The fourth book was *Manas: India's Threatened World Heritage* published in 2019 in collaboration with Gibbon Books (200pp. ISBN 978-93-80652-05-4). It was launched by Sarbananda Sonowal, the Chief Minister of Assam.

The technical reports published during the period includes, (1) *Records of Asiatic black bear in North East India.* Final report to International Association for Bear Research & Management (IBA) (2013; pp. 96); (2) *Camera trapping for wildlife with special reference to Small Mammals in parts of Arunachal Pradesh, Assam, Meghalaya, and Mizoram in North East India.* Technical Report No. 17 (2014; pp. 62); (3–5); (3-5) *Conservation of migratory Amur Falcons* Falco amurensis *in Assam.* 1st Year's Report (2018; pp. 30), 2nd Year's Report (2019; pp. 26) and Final Report (2020; pp. 40).





The hon'ble Chief Minister of Assam Sri Sarbananda Sonowal (3rd from left) launching the book *Manas: India's Threatened World Heritage* in August 2019.

Other activities

Networking. The network with different governmental and non-governmental agencies and individuals across north-eastern India and outside has been maintained. A major activity was maintenance of a network of informers around the key protected areas. These informers, who may never get open recognition, have played an important role in checking poaching, especially of the rhinoceros, wild buffalo, elephant and tiger.

***Newsletter* and *Journal* No. 10.** Like the previous issues, this issue has also maintained high standard with a section devoted as **peer-reviewed journal**. However, it came after a long gap of six years. One major issue was getting adequate number of publishable high quality articles on the focus area, i.e., north-east and adjacent areas.

Acknowledgements

The Trustees of the Rhino Foundation for their continuing support. The Forestry Bureau COA Taiwan and Oil & Natural Gas Corporation for their support, which enabled project activities in the field. The support of the following are also gratefully acknowledged: in *Assam*, Sri Sarbananda Sonowal, Chief Minister of Assam; Hrishikesh Goswami, Adviser to Chief Minister; Ranjit Barthakur of Balipara Foundation; D.D. Misra and J.K. Das (Chief Manager and Director respectively of ONGC, now ret'd); A. Swargiary, Head of Forest in BTC; Dharanidhar Boro, Debendra Luitel; Mukunda Hazarika (of Lengeri near Moran); J. Sharma (DFO, Hamren), Akhil Kumar Talukdar and Dhan Singh Terang (both ACF), Longkham Teron (Ranger), Yubraj Chhetri, Khogen Terang and Telesfor Kerketta (all Forest Guards), Megh Bahadur Thapa, Rojen Engleng, Babulal Subedi and Bapuram Parajuli (all Muster Roll workers), Subhas Bista, Hashimuddin Choudhury, Bhubaneswar Sharma, Laksman Chetry, Gyan Bahadur Chetry/Kharka; *Arunachal Pradesh*, we thank P. Ringu, Conservator; Tasi Mize, DFO; *Meghalaya*, we thank Ms H. Lato, DFO (wildlife), Jaintia Hills; Prabin Dunai, Range Officer, Nongpoh, and Jim, Forest staff; *Mizoram,* Liankima Lailung (then Conservator of Forest). *Nagaland*, Khekiho Sohe and Pelevizo Meyase.

For their continued support, we thank Asad Rahmani, Biswajit Roy Chowdhury, Moloy Baruah, Bibhab Talukdar, Bibhuti Lahkar, Bikul Goswami, Arup Goswami, late Thomas Kent of Nagaland, Bijoy Choudhury and Ratul Talukdar. Mrs Anne Wright, who was the founder Chairperson for her sincere support and encouragement. Last but not the least is the support extended by our family members □

Table 1: Projects completed.

Sl No.	Name	Year	Remarks
1.	Field staff equipment	1995–96	Funding: Own sources. Completed.
2.	Eco-development	1995–96	Funding: Own sources. Completed.
3.	Repairing of wireless, reward, etc	1995–96	Funding: Own sources. Completed.
4.	Forest Guard Equipment	1997–98	With support from Rhino & Tiger Conservation Fund (RTCF) of United States Fish & Wildlife Service (USFWS). Completed.
5.	Post-flood emergency assistance	1998	Supported by Rhino Rescue Trust, UK. Completed.
6.	Aid to Kaziranga (repairing of countryboats)	1998	Supported by WWF-Tiger Conservation Programme (TCP). Completed.
7.	Wireless Systems	1998–2001	With support from RTCF of USFWS. Completed.
8.	Motorcycles	1999–2000	Supported by Fauna & Flora International, UK. Completed.
9.	Anti-poaching support to Orang NP	1999–2001	Supported by WWF-Tiger Conservation Programme (TCP). Completed.
10.	Support to Nameri NP	1999–2001	Supported by WWF-TCP. Completed.
11.	Veterinary camps for patrolling elephants	2001-02	With support from Asian Elephant Conservation Fund (AECF) of USFWS. Completed.
12.	Survey of birds and mammals of Dibang-Dihang Biosphere Reserve	2002–05	Supported by Ministry of Environment & Forests, Government of India. Completed.
13.	Anti-poaching support to Nongkhyllem Sanctuary, Meghalaya	2004–06	With support from Asian Elephant Conservation Fund (AECF) of USFWS. Completed.
14.	Survey and monitoring of nesting sites of *Gyps* vultures in Assam	2004–05	With support from USFWS. Completed.
15.	Floating anti-poaching camp to Kaziranga National Park	2007–08	With support from Asian Elephant Conservation Fund (AECF) of USFWS. Completed.
16.	Assessment of population of wild water buffalo in Assam.	2008–09	With support from Taiwan Forestry Bureau and CEPF (Critical Ecosystem Partnership Fund). Completed.
17.	Camera-trapping of select 'Endangered' mammals in Meghalaya and Assam, India	2009–10	With support from Taiwan Forestry Bureau. Completed.
18.	Conservation of wild water buffalo *Bubalus arnee (=bubalis)* in Assam, India – follow up of an earlier Forestry Bureau, COA project.	2010–11	With support from Taiwan Forestry Bureau. Completed.
19.	Mammals of North-east India – review, compilation and production of a monograph.	2011–12	With support from Taiwan Forestry Bureau. Completed in 2013.
20.	"Production of a pictorial field guide on the mammals of northeast India" has been changed to "Mammals of India: a systematic & cartographic review", compilation and production of a monograph.	2012–13	With support from Taiwan Forestry Bureau. Completed in 2016.
21.	Conservation of migratory Amur Falcons *Falco amurensis* in Assam.	2017–19	With support from Oil & Natural Gas Corporation. Completed.

Appendix 1: Provision and construction of some major items since 1995

Protected Area / NGO	Motor-cycle	Motor -boat	Country-boat	AP Camp	P. Path	Wireless Mainset	Wireless Handset	Solar Charger	Battery Charger	TL	Vehi-cle
Kaziranga	1	–	1	1	–			–	–	5	–
Nameri	1	–	–	1	27 km	–	–	–	–	–	–
RG Orang	2	2	5	4	–	3	16	10	8	–	1
Pabitora	2	–	–	–	–	2	9	5	5	3	-
Manas	1	–	–	–	–	–	–	–	–	–	–
Nongkhyllem	1	–	–	2	–	2	8	8	–	–	1
Nature Care & Friend (NGO)	1	–	–	–	–	–	–	–	–	–	–
TOTAL	**9**	**2**	**6**	**8**	**27 km**	**7**	**33**	**23**	**13**	**8**	**1**

AP Camp= construction of anti-poaching camp; P. Path= laying of patrolling path; TL= tarpaulin (50'x12' sheets).

Appendix 2: Provision of some other items since 1995

Protected Area	1	2	3	4	5	6	7	8	9	10	11	12	13
Bornadi WS	–	–	–	–	–	–	4	–	–	–	–	–	–
Burhachapori WS	90	90	–	–	90	30	5	–	–	–	–	–	–
Dibru-Saikhowa NP	–	–	–	–	25	–	5	–	–	–	–	–	–
Kaziranga NP	800	550	–	–	1090	250	171	50	130	–	4187	–	–
Laokhowa WS	60	60	–	–	60	30	5	–	–	–	–	–	–
Manas NP	300	300	–	–	300	90	20	–	–	–	–	–	–
Nameri NP	–	–	–	–	111*	–	5	–	–	–	–	–	–
RG Orang NP	100	100	90	90	300	60	25	–	–	71	–	3	3
Pabitora WS	165	100	–	–	286	60	30	13	25	4	1102	3	–
Nongkhyllem WS	70	70	–	70	70	60	–	–	–	–	–	–	–
TOTAL	**1585**	**1270**	**90**	**160**	**2332**	**580**	**266**	**63**	**155**	**75**	**5289**	**6**	**3**

1= raincoat; 2= warm jersey; 3=jacket; 4=uniform (pairs); 5= huntingboot (pairs); 6= haversack; 7= drinking water-filter; 8= water-filter candle; 9= hurricane lantern; 10= torchlight; 11= torch battery; 12= wireless antennae; 13= extra wireless battery. * = shared betweeen Nameri and Burhachapori; Fire-crackers were also donated to Pabitora for anti-depredation.

Appendix 3: Veterinary Care Camps for Patrol Elephants between 2001 and 2005

Protected Area	Number of Camps	Number of Elephants Treated/Examined per camp	Cumulative Total Number of Elephants Treated/Examined
Kaziranga National Park	8	6 – 47	246
Manas National Park	5	4 – 27	101
Nameri National Park	6	7 – 13	67
RG Orang National Park	8	1 – 22	93
Pabitora Wildlife Sanctuary	8	3 – 7	48
Total	**35**	**1 – 47**	**555**

The Rhino Foundation

FOR NATURE IN NE INDIA - at a glance

1994. Founded under the initiative of Mr R.K. Krishna Kumar, Chairman of Tata Tea and Mrs Anne Wright, MBE, in Kolkata. Concerned about the endangered wild life species in North-east India with the Indian rhinoceros as its flagship species. The following tea companies have been the leading benefactors, and have extended support: Tata Tea; The Goodricke Group; Assam Co. Ltd; Williamson Magor & Co.; Methoni Tea Co.; Moran Tea Co.; George Williamson, Assam; Rossel Tea Co., and Amgoorie Tea Co.

1995. Started functioning with Dr Anwaruddin Choudhury as the founder Chief Executive (C.E.). The Founder Trustees were Mrs.Anne Wright, MBE (Chairperson), R. K. Krishna Kumar, K. S. David, R. L. Rikhye, M.P.S. Sidhu and R. Adige. The first successful project was the campaign to save the unique **Balpakram** National Park (in Meghalaya), and a vital elephant corridor where there was a proposal by ACC to set up a mega-cement factory. The appeal and the campaign resulted in the company concerned's withdrawal from the plan. Field staff equipments provided to **Kaziranga** and other protected areas in Assam. Veterinary care and awareness camps organised. Two posters on endangered species and a survey report were produced. A monograph entitled *Wildlife survey in Bherjan, Borajan, and Podumoni Reserved Forests of Tinsukia district, Assam, with a proposal for a wildlife sanctuary* was published. This was the basis on which the sanctuary was later notified.

1996. The first issue of Newsletter was published. Invited Dave Fergussion of the US Fish & Wildlife Service and organised meeting with late **Nagen Sharma**, then Forest Minister of Assam. The result was the beginning of a long-term conservation programme which benefited Government of Assam and other NGOs. Organised World Environment Day function at Guwahati. Field staff equipments provided to the protected areas in Assam, which included **Kaziranga, Manas** and **Orang** National

From the archive: *Late Nagen Sharma, then Assam's Forest Minister handing over field staff equipments provided by the Foundation to staff at Pabitora in 1996.*

From the archive: *L.K. Ramchiyari, then Range Officer patrols the Bhuyanpara range of Manas National Park with the motorcycle provided by the Foundation in 2003–04.*

Parks and **Pabitora** Wildlife Sanctuary. Veterinary care and awareness camps organized. By the end of the year, Anwaruddin Choudhury left the post of CE but continued as the honorary CE.

A monograph entitled *Survey of the white-winged wood duck and the Bengal florican in Tinsukia district & adjacent areas of Assam and Arunachal Pradesh* was published. This was the basis on which **Dihing-Patkai** Wildlife Sanctuary (now a national park) was notified.

1997. Provided **anti-poaching equipments** to Forest Guards in Kaziranga National Park and other protected areas.

1998. **Emergency** assistance to Kaziranga National Park after a devastating flood. The 2nd issue of Newsletter published. Two monographs entitled *Dhansiri Tiger Reserve* (revised proposal) and *Birds of Nongkhyllem Wildlife Sanctuary & adjacent areas* were published.

1999. Provided new **wireless** sets to Orang National Park and Pabitora Wildlife Sanctuary. The Government of Assam notified **Bherjan-Borajan-Podumoni** Wildlife Sanctuary, the proposal for which was published by the Foundation.

2000. Four **anti-poaching camps** constructed in Orang National Park. **Motorcycles, motorboats and country-boats** were provided to Orang and Motorcycles to Pabitora for anti-poaching patrol.

2001. Inducted as member of the **Indian Board for Wild Life**, the highest body in the country, chaired by the Prime Minister. Provided **motorcycles** to Nameri and Kaziranga. The 3rd issue of Newsletter published.

2002. Petitioned before the Ministry of Road Transport & Highways, Govt. of India for permanent **rumble strips** near Kaziranga to reduce death of animals. The Ministry vide its letter No. NH-12037/59/2002-AS/NH-10 dated May 27, 2002 agreed. The 4th issue of Newsletter published. **Veterinary care** camps organised for patrol elephants. **Faunal survey** in Dihang-Dibang Biosphere Reserve, Arunachal Pradesh. The honorary CE joined Environment & Forest Department of the Government of Assam as Joint Secretary.

2003. The veterinary care for patrol elephants and faunal survey in Dibang-Dihang in Arunachal Pradesh continued. The 5th issue of Newsletter published. The Government of Assam notified a new wildlife sanctuary, **Nambor-Doigrung**, identified as potential site and then proposed in 1980s by the honorary CE.

Two monographs entitled *Birds of Kaziranga National Park: a checklist* and *A pocket guide to the birds of Nagaland* were published.

2004. The Government of Assam notified three new wildlife sanctuaries, **Amchang, Barail and Dihing-Patkai**, identified as potential sites and then proposed in 1980s by the honorary CE. Veterinary care camps for patrol elephants continued. Awareness campaign in remote Noklak and Chongtongya (for Amur Falcons) areas of **Nagaland**. The 6th issue of Newsletter published.

2005. Provided anti-poaching equipments (vehicle, motorcycle, staff gear) to **Nongkhyllem** Wildlife Sanctuary, Meghalaya. Carried out the first comprehensive **survey** and monitoring of nesting sites of the 'Critically Endangered' ***Gyps* vultures** in Assam.

2006. Two **anti-poaching camps** were constructed in **Nongkhyllem** Wildlife Sanctuary, Meghalaya. Awareness campaign for the 'Critically Endangered' ***Gyps* vultures** continued. Two monographs entitled *A pocket guide to*

From the archive: *D.D. Lapang, Chief Minister of Meghalaya receiving anti-poaching equipments provided by Rhino Foundation from the hony. CE for Nongkhyllem Wildlife Sanctuary at a function held at Nongpoh in 2005.*

From the archive: *Street-corner awareness meetings, Tuensang village in Nagaland in January 2004. The hony. CE is 5th from right. Such meetings were held across Nagaland and posters were also distributed.*

the birds of Arunachal Pradesh and *Birds of Manas National Park* were published.

2007. Two anti-poaching camps constructed in Nongk-hyllem Sanctuary started functioning. Awareness campaign for the 'Critically Endangered' *Gyps* vultures continued. The 7th issue of Newsletter published, which also included a peer-reviewed journal section. A monograph entitled *Birds of Dibru–Saikhowa National Park* was published.

2008. Population estimation of wild water buffaloes done in Manas and Dibru-Saikhowa National Parks, and Laokhowa and Burhachapori Wildlife Sanctuaries in collaboration with Environment & Forest department.

From the archive: *Floating anti-poaching camp provided to Kaziranga National Park to patrol the Brahmaputra River stretch in 2009. It was launched by Assam's Forest Minister, Rakibul Hussain.*

The construction of **Floating Anti-poaching Camp** for Kaziranga completed. Waterfowl count in Rudrasagar and Gumti wetlands of **Tripura**. A monograph entitled *A pocket guide to the birds of Mizoram* was published.

2009. The Floating **Anti-poaching Camp** handed over to the authorities and is on patrol in the newly-created Bishnathghat Range of Kaziranga National Park since January 2009.

2010. Camera trapping in parts of Meghalaya. Firstever monograph on endangered wild water buffalo *Bubalus arnee "The vanishing herds: wild water buffalo"* published. The 8th issue of Newsletter including a peer-reviewed journal section published.

2011. Camera trapping in parts of Assam. Information network on the movement of rhino poachers and linkmen strengthened in Lakhimpur district.

2012. Camera trapping in parts of Assam and Arunachal Pradesh. A **motorcycle** provided to Nature Care & Friend NGO for awareness and conservation activities, especially for the unprotected population of the endangered wild buffalo in Dibrugarh district.

2013. A comprehensive book entitled *The mammals of North East India* published. Camera trapping in parts of Assam, Arunachal Pradesh and Mizoram.

2014–2015. Camera trapping in parts of Assam and Meghalaya.

2016. A comprehensive book entitled *The mammals of India: a systematic & cartographic review* published. Camera trapping in parts of Assam and Meghalaya.

2017–2018. Camera trapping in parts of Assam and Meghalaya.

2019. The Rhino Foundation completed 25th year of existence, i.e., **Silver Jubilee**. A comprehensive book entitled *Manas: India's Threatened World Heritage* published. Camera trapping in Assam and Meghalaya concluded. Dr Anwaruddin Choudhury has retired from Indian Administrative Service. His last postings were Divisional Commissioner of Barak Valley; Commissioner & Secretary to the Government of Assam, Pension & Public Grievance, Hill Areas and Mines & Minerals Departments, and Development Commissioner for Hill Areas. □

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From the archive: *Awareness campaign at Thanamir in Nagaland, the last village enroute Mt Saramati, the largest wilderness in the state and also the highest peak in mainland Asia south of the Himalaya-Mishmi Hills in 2003–2004.*
(Photo: *Late Thomas Kent*)

Newsletter & Journal of The Rhino Foundation for nature in NE India (2020) 10: 13–15. ISSN 0973-6530

Pygmy Hogs return to their home in Manas – the road ahead

PARAG JYOTI DEKA[1,2], DHRITIMAN DAS[1] AND GOUTAM NARAYAN[3]

Fourteen captive-bred pygmy hogs *Porcula salvania* were released in Manas National Park, Assam by the Pygmy Hog Conservation Programme (PHCP) in May 2020. This is a significant milestone in saving one of the most endangered mammals in the world. About 24 years ago, six hogs were captured from Manas as the original wild stock for conservation breeding. This iconic species has now returned back to its home where its last original population still survives but has been drastically declined. With this, the number of pygmy hogs reintroduced into the wild by PHCP has reached 130 (62 males, 68 females).

The Conservation Programme

The pygmy hog is the world's smallest and rarest wild pig and is threatened by extinction. It belongs to a unique genus that has no close relative. The species was originally found in the narrow belt of tall alluvial grasslands that runs across the southern edge of the Himalayas in the Indian Subcontinent. However, by 1993 it was reduced to a single population found only in a few pockets of the Manas National Park. The Durrell wildlife Conservation Trust (www.durrell.org) along with the IUCN/SSC Wild Pig Specialist Group initiated the PHCP (www.pygmyhog.org) in 1995 to save the pygmy hog from extin-ction. It partnered with the Assam's Environment & Forest Department (forest.assam.gov.in), Ministry of Environment Forest & Climate Change of Government of India (www.moef.gov.in), and a local partner, EcoSystems-India, and in 2017, another local partner Aaranyak (www.aaranyak.org) to implement the programme. The main aim of the programme was conservation breeding and reintroduction of pygmy hogs after habitat restoration, as well as monitoring in existing and potential grassland habitats for the species. The project to save the species also gave an opportunity to address the larger question about conservation and management of some of India's most biodiversity rich habitats.

The main threats to survival of pygmy hogs were loss and degradation of habitat due to human settlements, agricultural encroachments, flood control schemes, unsustainable livestock grazing, extensive grass burning, and improper management. Some management practices, such as planting of trees in the grasslands and indiscriminate use of fire to create openings and to promote fresh growth of grass, have caused extensive damage to the habitats the authorities intend to protect.

At the same time PHCP continues to work closely with protected area (PA) authorities to improve protection and management and to control annual dry season grass burning and unsustainable livestock grazing. Several frontline staff of these PAs have also been trained in wildlife monitoring and habitat management.

Conservation Breeding

PHCP holds almost the entire global captive population and maintains about 70 captive hogs at its two centres in Assam and breed more hogs for

Pygmy hog female with new born. (Photo: *Parag Deka*)

Close-up of a pygmy hog female. (Photo: *Parag Deka*)

release. The highly successful captive breeding project of PHCP began using six (2 M, 4 F) wild hogs captured from the last surviving population of the species in Manas in 1996. Later, a young male rescued in 2001, and another male and two females captured in 2013 from the same area had also joined the captive breeding stock.

Before releasing them into the wild, the hogs were imparted with survival training at a 'pre-release' facility near Nameri National Park where they were kept for about five months under minimal human contact and are conditioned to face the wild environment and enhanced opportunities to forage naturally. The simulated grassland habitat in these large enclosures helped the hogs to behave almost like wild animals.

Reintroduction of pygmy hog

Reintroduction of captive hogs in the wild began in 2008. Initially, three PAs in their past distribution range in Assam were selected for better protection and restoration of alluvial grasslands. Over the next decade, 35 hogs (18 M, 17 F) were released in Sonai-Rupai Wildlife Sanctuary, 59 (26 M, 33 F) in RG Orang National Park, and 22 (11 M, 11 F) in Bornadi Wildlife Sanctuary. The reintroduction in Orang has been particularly successful as they have multiplied almost two and a half times in number, and have spread to areas far from release locations. It has been estimated that with the release of these 14 (6 M, 8 F) hogs in Rupahi grasslands in the Bhuyanpara range of Manas National Park, the total number of reintroduced hogs and their progeny may have reached 200 in the four release sites. About 60 hogs will be released over a 5-year period in the Bhuyanpara range of Manas from where they had almost disappeared.

The road ahead

Till 2018, the PHCP was guided by the IUCN Species Action Plan (SAP) 1993, prepared by the Wild Pig Specialist Group. The revised SAP has been enacted with a long term vision till 2030.

The PHCP is guided by Durrell's 'Rewild Our World' strategy and two associated plans which map out the programme until 2025, one for field and community activities in Manas and the second for the pygmy hog captive breeding and reintroduction programme. In order to achieve the programme's vision of restoring pygmy hog populations in the wild and protecting their grassland habitat for the benefit of all threatened species and local communities, detailed programmme have been developed.

Manas contains some of the largest remaining grassland blocks in the sub-Himalayan grassland ecosystem. The tall alluvial wet grassland belt just south of the Himalayan foothills also happens to be home of a number of other highly threatened species, such as the Bengal Florican (*Houbaropsis bengalensis*), hispid hare (*Caprolagus hispidus*), barasingha (*Rucervus duvaucelii*) and the wild water buffalo (*Bubalus arnee*).

The grassland is also used extensively by rhino-

A pygmy hog escaping to wild from release enclosure in Rupahi, Bhuyanpara range, Manas. (Photo: *Goutam Narayan*)

Crates with pygmy hogs arrived at the release enclosure in Rupahi, Bhuyanpara range, Manas National Park, 14 May 2020. (Photo: *Goutam Narayan*)

ceros (*Rhinoceros unicornis*), elephant (*Elephas maximus*), tiger (*Panthera tigris*), hog deer (*Axis porcinus*) and a number of other small animals. The Manas Plan renewed the focus of PHCP on the recovery of grasslands and these grassland obligate species. At the same time the Pygmy Hog Plan envisions to establish pygmy hog populations in the entire sub-Himalayan grassland to ensure their long term survival. Under this plan a trial of different grassland management practices in the Manas National Park has been initiated to design an efficient model for the same.

The sub-Himalayan grasslands also help in maintaining long-term ecological and economic well-being of the region as they serve as buffer against floods in rainy season while maintaining high groundwater levels in dry season, indirectly benefiting farming communities living in the fringe areas. However, this tall alluvial grass came under significant pressures from expanding human populations, agriculture and uncontrolled harvesting and livestock grazing; all of which caused disappearance of this highly sensitive species. Therefore, the community actions in the fringe villages of Manas National Park have been initiated to identify the drivers of anthropogenic pressure on grassland habitat and to reduce the same by designing targeted and sustainable livelihood interventions. □

[1] Durrell Wildlife Conservation Trust - Pygmy Hog Conservation Programme (PHCP)
[2] Aaranyak - Threatened Species Recovery Programme (TSRP)
[3] EcoSystems-India - Rare & Endangered Species Conservation Unit (RESCU)

Corresponding author
Parag Jyoti Deka
Pygmy Hog Conservation Programme
Indira Nagar, Basistha, Guwahati, 781029
Email: parag.deka@durrell.org
Mobile: 9435016246

Newsletter & Journal of The Rhino Foundation for nature in NE India (2020) 10: 16–21. ISSN 0973-6530

Camera trapping in Balpakram Landscape, Meghalaya in north-east India

A REPORT

Balpakram, the land of perpetual winds, and the forest of the Garos, is a hidden gem of North-east India. Few other wilderness places are this closely entwined with the age-old beliefs of the resident tribal community. The history of the Garos themselves is mysterious. The first English language monograph on the Garos was published in 1909 by Major Playfair, then Deputy Commissioner, Eastern Bengal and Assam. In the century since, many anthropological studies have been carried out. The best stories, however, are those that continue to be told outdoors around the fire on nights, in their rich oral history tradition.

In 2018, the Garo Hills Conservation Area made it to UNESCO's Tentative List (2018) of World Heritage Site nominations, as a Mixed Heritage Site, combining both natural and cultural universal values. The proposed core area comprises the protected areas of Balpakram National Park, Nokrek National Park and Siju Wildlife Sanctuary;

A stunted Schima wallichi *(Boldak) tree, the Garos believe to be over a thousand years old, stands sentinel on the Balpakram plateau. Next to it is a stack of rocks called the Matcha Melaram – the meeting place of tigers.*

Dense forest on the Rongcheng Plateau, with the Agal Bisa or Baby Grassland in the distance. This plateau is excellent habitat for wildlife inside the National Park, with several species encountered during a camera-trap survey in 2012-2015. This is the area where uranium exploration was planned by the Government of India, but thwarted by local protests led by the Garo Student's Union in 2010. The plan is now held in abeyance.

while the buffer area includes several reserved forests, community forests and the Garo Hills Elephant Reserve.

The Balpakram landscape is also known for wild citrus. A Garo legend holds that the spirit of a dead man took oranges from Balpakram home to his wife and children in Nokrek whom he missed very much, but sad at not finding them at home, he left the bamboo basket or 'kok' full of oranges for them and returned to Balpakram. The oranges are called 'Memang Narang' or Orange of the Sprirts' in Garo. Nokrek National Park, also in Garo Hills is considered to be home of the mother germplasm of the wild *Citrus indica*, was declared India's first gene sanctuary. Nokrek is a National Citrus Gene Sanctuary as well as UNESCO Biosphere Reserve.)

A camera-trap excercise was done in 2012-2015 in Balpakram landscape. It was funded by

the Department of Science and Technology's research grant to Kashmira Kakati, through Samrakshan Trust. The field research team comprised Dr Kakati, Samrakshan Trust researcher Ms. Shikha Srikant, Meghalaya Forest Department Staff and local guides.

Acknowledgments: Meghalaya Forest Department (Tony Marak, C. Budnah, S.N. Sangma, P.R. Marak, M.M. Sangma and C.G. Momin) and field support (Tusar Sangma, Witness Marak, Sontos Sangma and Pidilson Sangma); Samrakshan Trust (Kamal Medhi, John Fernando Shira, Golebar Sangma and Kendesh Shira); trackers and camp support (Jonesh Marak, Maibin Sangma, Aminson, Keneth, Bul, Lasi and Joyhind).

A wild orange tree in the Jigrik hill area of the Balpakram National Park.

The Deoban section in the Balpakram National Park is visited by some local tourists. The site is reachable only after a steep walk downhill.

A camera trapped Himalayan black bear Ursus thibetanus. *Although not photographed, the Malayan Sun Bear has also been reported from the area.*

The stump-tailed macaque Macaca arctoides *is one of the seven species of primates found in Balpakram, but is scattered and spaced out in distribution, like the pig-tailed macaque.*

Hog badger Arctonyx collaris*, was photographed at eight locations in the western part of the National Park.*

Cave roosting bats fly out of the Rongalghat Dobakkol (Bat Cave) upstream of Deoban.

The uncommon ferret badger Melogale *sp. was photographed only once, but encountered at a jungle camp one night rooting among the vegetable peelings. Another killed by a poacher was found near a community forest.*

The first camera-trap record of the small-toothed palm civet Arctogalidia trivirgata *in India was taken at this 'kosi' on Chutmang hill. 'Kosi' are stones and sticks piled as offerings of respect to the forest and mountain spirits by Garo visitors to the jungle.*

The State Animal of Meghalaya, the clouded leopard Neofelis nebulosa*, occurs in Balpakram National Park and Siju Wildlife Sanctuary but was not frequently encountered on camera-traps.*

A Masked Palm Civet Paguma larvata *walks on a water pipe that supplies water from the Siju Wildlife Sanctuary to the nearest village. This wildlife sanctuary is adjacent and contiguous with Balpakram National Park.*

The diurnal crab-eating mongoose Herpestes urva *was a common carnivore in streams, both sandy and rocky, throughout the landscape.*

A common leopard Panthera pardus *walks undisturbed in broad daylight across the Pindengru plateau.*

A camera trapped Small Indian Civet Viverricula indica.

A camera trapped Asiatic brush-tailed porcupine Atherurus macrourus.

An elephant mother with calf pauses to rest on the very steep climb down from Balpakram plateau into the Kundulgup gorge.

Balpakram landscape is probably the most important elephant habitat of Meghalaya. Some of these elephants also seasonally migrate to northern Bangladesh. They also move towards Nokrek National Park & Biosphere Reserve through Rewak Corridor.

The red serow is a forest goat-antelope – one of six species that are found in east and central Asia. The red serow Capricornis rubidus *has a restricted distribution in North-east India south of the Brahmaputra, Bangladesh and Myanmar.*

A sambar Cervus unicolor *stag in hard antler. Sambar distribution was mostly confined to the central part of the park. They are prized by poachers for their meat.*

The largest of the four monitor lizard speces found in India, this large Asian Water Monitor Varanus salvator *turned up one night at the field researchers' camp.*

The carnivorous Drosera or sundew plant is tiny and occasionally found in select places on the Balpakram plateau (left). *A Songsarek hut with traditional features including a 'medicine pole' and rice fermenting jars* (right).

Newsletter & Journal of The Rhino Foundation for nature in NE India (2020) 10: 22–25. ISSN 0973-6530

Pheasants of West Kameng and Tawang districts of Arunachal Pradesh and their long-term conservation

HEERAK NANDY[1], ANWARUDDIN CHOUDHURY[2], RAJ BASU[3], AYAN BANERJEE[4], BISWAPRIYA RAHUT[5], JUDHAJIT DASGUPTA[6] AND PARKASH SHERIYA[7]

Arunachal Pradesh has among the highest floral and faunal diversity in the country. The state still has vast areas of undisturbed virgin wilderness. It is part of 'Global Biodiversity Hotspots' and an 'Endemic Bird Area'.

Arunachal Pradesh has the distinction of having the highest number of pheasants in the country - at least 11 species. It provides habitat for 65% of India's pheasant species and for more than 20% of the world's total. The western Arunachal Pradesh is especially important in this respect. The district of West (henceforth W) Kameng is perhaps the only area that shelters three out of five different species of Tragopans anywhere. In 2014, World Pheasant Association–India (WPA), proposed a study on pheasants covering the W Kameng and Tawang districts of the western Arunachal Pradesh that aimed at:

(a) Generating field data as well as secondary information on status, distribution and general biology of all pheasant species found within the study area, (b) utilizing the findings for awareness generation on the target species, and (c) utilizing the findings to enhance and strengthen the overall biodiversity conservation through their habitat landscape.

A Blood Pheasant male calling, western Arunachal Pradesh. (Photo: *Ayan Banerjee*)

The Matthai Trust, Anand, Gujarat assessed the proposal and approved for financial and related support. The initiative titled 'Long Term Conservation of Pheasants in western Arunachal Pradesh' began on March 1, 2014 and the field activities ended in May 2018.

Field activities

In all, nine field trips were conducted by the WPA team covering both W Kameng and Tawang districts. For target species observation, two field survey trips were conducted inside the Eagle's Nest Wildlife Sanctuary, the only Protected Area falling within the study area. Other wildernesses were visited for possible sighting of target species and collection of secondary data. The study area was spread over 9,594 km^2 of mountainous terrain. Observations were made mostly along and around the motorable road and adjacent routes accessible to civilians. Threats to the landscape were identified and assessed through direct visual observation and exchange of views with the local administration and common people. During the 5th, 7th and 8th trip, three workshops were organized in collaboration with the Tourism Department, Govt. of Arunachal Pradesh and local NGOs on 'Training in Homestay Hospitality and Conservation Tourism Leadership'. Awareness materials were distributed directly and also with the help of supporting stakeholders.

At the very beginning of the project, WPA developed and published a 18 inch x 23 inch paper poster depicting illustrations of all 10 pheasant species in pairs reported from W Kameng and

A Kaleej Pheasant male, western Arunachal Pradesh.
(Photo: *Ayan Banerjee*)

Tawang districts. During the entire survey period, this poster was distributed widely including schools. It also helped as an identification aid for collection of secondary information. A good number of posters and flex banners have been handed over for display at different army camps. For distribution among the workshop participants, an eco-flex wall-hanging with Lord Buddha in the middle and 10 pheasants found in W Kameng and Tawang districts surrounding him was developed and printed.

In February 2017, the first two-day workshop on "training in homestay hospitality and conservation tourism leadership" was arranged at Rupa, W Kameng district. The workshop was conducted jointly in collaboration with the state's Tourism Department, Association for Conservation and Tourism (a well known NGO working mainly on ecotourism) and 'Arunachal Welfare & Educational Society', a local NGO based at Rupa. In all, 72 villagers and potential homestay owners from different villages around Rupa attended as participants. It was inaugurated by the ex-Member of Parliament and Central Minister from Rupa, Shri R. K. Khrimey. During the workshop, possibilities of exploring and establishing the surrounding wilderness areas into prospective sustainable eco-tourism areas were discussed. A Certificate of Participation was awarded to each participant.

On February 2nd and 3rd, 2018, another two-day workshop was organized at Dirang of W Kameng District. Similar training was given to as many as 41 participants from Bomdila, Sangti, Thembang, Dirang and far away Zemithang of Tawang District. Smt. Bengia Mannan Sonam on behalf of Directorate of Tourism, Govt. of Arunachal Pradesh, attended the workshop and supervised the program. Again on April 10th and 11th, 2018, a third training workshop was arranged at Zemithang area of Tawang District; 34 participants from local villages attended the workshop. Smt. Sonam, attended this workshop too. Shri Raj Basu conducted the workshop activities and Dr. Anwaruddin Choudhury shared his experiences with the participants.

Study findings

Species Study: Before the initiation of the project, from literature survey and other secondary sources it was found that there were reported distribution of 10 pheasant species in W Kameng and Tawang districts, viz., Blood Pheasant (*Ithaginis cruentus*), Tragopans (*Tragopan satyra*, *T. blythii* and *T. temminckii*), Himalayan Monal (*Lophophorus impejanus*), Sclater's Monal (*L. sclateri*), KaleeJ Pheasant (*Lophura leucomelanos*), Red Junglefowl (*Gallus gallus*), Tibetan Eared Pheasant (*Crossoptilon harmani*) and Grey Peacock Pheasant (*Polyplectron bicalcaratum*). During the study, from primary observation and secondary sources presence of nine species out of these ten within the study area could be ascertained. Presence of Tibetan Eared

The WPA-India team with locals near Eagle's Nest pass.
(Photo: *Heerak Nandy*)

A poster developed during the study.

Pheasant could not be confirmed. Only a single herdsman who moves to high altitude areas of Tawang District during late monsoon claimed to have seen the bird.

The WPA team directly sighted and photographed four species – Blood Pheasant, Satyr Tragopan, Kaleej Pheasant and Himalayan Monal. The team sighted, but could not photograph Red Junglefowl. The species mostly encountered across the study area was the Kaleej Pheasant. As far as district-wise distribution is concerned, presence of Grey Peacock Pheasant could be verified from relatively low altitude areas of W Kameng. Presence of Himalayan Monal could be verified from both the districts. Most recent records of Sclater's Monal were from both the districts (from secondary sources). Presence of Satyr Tragopan could be confirmed in Tawang district and those of Blyth's and Temminck's Tragopans from W Kameng. There were recent past records of Satyr Tragopan from W Kameng (Choudhury 2003). Blyth's and Temminck's are also likely to be found in the eastern areas of Tawang District. Presence of Blood Pheasant, Red Junglefowl and Kaleej was recorded from both the districts.

Owing to dominance of Buddhism in the area, the threat of poaching is relatively less but there were some in W Kameng where these birds were sometimes killed for the pot.

Habitat Study: The study area barring scattered disturbed patches near human habitations is still largely a favourable habitat for the pheasants. About half of the area is nearly virgin and difficult to access. Across the entire study area, the forest (or its adjoining open natural habitat) is in good health and almost contiguous with no noticeable fragmentation. Road network criss crosses the area but does not really separate the habitats. Other than a few inhabited valleys and hill slopes, localities are isolated and with low population. The wildlife of the area is beaming with diversity. During the field trips, the team recorded and photographed 253 species of birds and 18 species of mammals. Most important sighting was that of Chestnut-breasted Partridge (*Arborophila mandellii*) in Eagle's Nest Wildlife Sanctuary. The WPA team could manage to get a very short but extremely rare video-clip of the bird in the open.

The exploitation of the forest and surrounding habitat by the local community for fuel and fodder is limited to a restricted periphery from the edge of the locality, as the population was sparse with

An eco-flex wall-hanging developed during the study for awareness.

limited demand that can be easily met from close vicinity. Nomadic or shifting herder groups are common with considerably large herd-size of yaks and yak-hybrids, but they do not cause any significant harm to the eco-system. The overall status of the forest is healthy and rich. Major threats to the habitat that could be identified are:

- Garbage disposal, particularly of non-biodegradable waste, poly-packs, thermocol materials, nylon nets, foils, glass bottles and cans as a result of rapidly growing tourism in the area.
- Encroachment and conversion of natural primary forest patches for commercial plantations, e.g, for growing Kiwi or other fruit.
- Damage of natural habitat (long-term and short-term) for constructions of infrastructures such as buildings, roads and the proposed dams pose a major threat to the habitats.
- Hunting of wild animals for the pot by the local community (both for consumption and monetary gain) and alleged involvement of influential locals and even govt. officials.
- Felling of trees to meet local need for timber as building material, illegal trade, for room heating and also for cooking.

Recommendations

a. Promotion of home-stay and sustainable eco-tourism so that local community becomes major stake-holder. Younger generation may get employment opportunities through eco-tourism and conservation activities.
b. Involvement of local communities in forest protection and monitoring activities and also by declaring some natural habitats as "Community Conservation Area's (CCA)".
c. Gradual reduction in extraction of timber, fuelwood and other forest produce. Natural gas for cooking and use of solar power for room heating should be encouraged. Joint Forest Management practices may also be introduced.
d. Sensitisation of armed forces to support wildlife conservation in the area.
e. Development of an efficient garbage disposal system for creating a waste-free tourism and homestays across the landscape.
f. Monitoring of labourers' camps along the new roads that are being constructed for prevention of hunting for the pot.
g. Regular awareness generation program in local schools on local wildlife.
h. Declaration of a new 'Wildlife Sanctuary' or (CCA) to include the near primary forest patches around Kalaktang and adjacent to the Assam-Bhutan border through which the new road from Orang to Bomdila via Rupa has been opened. Another sanctuary or CCA may be declared covering the virgin or nearly-virgin natural habitats lying between Indo-Bhutan border and Tawang-Lumla-Zemithang road. So far there is no protected area in Tawang District. □

Participants after a traning programme.

[1] 18/1/11 Uday Shankar Sarani, Golf gardens, Kolkata, 700033.
[2] House No.7, Islampur Road, Guwahati 781007, Assam.
[3] Help Tourism, Siliguri, West Bengal.
[4] Kolkata.
[5] Jalpaiguri, West Bengal.
[6] Shyamnagar, North 24-Parganas district, West begal.
[7] WPA-India, New Delhi.

Corresponding author
Heerak Nandy,
Email:heeraknandy@gmail.org

Newsletter & Journal of The Rhino Foundation for nature in NE India (2020) 10: 26–29. ISSN 0973-6530

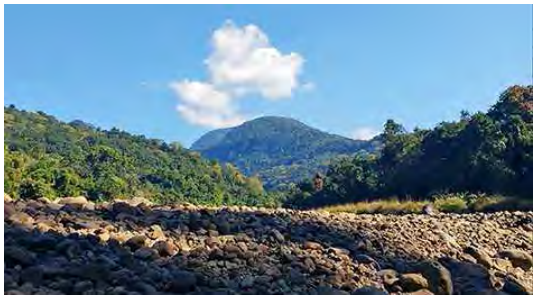
Conservation in Narpuh Wildlife Sanctuary, Meghalaya in North-east India

H.C. CHAUDHARI[1], HEISAKARU LATO[2] AND SHANBORMIKI LAW[3]

Narpuh Wildlife Sanctuary in East Jaintia Hills District was carved out of Narpuh Reserved Forests in the year 2014. It is among few places where lush green multi-storied primary forests are still intact. Jaintia Hills, located in eastern part of Meghalaya, is blessed with high rainfall and a picturesque landscape dotted with rolling hills, meandering rivers, cascading waterfalls and rich forests. The Jaintia tribe, also known as Pnar and Synteng, are the original residents of these hills. It is one of the very few tribes in the world which still follow matrilineal and matriarchal systems. To the outside world, Jaintia Hills is known mainly for its rich mineral wealth, especially limestone. The forests of Jaintia hills are also home to a rich diversity of wild flora and fauna.

As per the Champion & Seth's (1968) classification of the forest types of India, the forests in the Narpuh Wildlife Sanctuary are classified as Khasi Tropical Hill Forests with lower areas forming part of Cachar Tropical Evergreen Forest. Underneath the top story of tall trees of numerous species, forests in the Sanctuary have luxuriant growth of epiphytes, mosses and ferns. The floor of these forests is covered with a thick layer of moist humus. Wide variation in elevation and topography from 50 m asl to steep slopes culminating at 1,360 m asl high peak creates a wide variety of habitats in the Sanctuary.

Narpuh Wildlife Sanctuary



Narpuh Wildlife Sanctuary with Lumbabubakong peak.

Some information on Narpuh and surrounding areas are found Hinton and Lindsay (1926), Kurup (1968), Das *et al.* (1995), Choudhury (1998, 2002, 2003ab, 2006, 2013, 2014), Reudi *et al.* (2014) and Government of Meghalaya (2020). It has been listed as an Important Bird and Biodiversity Area (Islam & Rahmani 2004).

The Narpuh Wildlife Sanctuary having an area of 59.90 km² is home to several rare, endangered and endemic species of flora and fauna. With the objective of having an effective management of the protected area the Jaintia Hills Wildlife Division has undertaken a study to assess and record presence of various species of mammals by field observation and by installing camera traps at strategic locations. The study has recorded presence of several species listed in Schedule I of the Wild Life (Protection) Act. These include mammals such as the Chinese pangolin *Manis pentadactyla*, Wroughton's free-tailed bat *Otomops wroughtoni*, slow loris *Nycticebus bengalensis*, capped langur *Trachypithecus pileatus,* hoolock gibbon *Hoolock hoolock,*

A camera trapped leopard cat Prionailurus bengalensis.

A camera trapped marbled cat Pardofelis marmorata.

binturong *Arctictis binturong*, leopard cat *Prionailurus bengalensis*, fishing cat *P. viverrinus*, marbled cat *Pardofelis marmorata*, Asian golden cat *Catopuma temminckii*, clouded leopard *Neofelis nebulosa* and red serow *Capricornis rubidus*.

Among Schedule I listed birds there were Grey Peacock Pheasant *Polyplectron bicalcaratum*, Kaleej Pheasant *Lophura leucomelanos*, Mountain Bamboo Partridge *Bambusicola fytchii*, Jerdon's Baza *Aviceda jerdoni,* Austen's Brown Hornbill *Anorrhinus tickelli* (1st photographic reord for the state), Wreathed Hornbill *Aceros undulatus*, Rufous-necked Hornbill *A. nipalensis* (1st photographic record for the state), Oriental Pied Hornbill *Anthracoceros albirostris*, Great Pied Hornbill *Buceros bicornis* and Hill Myna *Gracula religiosa*.

The Schedule I listed reptiles include Bengal monitor lizard *Varanus bengalensis,* water monitor *V. salvator* and Burmese rock python *Python molurus bivittatus*.

In addition to the Schedule I species, Narpuh is also home to a large number of other mammals, birds and reptiles. Some noteworthy mammals are: pig-tailed macaque *Macaca leonina,* Assamese macaque *M. assamensis*, stump-tailed macaque *M. arctoides*, dhole or Asian wild dog *Cuon alpines*, Himalayan or Asiatic black bear *Ursus thibetanus*, stripe-backed or back-striped weasel *Mustela strigidorsa*, yellow-throated marten *Martes flavigula*, hog badger *Arctonyx collaris*, ferret-badgers *Melogale* spp., large Indian civet *Viverra zibetha*, common palm civet *Paradoxurus hermaphroditus*, masked palm civet *Paguma larvata*, crab-eating mongoose *Herpestes urva*, leopard *Panthera pardus*, wild pig *Sus scrofa*, Sambar *Cervus unicolor*, Indian muntjac *Muntiacus muntjak*, Malayan giant squirrel *Ratufa bicolor,* red giant flying squirrel *Petaurista petaurista*, crestless Himalayan porcupine *Hystrix brachyura* and Asiatic brush-tailed porcupine *Atherurus macrourus*.

The sanctuary is home to a few hundred species of birds. Lahkar (2002) listed 140 species. Some noteworthy other birds are: White-cheeked Hill Part-ridge *Arborophila atrogularis*, Red Junglefowl *Gallus gallus*, Green Imperial Pigeon *Ducula aenea*, Mountain Imperial Pigeon *Ducula badia*, Grey-headed Parakeet *Psittacula finschii* and Blue Pitta *Pitta cyanea* (2nd state record for Meghalaya).

Camera trapped stump-tailed macaques Macaca arctoides.

A camera trapped Blue Pitta Pitta cyanea.

Conservation

Notification of the sanctuary has provided a fresh impetus to conservation of wildlife and its habitat in this part of the state. The establishment of the sanctuary has not only brought conservation of the wildlife and its habitat to the centre stage but has also increased availability of resources for conservation and improvement of wildlife habitat in and around the sanctuary in a focussed and targeted manner. Apart from the intensification of patrolling, funds are being used for construction and maintenance of salt licks, check dams, water holes, patrolling foot paths, patrolling camps, boundary pillars and reforestation of blanks and degraded areas by planting of fruit bearing plants to improve quality of habitat for wildlife in the Sanctuary.

Rich flora and fauna of the sanctuary is under immense pressure. The presence of a variety of wild animals in the sanctuary attracts poachers. Except for an entry point at Sonapur, entire sanctuary is not accessible by any mode of transport except through boat or by a long trek along rugged terrain in thick vegetation. Availability of only a few patrolling paths makes it extremely difficult for the limited number of frontline field staff to prevent and detect entry of poachers in the sanctuary. The Forests & Environment Department through its team of dedicated officers and frontline field staff is making every possible effort to ensure protection of rich natural wealth of the sanctuary. Camps of poachers, whenever encountered are dismantled and burnt.

Because of regular patrols by the frontline field staff, which sometime involves stay in deep forests for several days at a stretch, the Narpuh Wildlife Sanctuary still harbours a rich population of several species of wild life.

Efforts are being made to elicit cooperation and support of local communities in our efforts in conservation and protection of wildlife and their habitat. The Voluntary Protection Squads (VPS) have been constituted in fringe villages to enlist participation of youths in these villages for patrolling of vulnerable areas. In return, the Forests & Environment Department provides assistance to the local communities by creation of small community assets like village foot path, water supply, community hall, etc., and distribution of chairs, tables, torch light, cooking utensils, stoves, etc.

The rich floral and faunal wealth of Narpuh Wildlife Sanctuary and the surrounding area is a nature's unique gift to the humanity. However, the wildlife and its habitat are under immense threat. Many of the species including the tiger *Panthera tigris*, which were known to exist in this area in the recent past have become extinct. It is therefore a duty of each one of us to take all possible measures to protect and conserve the wildlife in their natural habitat, to restock and restore healthy population of all those species which are presently under threat and also to recover and reintroduce the species which have become extinct.

A camera trapped Grey Peacock Pheasant Polyplectron bicalcaratum.

A camera trapped Rufous-throated Hill Partridge Arborophila rufogularis.

The Forests & Environment Department has initiated several measures in this regard. Efforts are being made to utilise the existing resources in a focused and targeted manner, and also to make residents of the surrounding areas proactive partners in conservation of wildlife and their habitat.

The department is also preparing a proposal for inclusion of the biodiversity rich area located in and around the Narpuh Wildlife Sanctuary as a biosphere reserve. Notification of the area as a biosphere reserve will provide due recognition and publicity to this biodiversity hotspot, which in turn will help the department to leverage adequate administrative, financial and policy support for better conservation of this landscape.

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[1] Chief Wildlife Warden, Meghalaya, Shillong.
[2] Divisional Forest Officer (wildlife), Jaintia Hills, Jowai.
[3] Range Officer i/c Umkiang.

Corresponding author
Heisakaru Lato
Divisional Forest Officer (wildlife), Jaintia Hills, Jowai 793150
Email: heisa22lato@gmail.com
Mobile: 9436998340

Newsletter & Journal of The Rhino Foundation for nature in NE India (2020) 10: 30–33. ISSN 0973-6530

Community Conservation in Jaintia Hills, Meghalaya in North-east India – a success story

TEXT & PHOTOGRAPHS BY **HEISAKARU LATO**

The ethnic tribes of Meghalaya especially the Pnar and the Khasi who claim to be the descendants of the Seven Huts' known as *Khun U Hynniewtrep*; are nature believers. Conservation of nature and natural resources has been an integral part of the cultural ethos of these tribal communities. The ethnic tribe of Jaintia Hills known as the Pnar who practice indigenous faith name as 'Niamtre' have been protecting and conserving tracts of forests, lakes, rivers for religious and cultural belief. These people consider nature as their sole provider and refer nature as the "Mother" who nurture them, feed them with its produce like wild vegetables, medicinal plants and fruits and also give freedom and comfort. The Jaintia Hills is home to several such undisturbed virgin forests commonly known as 'sacred groves'. Till date around 125 sacred groves have been recorded. The 'Niamtre' believe that their deity 'Ryngkaw' or 'Wasa' which guards them from natural calamities and diseases as well as provider for their well-being resides in these forests.

A barking deer Muntiacus muntjak *in Khloo Blai Sein Raij Kongwasan Chyrmang Community Reserve*

The 'Niamtre' believes that cutting of trees, removal of fruits, seeds or causing damage of any nature to these forests or even plucking a leaf, except for the religious rituals will offend the deity and will bring ill luck to the offender and also to the entire village. People are forbidden to carry leather articles, liquor, tobacco and any other into-

Khloo Pohblai Mooshutia Community Reserve, East Jaintia Hills District

Khloo Pohblai Mooshutia Community Reserve has some dense patches of subtropical groves, East Jaintia Hills District.

xicating materials inside a sacred grove to maintain its purity. Some of these forests are so sacred that one is required to remove shoes before entering into these forests.

The 'Niamtre' performs various religious rituals and sacrifices in community reserves. As a mark of respect to the distinguished religious leaders and warriors, rock memorials have also been erected in some of the sacred groves. For 'Niamtre' sacred groves have same significance as a temple or a mosque or a church have for the people of Hindu, Muslim and Christian faiths respectively.

The sacred forests which have remained undisturibed for centuries are repositories of rich biodiversity. They are the last refuge for a large number of endemic, endangered and rare species. Sacred groves are the last bastion where rich culture and customs of indigenous people are still preserved. These groves are a living example of the strong symbiotic relationship between forests and local tribal communities in the state of Meghalaya.

With the passage of time and gradual subordination of spiritual, cultural and religious beliefs by materialistic needs, the beliefs which helped in preservation of sacred groves are eroding. The gradual erosion of these beliefs is resulting in degradation and shrinkage of several sacred groves. The absence of a proper regulatory and funding mechanism for conservation, protection and scientific management has further accelerated the process of degradation of sacred groves. Vanishing of species in many of these sacred groves due to different anthropogenic disturbances like alteration of natural habitat, excessive utilization, pollution and invasion of non-native species is so fast that many precious taxa may disappear even before they are identified, properly documented and their scientific, cultural, therapeutic and commercial values are discovered.

In addition to the sacred forest, almost all the older villages in Jaintia Hills also have their village or community forest which they had been managing in for their domestic consumption for fire wood, house construction and some have been preserved as the catchment to their perennial source of water. In the past, these forests were managed in sustainable way, however with the passage of time there is so much pressure in these

Khloo Blai Raij Khonshnong Community Reserve

A scenic waterfall inside Wah Umpatho Mustem Community Reserve

Khloo Blai Sein Raij Tuber Community Reserve (left); *Crab-eating Mongoose* Herpestes urva *in Khloo Blai Sein Raij Kongwasan Chyrmang Community Reserve*

forests that these forests were in the degradation stage. In order to revive them back, some of these villages have delineated a part of their Village Forest as Community Reserve.

The amendment of the Wild Life (Protection) Act, 1972 in 2003 came as a boon for conservation of sacred groves/community forest. Section 36C inserted in the Act, which provided amendment for notification of the sacred groves and such other similar community owned areas having high conservation and cultural significance as Community Reserve. Section 36D inserted in the Act in 2003 provides for preparation and implementation of management plan and to take steps to ensure the protection of wild life and its habitat in the community reserve by a Community Reserve Management Committee consisting of five representatives nominated by the village level committee and one representative of the State Forest Department under whose jurisdiction the community reserve is located.

The insertion of clause 24A in Section 2 of the Wild Life (Protection) Act to define "Protected Areas" and inclusion of Community Reserve in the said definition paved the way for funding by the Central Government under the centrally sponsored scheme "Integrated Development of Wildlife Habitat (IDWH)" and by the State Government under various State Sector Schemes for conservation and scientific management of Community Reserves.

With much effort taken by the Forests & Environment Department to convince the local communities to conserve and protect the rich habitat of the sacred groves, village forests through establishment of Community Reserves, and the local communities came forward to allow the State Government to notify their village forests as Community Reserves. In the two districts of Jaintia Hills region, 17 Community Reserves have been notified by the Government with effect from the year 2013.

Among these Community Reserves, the Khloo Umthalong Community Reserve, Pynurkba is a Community Reserve with a cave which is the habitat of the rare and endangered *Otomops wroughtoni* or Wroughton's free-tailed bat. For long this rare bat was known from a single sites in Karnataka and Cambodia (Choudhury 2016) till a

Sein Raij Kongwasan Chyrmang Community Reserve

The very rare *Otomops wroughtoni* at Khloo Umthalong Pynurkba Community Reserve, East Jaintia Hills District

single specimen was collected in East Khasi Hills District in 2001 (Thabah and Bates 2002). Now this site has photographic record of several of this extremely rare bat (see above). Many such potential and suitable areas are proposed to be notified as Community Reserves. Majority of these areas which have already been notified or are proposed to be notified as Community Reserve are sacred groves.

The Forest & Environment Department in consultation with local communities have prepared Management Plans for scientific management and conservation of the notified Community Reserves.

With the funds available under various State and Central Sector Schemes, the Forest & Environment Department has undertaken various activities in community reserves. These activities include boundary demarcation by erection of boundary pillars and construction of footpaths, check dams/water holes, tourist view points, public toilets, rain shelters, cloak rooms, shoe rakes, community halls-cum-nature interpretation centres. Restocking of blank and degraded areas by

A camera trapped masked palm civet Paguma larvata *in Khloo Blai Sein Raij Kongwasan Chyrmang Community Reserve*

A large Indian civet Viverra zibetha *in Khloo Blai Sein Raij Kongwasan Chyrmang Community Reserve*

India's only Pitcher plant Nepenthes khasiana, *an endemic species, occurs in Khloo Thangbru Umsymphu Community Reserve (left); a Kaleej Pheasant* Lophura leucomelanos *male in Khloo Blai Sein Raij Kongwasan Chyrmang Community Reserve.*

by aided natural regeneration and planting of native species have also been undertaken in some of the community reserves. Sitting benches for visitors and swings, see saws and other children's play things have also been provided in some of the Community Reserves. Renovation of places of worship located in some of these sacred groves has also been undertaken.

Majority of land in Meghalaya is owned by communities and private individuals. The State therefore has a limited scope for expansion of protected area network by notification of national parks and wildlife sanctuaries. Notification of biodiversity rich sacred groves and such other community owned rich habitats of wildlife as community reserve is the only hope for expansion of protected area network in the State.

Camera trapped leopard cat Prionailurus bengalensis *in Khloo Blai Sein Raij Kongwasan Chyrmang Community Reserve*

The Forest & Environment Department is taking all possible measures to persuade the communities to allow the State Government to notify rich habitats of wildlife as community reserves. As we have seen progress so far is very encouraging. The Forest & Environment Department with proactive cooperation and participation of local communities is taking measures for protection, conservation and scientific management of areas which have already been notified as community reserves.

The Community Reserves of Jaintia Hills are listed in Table 1.

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Heisakaru Lato
Divisional Forest Officer (wildlife), Jaintia Hills, Jowai 793150
Email: heisa22lato@gmail.com
Mobile: 9436998340

Table 1. Conservation Reserves in Jaintia Hills region of Meghalaya.

Sl. No	Name of Community Reserve	Area in hectares	Location	Notification.
East Jaintia Hills Dist				
1	Ka Khloo Blai Sein Raij Tuber	89.43	Tuber Kmai Shnong Village	FOR.17/2013/134 Dt.10th July, 2013.
2	Ka Khloo Thangbru Umsymphu	19.6	Mukhaialong village	FOR.17/2013/Pt/44 Dt.4th March, 2014
3	Ka Khloo Pohblai Mooshutia	33.5	Mukhaialong village	FOR.17/2013/Pt/45 Dt.4th March, 2014
4	Khloo Umthalong	2.40	Pynurkba Village	NO.FOR.17/2013/Pt/212 Dt.29th January, 2020.
5	Smaw Der Khli	0.21	Lakadong Ummat Village	NO.FOR.17/2013/Pt/214 Dt.29th January, 2020.
6	Krem Labit Umkyrpong	4.80	Umkyrpong Village	No.FOR.17/2013/Pt/214 Dt.9th March, 2020.
7	Ka Khloo Khyllem Shrieh Khloo Thangbru	4.10	Mutong Village	No.FOR.17/2013/489-A Dt.19th January, 2021.
8	Ka Khloo Moopyai Wapung Shnong	68.46	Wapung Village	NO.FOR.17/2013/Pt/441-A Dt.21/2/2021
West Jaintia Hills Dist				
9	Ka Khloo Blai Chyrmang Kmai	7.00	Chyrmang Village	FOR.17/2013/135 Dt.10th July, 2013
10	Ka khloo Langdoh Kur Pyrtuh	15.4	Sohmynting Village	FOR.17/2013/Pt/46 Dt.4th March, 2014.
11	Ka Khloo Amrawan	128.75	Umladkhur Thangbuli	FOR.17/2013/Pt/132 Dt.20th Nov, 2015
12.	Sacred Grove Raliang	3.85	Raliang Village	No.FOR.17/2013/491-A Dt.19/1/2021
13	Ka Khloo Blai Ka Raij U Langdoh Ionglang	15.12	Raliang	FOR.17/2013/Pt/144 Dt.7th March, 2016.
14.	Ka Lum Luwe	14.1	Namdong "A"	FOR.17/2013/351 Dt.7th August, 2018.
15.	Mynso Community Reserve a.Ka Khloo Blai Lyngdoh Sein Raij Mynso	1.06	Mynso Village	No.FOR.17/2013/Pt/204 Dt.18th Nov, 2019.
16.	b.Ka Khloo Thangbru Sula Lynter Sein Raij Mynso	3.3		No.FOR.17/2013/Pt/206 Dt.18th Nov, 2019.
17.	Ka Wah Umpatho	31.86	Mustem Village	NO.FOR.17/2013/PT/208 Dt.18th Nov, 2019

Newsletter & Journal of The Rhino Foundation for nature in NE India (2020) 10: 36–38. ISSN 0973-6530

BRIEFLY

Compiled by **ANWARUDDIN CHOUDHURY**

Rhino census: Assam, West Bengal and Nepal

The latest census of the Great Indian one-horned rhinoceros *Rhinoceros unicornis* in Kaziranga, RG Orang and Pabitora in 2018 showed increase in the number of animals. It was carried out by using direct visual count method from elephant-back.

The census in northern West Bengal was carried out in 2019 and in Nepal in 2021.

Year →	1999	2006	2009	2012	2018
Kaziranga	1552	1855	2048	2290	2413
RG Orang	46	68	64	100	101
Pabitora	74	81	84	93	102
Manas	–	–	2	22	41

Source: Env. & Forest Depatment, **Assam**

Year →	2008	2010	2013	2015	2019
Jaldapara	192	155	186	204	237
Gorumara	31	35	43	49	52

Source: Forest Depatment, **West Bengal**

Year →	2000	2008	2011	2015	2021
Chitwan	535	408	503	605	694
Bardiya	73	22	24	29	38
Suklaphanta	4	5	7	8	17
Parsa	–	–	–	3	3

Source: Dept. of National Parks & Wildlife Conservation, **Nepal**

Rhino with calf in Pabitora Wildlife Sanctuary.
(Photo: *Anwaruddin Choudhury*)

White-winged Wood Duck pair at Choraipung, near Dihing-Patkai National Park.
(Photo: *Anwaruddin Choudhury*)

Dihing-Patkai upgraded to a national park

Dihing-Patkai Wldlife Sanctuary (111 km²) in eastern Assam which was declared as a sanctuary in 2004 has been upgraded to a national park with an enlarged area of 231.65 km². Known as an important rain forest area, it is home to primates, cats, elephants as well as the White-winged Wood Duck *Aarcornis scutulata*.

The identification of the area as a potential Protected Area and the first proposal covering 440 km² was made in 1987 and reported in 1989 in a Ph.D thesis by Dr Anwaruddin Choudhury. The second proposal, after further fieldwork in 1992–94, was made in 1996 as Upper Dihing National Park covering 267 km² was also prepared by Dr Choudhury and published as a monograph by The Rhino Foundation for Nature in North East India.

Wild buffalo killed near Burhachapori Wildlife Sanctuary, Assam

A wild water buffalo *Bubalus arnee* was killed by poachers in a *chapori* near Burhachapori Wildlife Sanctuary in Assam in the first half of August 2020. Two poachers were arrested by the authorities.

India has 430 species of mammals

The book *The Mammals of India: a systematic & cartographic review* by Anwaruddin Choudhury with a foreword by Colin P. Groves (published in 2016) has revealed that India has 185 genera with 430 species of mammals (listed below).

	No. of Genera	No. of Species
Pangolins	1	2
Insectivores	11	31
Treeshrews	2	3
Bats	36	115
Primates	6	15
Carnivores	32	59
Whales, Dolphins	22	31
Sea cow	1	1
Elephants	1	1
Odd-toed ungulates	3	5
Even-toed ungulates	23	40
Rodents	44	115
Hares, Rabbits and Pikas	3	12

Baghjan Oil Well Explosion

For more than five months starting from end May 2020 Baghjan oil field in Tinsukia District of upper Assam was burning, causing serious air and water pollution. It is located close to Motapung-Maguri Important Bird and Biodiversity Area (IBA) at the edge of Dibru-Saikhowa National Park (NP). Thousands of villagers have fled, their cultivations devastated; many mammals, birds, reptiles and fish have died. Two fire fighters have lost their lives. An immature Endangered Ganges river dolphin and a parti-coloured flying squirrel have died too. The Endangered wild water buffalo suffered owing to damage to their grassland habitat. The area is known for some rare grassland birds such as Black-breasted Parrotbill, Jerdon's Babbler, Marsh Babbler, Swamp Prinia and Swamp Francolin. But it is a known fact that when such mines or rigs are set up, contingency plan, environmental impact and safety of surrounding people are jotted down only on paper. The Baghjan episode is one such example of careless and indifferent attitude of the companies towards poor villagers living in the neighbourhood and environmental impact in the surrounding areas. Extraction of resources is much needed, but it should not come at the cost of human lives and environmental catastrophes.

Being located close to Dibru-Saikhowa NP it is a natural buffer as well as eco-sensitive zone to the area. Its impact on Maguri-Motapung *beels*, was severe. Although the impact in the down-stream areas may not be conspicuous, it certainly would be there. There are plans to drill even inside Dibru-Saikhowa NP by using Extended Reach Drilling (ERD) technology, i.e., drilling would take place 1.5 km outside the boundary of the park at seven locations. Now, after blowout at Baghjan, the companies do not have any other excuse. The irony is that they try to avoid public hearing with various pleas in most of the cases.

In this case, the companies have shown their complete incapability and incompetence to tackle a calamity. Experts were flown in from Singapore and Canada indicating that there was no local expertise to handle such cases. The fire was doused only in November 2020.

While the companies must be held responsible and made to compensate the loss, it must be realised that no compensation can ever recover natural habitats that have evolved over thousands of years.

Burning oilfield, Baghjan at the edge of Dibru-Saikhowa National Park and right near Maguri-Motapung Important Bird & Biodiversity Area, Tinsukia district, Assam.

(Photo: *Biju Boro*)

Rufous-necked Hornbill female Aceros nipalensis in Narpuh Sanctuary – first photographic record from Meghalaya.

First photographic record of Rusous-necked Hornbill *Aceros nipalensis* from Meghalaya

A Rufous-necked Hornbilll *Aceros nipalensis* female was photographed in Narpuh Wildlife Sanctuary, Meghalaya on 2nd February 2018. It was the first photographic record of the species in the state. The elevation of the site was 905 m asl and GPS location: 25°07´N, 92°29´E (*source*: DFO, wildlife, Jaintia Hills)

No Eastern Hoolock *Hoolock leuconedys* in India

There were reports without proper supporting materials of occurrence of eastern hoolock *Hoolock leuconedys* in India. Although these animals lacked the wide gap in eye-brows and longish silvery white tail tufts, two basic identification keys of the ape, several papers were published in international journals without verification disseminating information that should not have been.

A recent study revealed in the paper entitled "Understanding the Phylogenetics of Indian Hoolock Gibbons: *Hoolock hoolock* and H. *leuconedys*" by Trivedi1 et al (2020) published in *International Journal of Primatology* that the so-called *Hoolock leuconedys* in India are actually *H. hoolock*.

They collected blood, tissue, and fecal samples from various populations of *H. hoolock* (N = 17) and the Mishmi Hills gibbons (N = 14) from their distribution in North-east India, zoos, and rescue centers. They isolated DNA from these samples and constructed phylogenetic trees using partial D-loop and COI markers. They also performed whole mitochondrial analysis to study the phylogenetics of the Hylobatidae family. Their genetic analysis showed that none of the samples from India were *H. leuconedys*, and that all samples from the Mishmi Hills could be assigned to *H. hoolock*. The mitogenome analysis supported this conclusion. They estimate that gibbon divergence from a common ancestor occurred 8.38 mya and that the split between *H. hoolock* and *H. leuconedys* occurred 1.49 mya.

Hoolock leuconedys *male. Mishmi Hills hoolocks lacked such wide gap between eye-brows (top) and also longish silvery-white tail tuft (bottom). Hence, morphologically also there is no similarity with* Hoolock leuconedys.

(Photos: *Thomas Geissmann* [top]; *Fan Peng-Fei* [bottom])

Newsletter & Journal of The Rhino Foundation for nature in NE India (2020) 10: 39–58. ISSN 0973-6530

OBITUARIES *by* ANWARUDDIN CHOUDHURY

Colin Peter Groves

(24 June 1942, England–30 November 2017). He was a renowned authority, especially on taxonomy of mammals. A British-Australian biologist and anthropologist, Groves was Professor of Biological Anthropology at the Australian National University in Canberra, Australia.

Groves had a Bachelor of Science from University College, London in 1963, and a Doctor of Philosophy from the Royal Free Hospital School of Medicine in 1966. He was a Teaching Fellow at the Universities of California (Berkeley), and Cambridge, and Queen Elizabeth College. Groves joined the Australian National University in 1973 and became a full Professor in 2000 and then remained Emeritus Professor until his death.

His research included human evolution, primates, mammalian taxonomy, skeletal analysis, biological anthropology, ethnobiology, cryptozoology, and biogeography. Among his many publications, *Primate Taxonomy,* which was published by the Smithsonian Institution Press in 2001 was noteworthy. He also suggested that the swamp deer found in Assam can be treated as a separate subspecies *ranjitsinhi*.

With Prof. Colin Groves (left) at Bangkok zoo, 1995.

My introduction to late Groves was quite old, probably early 1980s. Owing to my interest in primates I went through works on hoolocks and then correspondence started, which continued till 2016–17. The last correspondence was on receipt of my book entitled *Mammals of India: a systematic & cartographic review* for which he was kind enough to write the foreword.

Groves was very positive and as a reviewer he was bold. When I described a new speices of giant flying squirrel *Petaurista mechukaensis* on the basis of a single specimen, he was one of the reviewers and strongly opined that once it is clear as a distinct taxon it should be published.

I met Groves only once but for quite a few days in Thailand in 1995. We were attending a workshop on Asian wild cattle at Khao Khiew Open Zoo. He was very happy to see me as we were in touch for quite long. We had very fruitful discussion and he suggested lot of things to me. One was how to measure horns and he made a drawing for me. We also travelled together to and from Bangkok where we visited Dusit zoo.

He was a great support to me and my works and I gratefully acknowledge that. His works would continue to inspire and guide innumerable researchers and conservationists across the globe.

Peter Jackson

(27 January 1926–8 December 2016). He was a renowned tiger conservationist. Jackson was also a journalist, photographer and author. He was the Chairman of the IUCN/SSC Cat Specialist Group between 1983 and 2000, and subsequently became chairman emeritus.

Jackson was the chief correspondent for the Reuters (India bureau) in 1954–1960 and 1962–1970. During his stay in India he developed keen interst on tigers. Jackson co-authored and co-edited several publications.

It was in late 1990s that I came into contact

Peter Jackson

with him and had communicated off and on. It was Jackson who invited me to join the IUCN/SSC Cat Specialist Group and also asked me to write an overall status report on North-east India for *Cat News*. There was some delay and I also forgot owing to other works including government duties. He sent me another mail – and I really felt sorry and immediately sent the article that came out in *Cat News* in 2003. I was apologetic as it was not my intention to hurt an eminent conservationist. He also sent me a copy of *Wild Cats: Status Survey and Conservation Action Plan*, edited by Jackson jointly with Kristin Nowell in 1996, an outstanding compilation on wild cats. Among his many works was *Riding the Tiger: Tiger Conservation in Human Dominated Landscapes*. At my request he wrote an original article for the *Newsletter of The Rhino Foundation* in 2004.

Mark Shand (Mark Roland Shand)
(28 June 1951–23 April 2014). He was a travel writer with keen interest on conserveation. He was the brother of Camilla, Duchess of Cornwall. Well known as author of travel books Shand's book *Travels on My Elephant* became a bestseller and won the Travel Writer of the Year Award at the British Book Awards in 1992. His interest on conservation mostly centered on elephants. Shand was the chairman of Elephant Family, a conservation body, which he co-founded in 2002.

I came in touch with late Shand during the Kaziranga Elephant Festivals of 2003–04. I was the Chief Coordinator for the state of Assam and he was the Brand Ambassador. We made a few email correspondence. In Janurary 2004, he was kind enough to release my book entitled *Birds of Kaziranga National Park: a checklist* during the Elephant Festival. A soft-spoken and perfect gentleman he also authored *Queen of the elephants*, a book centred on Assam and Parbati Barua.

Mark Shand releasing my book on birds of Kaziranga. At the centre is Mr Pradyut Bordoloi, then Assam's Minister of Environment & Forest at Kaziranga Elephant Festival, 2004.

Prof. Ying-Xiang Wang
(21 July 1938–10 February 2016). He was from Honghe, Yunnan. Wang moved to Kunming with his parents following an acute bout of bronchitis, the effects of which he battled all his life. Prof. Wang graduated in 1962 and took a job and began his life long career as a mammalogist at the Kunming Institute of Zoology (KIZ), Chinese Academy of Sciences. Prof. Wang was promoted to full Professor of Zoology in KIZ in 1990.

Prof. Wang acted as the head of the mammal research group in KIZ, and conducted extensive research on taxonomy, phylogeny, zoogeography, and the conservation of mammals linked to museum specimens and field observations from 1983 until he retired in 2003. However, he worked until his final days as the Editor-in-Chief of *Fauna Sinica Mammalia* Vol. 3. *Primates*, *Lagomorpha and Pholidota.*

Prof. Wang published 121 scientific papers. He and his colleagues described five new mammal species, including *Ochotona gaoligongensis*, *Muntiacus gongshanensis*, *Ochotona nigritia*, *Tylonycteris pygmaeus*, and *Rhinolophus xinanzhongguoensis*.

With late Prof. Ying-Xiang Wang (right) at Cuc Phuong National Park, Vietnam, July 2006.

His landmark publications include *A complete checklist of mammal species and subspecies in China: A taxonomic and geographic reference* in 2003 and *A field guide to the mammals of China* in 2007.

I met late Prof. Wang in Vietnam where I went to attend a workshop on small carnivores, especially to assess their current status for IUCN red listing. In fact, we were room-mates and had long discussion on mammals. He was an undoubted authority of Chinese mammals. A perfect gentleman, I was fortunate to get the opportunity to spend time with him.

Prof. Mohammed Taher

(21 April 1931–15 February, 2015). He hailed from Khutakatiya village, near North Lakhimpur town in eastern Assam. To us he was known as "Taher Sir". He joined the teaching faculty of Geography Department of Gauhati University in 1958. He obtained Ph.D from the University of Auckland, New Zealand in 1965. He was outstanding as an "ideal" teacher.

Prof. Taher has authored many articles, technical papers, books and atlases. More importantly most of the text books of geography for schools and colleges in Assam were authored by him. He also served as the Chairman of the Board of Secondary Education, Assam in 1991. His areas of expertise included social geography and biogeography among others.

While I was still in school in early 1970s, I heard the name of Prof. Taher from the book-covers as I was interested in geography and wild-life since childhood. I came in direct touch with him when I joined Gauhati University as a student in 1980–81. He was known for his honesty and simplicity and used to come to university in a bicycle. Taher Sir was highly respected by students. Once a student attended his class with full attention, he hardly needed to look at the book.

After completion of my post-graduation (MA), I got registered for Ph.D on primates and Taher Sir became my guide. He used to meticulously go through each and every sentence and I came to know that many small mistakes can completely change the meaning of the sentence at places and even making the sentence grammatically wrong! His craving for correctness and his stint in New Zealand must have worked together to give him such a command over English language. I was a frequent visitor to his house near the by-pass in Jalukbari.

Prof. Mohd. Taher had also studied for some time in Dakuakhana High School by crossing the Subansiri River. Dhakuakhana is now a sub-divisional headquarter in Lakhimpur District and I

With Prof. "Taher Sir" (left) at his house near by-pass in Jalukbari, Guwahati, July 2008.

happened to be its first administrator or Sub-divisional Officer (civil) in 1989.

He was also an authority on the demographic history of Assam. He wrote several thought provoking articles on migration of population to Assam and the North-east. In 2012, I think, he went to North Lakhimpur when I was the Deputy Commissioner. There was a marriage in his ancestral family and I made it a point to attend it so that he was not hurt in any way. At his advice I wrote the chapter on Kaziranga in *Asomiya Biswakosh* (Assamese encyclopedia) vol. 8 in 2007.

I came to know his demise from Braja Kishore Saikia. I visited both the Geography Department as well as his house to pay my last respect. Next day he was laid to rest at Islampur kabrstan near our house in Guwahati.

With late L. Khachar (left) at an ornithologists' meet in IISc, Bangalore in November, 2008.

Lavkumar Khachar

(24 February 1931–2 March 2015). He was an ornithologist and conservationist. Late Khachar was born in the royal family of the former princely state of Jasdan in Gujarat, India. He taught biology and geography at a college in 1956. He came to the field of conservation in the 1950s and was associated with ornithologists like Sálim Ali, Humayun Abdulali and Zafar Futehally. He was associated with Bombay Natural History Society and WWF, India. He initiated the nature education movement in 1976 in his area of activity. He advocated for the creation of Marine National Park in Gujarat. Khachar founded the Hingolgadh Nature Conservation Education Sanctuary.

I became familiar with his name through WWF newsletters in early 1980s but it was only around mid1990s that I had the opportunity to meet him personally at a conference in Mumbai. Since then we met on several occasions and were quite friendly. He was a true well wisher of my works and he himself wrote several articles, especially on the birds of Gujarat region. Our last meeting was in Bangalore in 2008. With him another ornithologist of Sálim Ali era has been lost.

Baliram Gogoi

(c. 1936–8 August 2017). Probably fewer people are aware that there were several local green warriers across North-east India and late Baliram Gogoi of Pohumara, Lakhimpur district was one of them. Some call him the "Birdman" of Lakhimpur, he was deeply involved in the community conservation of Satjan wetland, an outstanding site for watching waterfowl from a close range. This wetland is near the river Ranganadi and is near North Lakhimpur town.

Although he was around for quite sometime, my first contact with him was in February 2011 when I joined as Deputy Commissioner of Lakhimpur district. Apparently I started visiting the wetland off and on and was always accompanied by late Gogoi. After the visit sometimes we took tea at his house on the banks of the wetland. He used to identify several species of waterfowl with their English names and monitor their arrival and departure. Late Gogoi had lot of good suggestions for Satjan, some of which I could implement. So far as protection to the area concerned, there were some unscrupulous elements in the adjacent villages. I ensured that during winter forest staff patrol the area which supplements late Gogoi's efforts. Once or twice I also called the police from the nearest outpost to patrol the area.

For permanent conservation of the area as a sanctuary or conservation reserve was also given a thought but there were some private land (might have been illegally privatised in the past!) and nearly half is railway land. Railway officials were in frequent touch with me those days as lot of land acquisition cases were there under me. The railway authorities cooperated and ensured that the railway portion of the wetland is not filled up. A major issue came up while planning a by-pass

Late Baliram Gogoi with some young birdwatchers at Satjan, January 2012.

of the National Highway. It was proposed that it would pass by Satjan partially damaging the wetland and even the house of late Baliram Gogoi could be affected. I called a meeting of the concerned officials and directed them that a new alignment need to be proposed so that the wetland and the houses of surrouding people who under the leadership of late Gogoi are protecting the area are not harmed. I left Lakhimpur in 2013 on transfer and my next meeting with him was in February 2017 when I took over as Divisional Commissioner of North Assam for a short period. Late Gogoi informed me that the engineers had already proposed a new alignment after my directives and now the wetland and their houses are safe. I also gave him a pair of binoculars.

Late Gogoi also served as the Convenor of Village Defence Party. During the national days late Gogoi was honoured by the administration with citations for his commendable conservation activities. The news of his death was shocking as for Satjan wetland there is no more a "care taker" who used to keep an eye whole day!

Prakash Gole

(1938–27 November 2013). Ornithologist and economist, late Gole was known for his pioneering work on environmental education. With a masters degree in economics he had worked for Gokhale Institute of Politics & Economics for sometime. Gole has many publications on birds and environment but there was a surprise as well – a book on Indian history. He started "Outward Bound Pioneers Club", from where he initiated work for environment conservation and education in 1963. He founded Ecological Society at Pune in 1982 and had also worked with Sálim Ali.

I think the first report of Black-necked Crane at Sangti valley in Arunachal Pradesh around late 1980s was by Gole. My first contact with Gole was in 1989–90 when he asked me to write an article for the Journal of Ecological Society that was edited by him. Then we met at Mumbai and our last meeting was in Bangalore in 2008.

With Prakash Gole (left) and his wife at an ornithologists' meet in IISc, Bangalore in November, 2008.

Thomas Kent Rengma

(23 September 1960–27 January 2017). He was Director of Nagaland Tourism. Late KT Thomas had is higher education at North-east Hill University, Shillong. I first met him in 1996 at a seminar on conservation organised by an NGO called Peoples' Group at Kohima. Late Thomas was one of the founders of the NGO. That was the first wildlife and environmental preservation initiative in Nagaland and soon we became close friends. I made it a point to visit Nagaland at least once every year and in most cases Thomas and Khekiho Sohe were my companions.

With late Thomas I made two expeditions to the picturesque Dzukou valley, in 2001 from Jakhama side then after a couple of years from Khonoma side. With him I also explored the

With late Thomas Kent Rengma (right) at Dzukou valley, Nagaland in 2001.

Shilloi lake after crossing Mt Ziphu, all part of Chindwin basin. We camped at Waziho in cement plant's guest house. While returning, from Meluri we took a different route so that we could visit Mt Zanibu, Dzudu lake and Phek township. Inclusion of sites such as Mt Ziphu and Mt Zanibu in the list of Important Bird & Biodiversity Areas was on the basis of those visits.

Then in October 2001, accompanied by late Thomas and Khekiho Sohe I completed a once in a lifetime trip to Saramati area. We camped at Thanamir, Fakim and Pungro during that trip. One of his favourite sites was Dzülakie where we spent together several days once even reaching Poilwa. In all those visits, awareness campaign for wildlife and nature conservation was done through talks with villagers and late Thomas played active part in explaining them in Nagamese. Since he was also involved with church activities he was a very good motivator. Thomas also used to write articles and published a few in Nagaland dailies on environment.

With late Thomas Kent Rengma (extreme left) and Khekiho Sohe on the slopes of Mt Saramati, Nagaland in 2001.

Off and on we were in touch over phone and he visited our house at Guwahati. Perhaps our last meeting was at Dhaka, Bangladesh in the last week of September 2010 when we participated in International Travel & Tourism Fair. It was only when I tried to contact him through facebook in 2017 that I came to know of his sudden demise. Very sad, we even did not talk for quite long!

Late Thomas Kent Rengma in Dhaka, 2010.

Anand Masi Hasa (Theebu)

He was a gate keeper of the "Pengeri Gate" of Oil India Limited in Upper Dihing (east block) Reserved Forest in Tinsukia district, Assam. I met him in 1993 when I came to know that he sometimes used to catch the endangered White-winged Wood duck *Asarcornis scutulata*. Since then he accompanied me in all the field trips to the area. He confessed that he was not aware that the duck was rare and a protected species and had caught 12–13 in his lifetime for the pot. After meeting me he stopped cathing and kept me updated of sightings. When Kashmira Kakati of the Wildlife Institute of India asked me to suggest a field guide for her works in the area a decade back, I gave his name and she had engaged him in her works. In January 2020 after a long gap I visited Pengeri Gate and enquired about him. Sadly, the reply came that Theebu had left for heavenly abode "a couple of years back".

With Theebu I lost another friend and field guide with local expertise who was part of my rain forest expeditions in Upper Assam.

Late Natwar Takkar

Natwar Thakkar

(1932–7 October 2018). A noted social worker he founded the Nagaland Gandhi Ashram at Chuchuyimlang village in the Mokokchung district of Nagaland in 1955. Late Thakkar went to Naga Hills after being inspired by Kaka Kalelkar early in his life. He assisted residents in bee-keeping, gur production, oil ghanis, a biogas plant, a mechanised carpentry workshop, and Khadi sales outlets. Jawaharlal Nehru, the then Prime Minister of India, had encouraged Thakkar to continue his work. Due to his efforts, an extension centre of National Institute of Electronics and Information Technology was established in Chuchuyimlang in 2006. He was awarded Padma Shri in 1999.

Late Thakkar virtually introduced me to Nagaland. Although I was always interested and had been to Dimapur and other areas, it was he who suggested my name for a meet on conservation in Kohima organised by Peoples' Group, a local NGO in 1996. That visit had acted as a breakthrough which enabled me to have very good contacts and understand Naga people better. Since then I did not look back and till 2004 I continued to visit the state every year.

Late Thakkar started a newsletter/bulletin entitled *Ishani*, focussing on North-east India. He had requested me for contributing articles on wildlife and conservation, which I did for two editions.

Dr John R. Lao

(1933–12 September 2017). Late Lao was born to Dr Htinpoh Lao (father) of Burmese-Chinese origin, who was a Civil Surgeon and Winifred Reynolds, a British (mother). They escaped to Calcutta, India during the World War II in 1942 by air. Late John Lao attended Woodstock School in Mussoorie and graduated in science from Wheaton College, Illinois in USA. He came back to India in 1958 and obtained medical degree from the Christian Medical College (CMC), Vellore. He worked in Baptist Hospitals in Assam. In 1972, Dr Lao attended a diploma course in ophthalmology at the CMC, Ludhiana. He then served in Jorhat, Tezpur, Wokha and Ukhrul. In 1976 he married Dr Delphine G. Momin and they returned to work at the Tura Christian Hospital in 1980, where he remained until his retirement in 1996.

I heard late Lao's name in 1996 during a visit to Tura, Garo Hills. J.P. Datta, then Divisional Forest Officer (DFO) told me that Dr Lao has a red panda skin from Garo Hills. I immediately rushed to the quarter of Dr Lao in the hospital campus but he was not there. However his wife, Mrs Lao (Dr D.G. Momin) was kind enough to come out and showed me the skin, which I examined. Then after a long gap I again visited Tura in 2008 but by that time Lao family had left quarter and started living in their own house at Chandmari. I located the house and had nice meeting with him. His name and photos appeared in books and magazines owing to the important red panda record. Somehow, again after a gap of nearly a decade only in 2017 that I got an opportunity to visit Tura en ruote South Salmara-Mankachar district as Commissioner of Lower Assam Division. This time they shifted to another house. I presented him a copy of my book *The mammals of North East India*, which had a photo of Dr Lao with the red panda skin. He was unwell and I felt that I should have given him a copy in 2013 itself.

Dr Lao used to hunt small game as a sport hunter. It was in late 1960s, about half an hour after dawn in early winter, he saw a giant squirrel like animal was climbing up a tree. The location was about half way between the Tura and Nokrek peaks. He shot the animal with a 12-bore shot gun from a distance of c. 40 yards but later on when he saw that it was not a giant squirrel but a red panda, he felt sad. In early 1970s, he saw one in Balpakram plateau, in a depression with forests

With late John R. Lao and his famous red panda skin in 2008 (top); presenting him a copy of my book Mammals of NE India *where his photo with skin was published, in 2017 (bottom), both at Tura, Garo Hills, Meghalaya.*

near the natural 'rock bridge' (I had been to the bridge). Some other records of red panda in Garo Hills includes sighting by J.P. Datta, then DFO; one in Nokrek area seen by Watisingh Marak, 60+ years in 2008 (of Daribokre village, saw in his youth), one forest staff showed a skin to Mrs Anne Wright, MBE in early 1980s, skins were seen by P.R. Marak (DFO), and sighting by members of APEES (a Tura based NGO).

Dr Lao also provided me vital information of an encounter wth a gharial *Gavialis gangeticus* near Chokpot, also in Garo Hills. He will always be remembered for the very important record of red panda, which he preserved well enabling me and others to examine it.

Mohiuddin Choudhury (Mokai)

(29 April 1934–3 May 2018). He was my lone paternal uncle; younger than my late father. He was born at Joydhanpur village and lived in Jamalpur village, both near Bhaga Bazar in Assam's Cachar district. Jamalpur is at the fringe of Inner Line Reserved Forest (RF) (touches Assam-Mizoram border). He was Head teacher in a local school. Since his childhood he encountered innumerable birds and mammals, and later on he became a sport hunter when he traversed every nook and corner of Inner Line RF in that sector. When I started field work in that area with base camp at Jamalpur in 1987–88, he guided me by pinpointing high diversity areas and the remaining good patches of rainforest.

Late Mohiuddin Choudhury at his house in Jamalpur, Cachar. May, 2007.

M. Islam Bora

(15 March 1940–5 January 2019). He was an officer of the Nagaland Civil Service and later Indian Administrative Service hailing from Laban, Shillong. I came in touch with him while he was posted as the Deputy Commissioner (DC) of Zunheboto district in Nagaland. After attending a meet in Kohima organised by Peoples' Group, a local NGO in 1996, I left for Zunheboto with Khekiho Sohe, one of the organisers of the meet giving reference of Akato Sema, then EAC (later he also became DC of Zunheboto). Akato took me to DC late Bora for introduction.

Late Bora was busy talking to another officer for some time but was staring at me. When we started conversation, he asked me whether I am related to Jatan and Romu. I realised his intellig-

ence, while staring at me he could make out some resemblance in me of my maternal uncles, Jatan (Abdul Momin Mazumder) and Romu (Abdul Mukib Mazumder) who were late Bora's contemporary in Laban, Shilllong. When I replied in postive he was very happy as my mother was his elder sister, Hamida's close friend. In fact, I was also born and brought up in Upper Laban. He asked Akato to be with me during my stay and arranged accommodation at Circuit House. On the day of my return, he invited me for breakfast at his bungalow and had discussion with me on wildlife conservation. He also showed me a stuffed clouded leopard that was presented to him by some villagers. Photo of the stuffed animal was later published in the *Journal of the Bombay Natural History Society*. My last meeting with him was in 2009 at Shillong *kabrstan* in Laban during the last rites of my uncle Jatan.

Rajani Kalita

(8 December 1964–5 July 2020). He was a retired Divisional Forest Officer of Assam. It was in 1992, I was Additional Deputy Commissioner in Assam's Karbi Anglong district. After hearing so much of a place called Khelma, an area located at the trijunction of Karbi Anglong, North Cachar Hills and Nagaland (hence, extremely remote), I decided to go for an expedition. Late Kalita was then in charge of Borlangpher range. He was quite smart and prepared the ground work. So after much difficulty we reached Khelma and put our tents near the source of Lungding river. It

Late Kalita (extreme right) with me (3rd from right) and R. Dubey then DFO (2nd from right) camping at Khelma, 1992.

was unimaginable. Next morning we saw pugmarks of tiger and there were Austen's Brown Hornbills, large owls, and many more. The Dhansiri river that marked the interstate boundary has the Intanki National Park of Nagaland on the other side. We just walked across as the river was like a *nullah*. Some of the finest forests of Intanki were in that remote corner. Late Kalita had good knowledge about his working territory including tree species and was a good company. Some how after that for decades I lost contact with him untill recently when he started using facebook quite frequently.

Soneswar Kalita

(1 May 1957–30 June 2020). Late Kalita was one such Forest official in Assam who had first-hand experience on the rare White-winged Wood duck *Asarcornis scutulata*. My first meeting with him was in 1992 while I was Project Director of Rural Development at Tinsukia. One day in search of the duck I landed up at Kakopathar Range Office. My target was Dum Duma Reserved Forest (RF) – a key site for the duck. Late Kalita was given the assignment to accompany me.

We entered the forest through Kasijan gate and encountered a duck near the gate itself, which was otherwise not a site for the ducks. It was high up in a hollong tree. That was my first encounter in the wild with the "spirit duck" as it is known to the locals. It was like welcoming us at the gate itself. We continued our trek to the Dum Duma river. En route there were hoolocks everywhere. On the river bank there were Austen's Brown Hornbills and a group of pig-tailed macaques. Tall and majestic hollong trees were all around. Suddenly we heard a mild honk which gradually became louder when three wood ducks flew past overhead in low and slow flight. It was still among my best encounters as it had everything: closeness and nice view in a sunny morning. My camera remained at my hand; we were like statues for some time that even a camera could not be moved!

Subsequently he accompanied me in all my visits including one to Dangori RF in an evening when we saw 14 ducks gathering for night roost. That was the largest such flocking of this duck anywhere

Late Soneswar Kalita at Kakopathar, January 2020.

and anytime in its global range. Kalita showed me several nesting sites. There was a long gap that I was not in touch with him. In January 2000 I again visited Kakopathar and enquired about Kalita. I was told that he was unwell. I went to his house and took this photo. He also had an injury, which occurred when he stood between some wild elephants and villagers in Saikhowa area but was not harmed by the pachyderms as such. They simply carried him for some distance but an unintentional collision with a young one got him the injury – after all it was wild elephant even a mild touch could end up being painful. But I was never expecting that his demise would be so close. With late Kalita gone, we also lost a wealth of knowledge on the White-winged Wood Duck and its rainforest habitat.

Sally Walker (Sally Raulston Walker)
(12 October 1944–22 August 2019). A conservationnist of repute, she came to India from USA in 1975 to study yoga and Sanskrit. But the turning point of her conservation career started when she got involded with Mysore zoo in early 1980s. Sally founded the Zoo Outreach Organization (ZOO) in 1985 and initiated Zoo's Print magazine. To tackle the problem of non-availability of scientific articles on zoo's, she started ZOO ZEN. Sally set up studbook-like records for tigers, lions, rhinos, lion-tailed macaques and sangai. She trained herself in record-keeping and studbook-keeping with the International Species Information System.

Sally shifted the organization's focus into conservation planning by setting up the first network of the Conservation Planning) Specialist Group (CPSG) of IUCN/SSC in India. Late Walker had introduced and conducted a series of Conservation Assessment & Management Plan (CAMP) workshops in India. Her major contributions were zoo education and outreach. She prepared complete educational packet, which were sent to zoos, NGOs, conservationists, educators, forest departments, academics, institutions and individuals.

I met Sally on several occasions in meetings, workhops, etc. Last time we met and talked was in Kathmandu, Nepal in 2010. That was a CAMP workshop on red panda. After a few years she invited me to Darjeeling on another meet on red panda but some how I could not attend. I still remember she sent a few emails asking me any difficulties or any other issues for not attending in a very nice language. Late Sally Walker will always be remembered for her works on zoo welfare.

Late Sally Walker (front row, 2nd from left), Angela Glatston (front row, 3rd from left) and myself (standing, 2nd from right) at a meet on red panda in Kathmandu, 2010.

Ronald L. Tilson
(1944–19 November 2013). He passed away in Apple Valley, Minnesota, USA. Late Tilson worked to halt the rapid decline of the world's wild tiger population. He was zoo's director of conservation until his retirement in 2011. His family sources indicated that he had been battling kidney cancer. Late Tilson was 69 at the time of his death. He joined the Minnesota Zoo staff in 1984, holding leadership positions in research, biological programs and conservation.

He spent years in Indonesia, and also elsewhere giving lectures, writing or contributing to more than 220 scientific and general-audience books and articles. Tilson is also known for his book *Tigers of the World* published in 1988 and updated in 2012.

In 1974, late Tilson helped create the Teitei Batti Wildlife Reserve in Indonesia. His Adopt-a-Park program, in which the Minnesota Zoo "adopted" an Indonesian national park, was his major accomplishment. The program started in 1990.

I came to know late Tilson's name when I started research on primates in early 1980s. He was perhaps the first to carry out field research on hoolock gibbon *Hoolock hoolock* that too in Assam's Hollongapar Gibbon Sanctuary (then a reserved forest). Then I met him in 1993 in Bandar Lumpung, Sumatra in Indonesia. But then he was far off from primates and focussed on tigers. He told me that he still remembers his Hollongapar days. Then I think I also met him in Thailand at Khao Khiew Open Zoo where I spent several days attending CAMP workshops.

Rajab Ali Laskar

(31 December 1939–7 November 2018). He was my mother's first cousin and was from Nitainagar near Hailakandi in southern Assam. He spent his entire active life in the rainforests of Inner Line and Katakhal Reserved Forests of Assam and in northern Mizoram, known at that time as Lushai Hills where he was involved in timber business. His main areas of activities in Mizoram were Aizawl, Kolasib and Mamit districts.

Late Rajab Ali Laskar (middle) with other relatives at Monachara, February 1951 before his logging adventures.

When he used to work in those jungles in 1960s and 1970s wildlife were relatively plentiful. His stories helped me design my field works in those areas since 1980s. Late Laskar uncle narrated his encounters with hoolocks, langurs, tiger, elephants, wild water buffaloes, gorals, serows, swamp

Ronald Tilson (3rd from left), Widodo Ramono (2nd from left), myself (3rd from right standing) at Marco Polo Hotel, Bandar Lumpung in Sumatra, Indonesia during CAMP workshop on Sumatran rhino, Sumatran elephant, Sumatran tiger and White-winged Wood Duck, 1993. Also seen are Kathy Traylor-Holzer (1st from left front row), Charles Santiapillai (5th from left), Andy Green (7th from left),Tom Foose (10th from left) and Ulysess Seal (9th from right).

deer or barasingha, gharials, Ganges river dolphin and many other species. Many of the information provided by him have found mention in my articles and books as personal communication.

P.M. Lad (Parashuram Mahadev Lad)
(29 December 1934–17 January 2018). He retired as the Chief Conservator of Forests of Madhya Pradesh. An accomplished birder, he was actively involved in wildlife conservation of Madhya Pradesh. Late Lad was born in Khedi Sawaligadh in Betul district. He obtained his Bachelors degree in Mathematics from Nagpur. He was a known wildlife photographer and had excellent shots of Lesser Florican and Central Indian wild water buffalo.

In around 2001–02 late Lad along with his family members surprised me by visiting my office chamber when I was Director of Tea, Government of Assam. The office was located in Bamunimaidam at the top floor of the building of Directorate of Industries. He must have taken lot of trouble to locate. That was my first meeting and he told me that after retirement from service he is visiting various parts of India in search of birds and other wildlife. I developed great respect for him as there are relatively fewer senior forest officials with such interest and expertise. He was certainly a naturalist-forester, not always found.

Late P. M. Lad.

While writing the book on wild water buffaloes *A vanishing herds* in 2008–09, I made quite a few correspondence with him and he was kind enough to send an excellent and apparently rare photo of a herd of Central Indian wild water buffaloes, which was included in the book. With his demise, a repository of knowledge has been lost.

Late Abdul Mukib Mazumder, Shillong, August, 1963. (Photo: late *Hena Choudhury*)

Abdul Mukib Mazumder (Romu)
(3 October 1945–12 May 2020). He was my maternal uncle. When we were living in Upper Laban locality of Shillong in Meghalaya, I remember to have trekked with him and his friends, and other relatives in Laitkor Protected Forest in around mid 1960s. I was probably around six years of age. There were Khasi pines *Pinus kesiya* and mixed forest with oaks. Lot of birds were seen which I did not know (neither their names nor do I remember their exact features). On the ground there were perhaps a few partridges. He occasionally used to go for sport hunting looking for birds, particularly in Hailakandi in southern Assam. He taught me driving and also drove me and some other family member including my father in my maiden visit to Manas National Park in early 1980s. He was Superintendent at Assam Plantations Crops Development Corporation.

Ashok Kumar
(1935–18 August 2016). He was pioneer in the field of wildlife trade monitoring. He was working for Tata Steel but his travels brought him into

Late Ashok Kumar

contact with the forests and elephants of Similipal, which was the turning point. He joined WWF-India in 1990 and subsequently started TRAFFIC INDIA as the Indian branch of TRAFFIC. His fight against wildlife crime will be remembered for his nabbing of notorious poacher Sansar Chand. Ashok was also co-founder of Wildlife Trust of India and Vice President of the Wildlife Protection Society of India.

I met Ashok Kumar on many occasions, at Delhi, Bangalore, Guwahati and also perhaps elsewhere. We always had nice and fruitful discussions on illegal trade and conservation. Probably our last meeting was in Bangalore in 2010. He was always supportive of my works.

I had prepared a proposal for Dhansiri forests as a tiger reserve under Project Tiger in 1992. After a few years Ashok Kumar asked me for a revised proposal and provided me some support from Wildlife Protection Society of India for field visit. The revised proposal was published by the Rhino Foundation in 1998. This was officially sent to Government of India by the then Chief Wildlife Warden M.C. Malakar in 2003. Late Ashok Kumar placed it before the Steering Committee of project tiger but some how it was not approved. Both of us were surprised. An area of nearly 1500 square kilometres of prime forest with tigers (may be small number as by that time, i.e., between 1992 and 1998 lot of unreported poaching took place) itself was a plus point and worth preserving as a tiger habitat. If 500 square kilometres Dampa in Mizoram and smaller Buxa in northern Bengal with small or doubtful tiger presence could be tiger reserves why not a 1500 square kilometres area? Now lot of encroachment and felling have taken place during the last two decades and tigers are stray with tolls taken by unreported poaching being on the Assam-Nagaland border.

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Daya Krishna Goswami

(15 September 1918 –16 January 2014). He was the *satradhikar* of Gharmora *satra* of Lakhimpur district. He was a freedom fighter and social worker. He set up three destitute homes and schools near Assam – Arunachal Pradesh border at Kimin, Likabali and Seajuli.

I met him for the first time in 1989. His naturalist son Bikul Goswami was my friend being a keen birdwatcher. Late Goswami was also a nature lover and whenever I used to visit their house at North Lakhimpur town we used to spend some time discussing on wildlife. He had experience of encountering wild elephants, tigers, and many other species and had good observation about their decline in recent decades.

After our first meeting, I got three postings in that district as Sub-divisional Officer (civil), Dhakuakhana (1989–91); Project Director, District Rural Development (1994–95), and lastly the Deputy Commissioner (2011–2013). I was also Divisional Commissioner, North Assam Division for a short period (2017). During those postings I was a regular visitor to the house of late Goswami. In fact I was like their family member. I also visited his destitute home-cum-school at Seajuli. He worked with missionary zeal for the

With late Daya Krishna Goswami at Gharmora satra, 2012.

institutions set up by him. It is right on the border of Ranga Reserved Forest. Wild elephants, muntjac, leopard and smaller mammals and birds including hornbills still visit the school compound. He also talked about the poaching of elephants by local poachers from Arunachal Pradesh and we tried to find out ways to stop those.

Once late Goswami and his wife (herself a writer) visited our bungalow at Nalbari while I was Deputy Commissioner of Baksa in 2005. Our last meeting was in 2013 while departing North Lakhimpur on transfer.

Amrit Kumar Phookan

(1944–13 October 2015). He was an eminent jurist and former Advocate General of Assam. After completion of his studies, he started legal practice at Gauhati High Court from 1972 onwards. He was also Advocate General of Arunachal Pradesh.

I met him only once in 2007 when I was Joint Secretary in Environment & Forest Department. I went with Bir Bhadra Hagjer, then Commissioner & Secretary of Environment & Forest Department to discuss about a case of the department. Hagjer Sir, now a Member of Legislative Assembly (MLA) introduced me as Joint Secretary of the department as well as nephew of Abdul Muhib Mazumder, former Advocate General and Law Minister of Assam. Late Phookan Sir then asked me about my late father Alauddin Choudhury, who was Deputy Registrar of Gauhati High Court. He then told me that both my father and uncle were very close to him and for a short while he became nostalgic.

Late Phookan Sir was such a legal authority that he kept law and justice above everything. I have first hand experience in this regard. I had to file a case against my own government at CAT (Central Administrative Tribunal) in 2012 on an issue of injustice inflicted upon me. The hon'ble CAT gave me relief by quashing the order. The authorities then filed an appeal before the hon'ble Gauhati High Court. After hearing, the court again gave me relief by dismissing the appeal. Then ultimately the authority approached the Supreme Court of India and prepared the SLP. It is mandatory to get the views of Advocate General before placing the matter in Supreme Court. He took a very bold step to uphold the rule of law. Ultimately the SLP could not see the hon'ble Supreme Court.

His bold step to ensure justice allowed me to remain at Lakhimpur for some more months when I could describe a new species of giant flying squirrel *Petaurista siangensis* and a subspecies of hoolock gibbon *Hoolock hoolock mishmiensis*.

William R. Oliver

(1947–10 September 2014). A renowned conservationist, late William Oliver was known for his outstanding contribution towards conservation of various species of wild pigs including the Critically Endangered pygmy hog *Porcula salvania*.

Born in England, he was an animal keeper and education officer at Marwell Zoo, before moving in 1974 to the Jersey Wildlife Preservation Trust, founded by Gerald Durrell. His first visit to India was in 1977 when he attempted to study pygmy hogs. He was Director of the Philippines Biodiv-

Late Amrit Kumar Phookan

Pygmy hog illustrated by William Oliver

With William Oliver (2nd from right) at his dream project – Pygmy Hog breeding facility, Basistha. Also seen are Mrs Anne Wright, MBE (1st right), Bittu Sahgal (1st left) and myself (2nd from left), 13 April 2013. (Photo: *Goutam Narayan*)

ersity Conservation Foundation based in Manila, which was founded in 1990.

William had a particular interest in breeding endangered species in captivity. Alongside his scientific work, late Oliver was also a highly respected wildlife artist. The logo of The Rhino Foundation for Nature in North East India was also designed and drawn by him.

My first meeting with William was in 1980s at Belle Vue hotel, Guwahati. He asked an official of the hotel whether he knew me and coincidentally the official was my first cousin – Mr Nurur Rahim Mazumder (Abu). I visited the hotel and had an hour long talk with Oliver, which was exclusively on captive breeding of pygmy hogs and the bottlenecks faced from Forest Department and other agencies. Thereafter we continued to meet off and on whenever he was in Assam. Ultimately mainly owing to his untiring efforts, the conservation breeding of pygmy hog saw the light in around later 1990s. The breeding facility came up at Basistha near Guwahati city and is a major success story. Since I was with the Government of Assam and had understood the thoughts of William, I had extended help as and when necessary. There was a time when the Central Zoo Authority (CZA) decided to take over the conservation breeding programme of pygmy hog but with justification I had opposed it as the Deputy Secretary in the Forest Department. The Government of Assam, especially the Forest Minister late Nagen Sharma who was keen on wildlife had accepted my views and the CZA was informed accordingly.

William gave one of his fine paintings on pygmy hog for use in my book *The mammals of North East India* in 2013 with the request that I give him a copy. But instead of sending it I waited for him and unfortunately he could not see it. I felt very sad. Our last meetings were in 2013 at Guwahati.

Apart from pygmy hogs, William Oliver will be particularly remembered for his pioneering efforts to conserve rare and endemic wildlife of the Philippines.

Frederick Chamberlain Dean

(22 May 1927– 28 November 2014). Fred was born in Brookline, Massachusetts. He was Chair, Research & Conservation Grants Committee of International Association for Bear Research & Management (IBA). He received Master of Science in 1952 and doctorate in forest zoology in 1957 from State University of New York, College of Forestry, Syracuse.

Fred taught wildlife management and was head of the Department of Wildlife Management at the University of Alaska Fairbanks from 1954 to1973, becoming a full professor in 1966. He was program leader of the Cooperative Park Studies Unit from 1972 to 1983, and adjunct professor of wildlife management from 1983 to 1990. He was made professor emeritus in 2001.

Fred's chief research focus was on the grizzly bears of Denali National Park where he worked many summers from the East Fork research cabin

Late Frederick C. Dean

with graduate students, starting in 1957. He was a founding member of the Alaska Conservation Society and served as president.

Fred received many honors including the President's Award from the International Association for Bear Research and Management (IBA: 2010), and, most recently, the Distinguished Service Award from the IBA (2014).

For 15 years, Fred was chairman of the Bear Research and Conservation Grants Committee of the IBA. He so ably devised an organized, transparent and fair system for distributing these funds that IBA credits him for advances in bear conservation around the world that would not otherwise have been possible.

I never met Fred but was in touch since I became a member of IUCN/SSC Bear Specialist Group. While he was chair, Bear Research and Conservation Grants Committee of the IBA, he ensured two small grants for me. The first was for "Records of Sloth Bear and Malayan Sun Bear in North East India" (report finalised in 2011) and the second, "Records of Asiatic black bear in North East India (report finalised in 2013).

Esmond Bradley Martin

(17 April 1941–4 February 2018). Born in New York City, he was a trained geographer and conservationist who fought against the illegal trade of ivory and rhinoceros horns. Martin was considered an internationally-known expert in such matters. He had been a special envoy of the United Nations for the conservation of rhinoceros. Martin was found dead with a stab wound to his neck in Nairobi, Kenya.

Late Esmond Bradley Martin

Martin had graduated in 1959. He then earned a bachelor of science degree in geography from the University of Arizona in 1964, followed by a Ph.D. in philosophy from the same university in 1970. In the mid-1970s, Martin and his wife, Chryssee Martin, had settled in Nairobi, Kenya.

Being involved in conservation, research and writing on wildlife issues, I was aware of Martin. Apparently he was also aware of me as he distributed a copy of my article on Indian rhinoceros to several concerned people.

It was perhaps in 1995 or 1996, when he visited Guwahati that we met for the first time. Subsequently we met on a few more occasions and were in touch. At his request, I also wrote for *Pachyderm* journal.

Martin traveled extensively and took great risk to gather data surrounding the illegal trade. His research primarily focused on curbing the demand of ivory and rhino-horn products. He was instrumental in stopping the rhinoceros horn trade in 1993 and ivory trade in China in 2017.

One of his best known books was *Run Rhino Run*, 1983 (co-authored with Chryssee Martin).

Tsilie Sakhrie

(15 March 1943–13 February 2021). He was one of the pioneers of community conservation in Nagaland as well as North-east India where hunting is a way of life. There is a saying that in 1993, more than a hundred tragopans were killed for their meat to be consumed in Khonoma village! Such killings concerned the sensitive villagers and they decided to do something against hunting.

In 1998, the Khonoma Village Council declared its intention to notify about 20 km² as the Khonoma Nature Conservation and Tragopan Sanctuary (KNCTS). This was motivated by some of the village elders, notably Tsilie Sakhrie, who had in the 1980s been a contractor dealing with the Forest Department. He was helped by forest officers like T. Angami. In the 1980s, Tsilie proposed that the village do something to this effect, but without success. In 1995, he became a member of the village council. A number of villagers were opposed to the idea but gradually the majority was convinced. The sanctuary's

foundation stone was laid in December 1998; it was also decided to ban hunting in the entire village, not only in the sanctuary area.

A trust was set up with a formal set of rules and regulations. Office bearers were chosen from amongst the villagers; Tsilie was chosen the Chief Managing Director. Some youth members were selected as wardens.

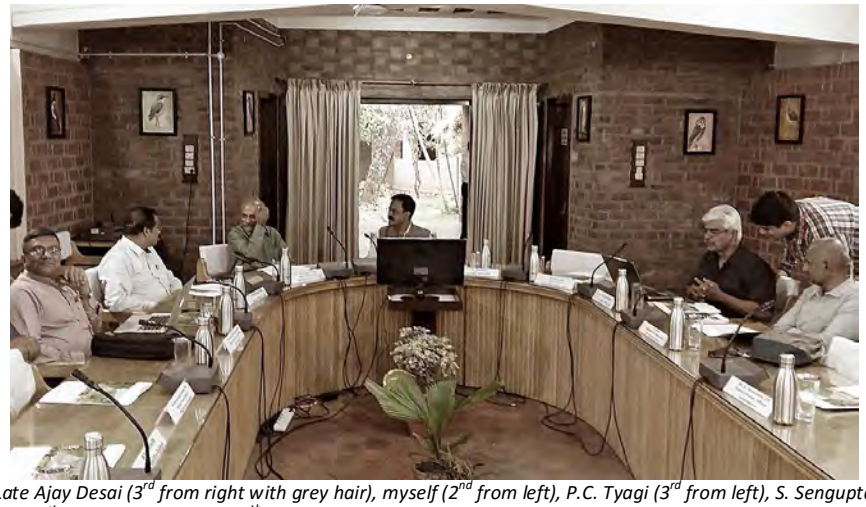
Since 1996 after a seminar on conservation organised by a local NGO called Peoples' Group at Kohima, I made it a point to visit Nagaland at least once every year with a trip to Khonoma village to interact with Tsilie. Late Thomas Kent used to accompany me and on some occasions I had lunch or evening tea at Tsilie's house. I used to get enlightenment from his experience and our discussions with members of KNCTS were encouraging.

My last meeting with Tsilie was in April 2007 while I was Deputy Commissioner of Baksa. I had invited him with a group of volunteers and villagers to visit Manas National Park and had arranged for their interaction with Maozigendri, an active NGO working in Manas. In fact I had put them in Maozigendri's huts so that both the groups can have round-the-clock deliberations. While leaving Manas enroute Kohima, I invited them for breakfast at my official bungalow at Nalbari. Prior to that I had invited him to a meeting of the IBCN (Indian Bird Conservation Network) at Kaziranga, which he attended with his team where Dr A.R. Rahmani was also present. With Tsilie Sakhrie and Thomas Kent gone for heavenly above, Nagaland has lost two of its top conservationists and I lost two of my all time best friends.

Ajay Desai

(24 July 1957–20 November 2020). A widely known expert on Asian elephants, late Desai spent decades studying the behaviour of Asian elephants, especially in southern India. He was associated with WWF-India as a consultant for over 15 years. He was also Co-chair of IUCN/SSC Asian Elephant Specialist Group. Desai's family was from Konnur, Bagalkot district, in Karnataka, and had settled in Belgaum. He was post graduate in marine biology from Karnatak University.

Late Tsilie Sakhrie (2nd from right), myself with daughter and wife (3rd to 5th from right, front row) at Deputy Commissioner of Baksa's bungalow, Nalbari for breakfast and roundup meeting after their visit to Manas and meeting with Maozigendri NGO. His team members are also seen in the photo. April 2007.



Late Ajay Desai (3rd from right with grey hair), myself (2nd from left), P.C. Tyagi (3rd from left), S. Sengupta (1st from left), K. Sankar (4th from left) at human-gaur conflict meeting, SACON, 29 October 2019.

Desai started his career with the Bombay Natural History Society as a researcher focusing on elephants. He was an advocate for creation of dedicated animal movement corrdors. He authored books and many articles, mainly on elephants.

I first came into contact with late Desai when he became Co-chair of Asian Elephant Specialist Group as I was member of the group. Thereafter we were in touch off and on and had met on several occasions in India as well as abroad mostly on wildlife related meetings.

My last interactions were in the meetings of human–gaur conflict, which was part of Indo-German Cooperation Project Human Wildlife Conflict Mitigation in India. Our last meeting was at SACON, Coimbatore on 29 October 2019 (see photo). Ajay was fit and very active. We had interacted as ususal without knowing the fact that we are not going to meet again! How sad.

Alan Robert Rabinowitz

(31 December 1953–5 August 2018). He was a reputed zoologist who served as the president, CEO, and chief scientist at Panthera Corporation, an organization devoted to protecting the world's wild cats. Born in Brooklyn, New York, Alan became interested in wildlife conservation in his childhood. He had Ph.D. (1981) in ecology from the University of Tennessee.

Alan mainly worked in Asia to Latin America. In a career spanning more than three decades, he was a global advocate, especially for wild cats. Alan conceptualized and implemented Panthera's Jaguar Corridor Initiative to connect jaguars from Mexico to Argentina, and the establishment of the world's first jaguar sanctuary in Belize. He was also a major stakeholder in the creation of the Hukaung Valley Tiger Reserve, in Myanmar.

Alan Rabinowitz described the leaf deer *Muntiacus putaoensis* from northern Myanmar. Some of his books include *Beyond the Last Village: A Journey of Discovery in Asia's Forbidden Wilderness* (2001); *People and Wildlife: Conflict or Coexistence?* (2005), and *Life in the Valley of Death: The Fight to Save Tigers in a Land of Guns, Gold, and Greed* (2008).

I never met Alan but had correspondence with him, especially when I wanted to examine the

Alan Rabinowitz

specimens with him from northern Myanmar. I was particularly interested in leaf muntjak. Unfortuntely, he was in the field in South Africa but directed his Assistant Kathy Conforti at Wildlife Conservation Society that I use his chamber and she should provide me with all the specimens I want to examine. Accordingly I visited his office on 10th August 2001. His greatness as a human was obvious. Without knowing me personally he allowed me so much of liberty! I also confirmed that the small muntjac skulls I had examined and photographed in eastern Arunachal Pradesh throughout 1990s were mostly *Muntiacus putaoensis*. At that time the only specimens were with Alan.

Kulodhar Das

Kulodhar Das
(6 June 1985–31 October 2020). A young man from Gauripur in western Assam, late Das was a conservationist and was involved with an NGO, Nature's Friends. While I was Joint Secretary in Forest Department, Assam I had included the NGO as a member of the State Board for Wildlife. Das was a committed worker and was fighting for getting bird sanctuary status for Sareswar *beel*. During my camping at Gauripur in January 2010, he was my constant companion. Kulodhar was also in regular touch with me. He in fact, was successful in getting a proposal for a sanctuary for Sareswar but by then I had left the deparment and it was somehow not pursued at government level. Sareswar *beel* is an Important Bird & Biodiversity Area and Kulodhar was instrumental in its inclusion (not there in the first edition of the list).

Widodo Ramono (Widodo Sukohadi Ramono)
(4 April 1945–24 December 2020). He was the president and executive director of Yayasan Badak Indonesia (YABI) also known as the Rhino Foundation of Indonesia. Widodo spent more than five decades for protection of Sumatran and Javan rhinos. He has served as YABI's executive director since 2009, stewarding the organization's role in the protecttion of Indonesia's rhinos.

Widodo was born in the city of Blora in Central Java. Since 1969, Widodo has held several government positions in wildlife conservation, notable among them being the head of Nature Protection and Conservation of Ujung Kulon National Park, which now holds the only population of Javan rhinos – numbering 74 individuals.

Widodo has also overseen the development of three Indonesian national parks in Sumatra (Bukit Barisan Selatan, Kerinci Seblat and Way Kambas). As the former Director of Biodiversity Conservation for the Ministry of Forestry, he played a major role in establishing management practices for Indonesia's national parks and reserves. Widodo was awarded the Sir Peter Scott Award for Conservation Merit by the Species Survival Commission of IUCN in 2015 in recognition of his lifetime's work for protection of rhinos.

I met Widodo in 1993 at Bandar Lumpung, Sumatra in Indonesia while attending a Conservation Assessment & Management Plan (CAMP) workshop on Sumatran rhino, Sumatran elephant and White-winged Wood Duck. We spent some time talking to each other on various issues (see photo on p. 49, bottom).

Srikanta Sharma
(Died on 28 April 2021). He was a Divisional Forest Officer in Assam. In his early service life he was posted in Manas Tiger Reserve and had played a key role in its management. He recorded for the first time the Assam roofed turtle or Khasi Hills terrapin *Pangshura sylhetensis* in Manas. In fact, I met him for the first time in Manas in 1984 while he was posted at Bansbari range.

Neid (Neisatuo) **Keditsu**
(12 September 1963–11 June 2017). Generally when in Nagaland for field works, late Thomas Kent and Khekiho Sohe had accompanied me; however, in February 2004, both of them were indisposed. I contacted biologist Dr Feroz Ahmed

who gave me reference of Neisatuo Keditsu. I phoned him and soon he came to hotel Japfu to meet me. A lively and friendly person he soon tied up my field trips to Wokha, Mokokchung, Tuensang and Noklak. Neid was a vital figure in Nagaland Tourism Association and had good contacts.

It was during that trip that the first awareness drive for the migratory Amur Falcons *Falco amurensis* in Nagaland was held at Chongtongya. The presence of leaf deer *Muntiacus putaoensis* in Noklak area was also discovered at that time.

Our last meeting was at Dhaka, Bangladesh in the last week of September 2010 when we participated in International Travel & Tourism Fair. I represented Assam as Joint Secretary in Tourism Department and he as President, Tourism Association of Nagaland. I observed him visibly unwell, he was frail. It was disturbing.

His demise is a personal loss to me, a friend who, just on the basis of a single reference helped an unknown person in me whole-heartedly. In Neid, Thomas Kent and Tsilie Sakhrie not only me as a personal friend but Nagaland as a state have lost three silent workers whose direct/ indirect contribution to the society and environment is yet to get due recognition.

Neid Keditsu at Dhaka tourism meet, 2010. I am standing behind him.

Dhritikanta Lahri Choudhury

(10 September 1931–1 March 2019). A well known elephant expert of India, he served as a Professor at Rabindra Bharati University. Born in Mymensingh district, now in Bangladesh, Choudhury travelled widely in the forested areas of eastern India. His well known books include *The Great Indian elephant Book* and *A trunk full of tales: sevety years with the Indan elephant*. He was a member of IUCN/SSC Asian Elephant Specialist Group since 1977.

I met Dr Lahiri Choudhury twice; once at his residence in Kolkata in late 1990s and then at Pnom Penh, Cambodia in 2002 where we attended the meeting of the Asian Elephant Specialist Group.

P. K. Sen

(1941–1 May 2021). He was former Director of Project Tiger. Sen passed away due to COVID-19. He was awarded Padma Shri in 2010.

I met him in 1999 when he invited me to attend the Silver Jubilee function of Project Tiger at Delhi. Thereafter I met him on a number of occasions at Kolkata in seminar and also otherwise. Once we met at Kathmandu, Nepal . The meeting at Kathmandu in 2001 was on World Natural Heritage Sites, a preparatory meet for the World Parks Congress to be held at Durban, South Africa. Both of us were part of Indian delegation. Late Sen was very vocal and had humour, so he becomes good friend quickly. He hailed from Jharkhand and had contributed towards development of Palamau Tiger Reserve.

Sunderlal Bahuguna

(9 January 1927–21 May 2021). A reputed Indian environmentalist he fought for preservation of forests in the Himalayas, especially in Uttarakhand area, which became famous as Chipko movement in 1970s. He died due to COVID-19. I never met late Bahuguna but was aware of his activities including his movement against Tehri dam. In fact he was born in Tehri District.

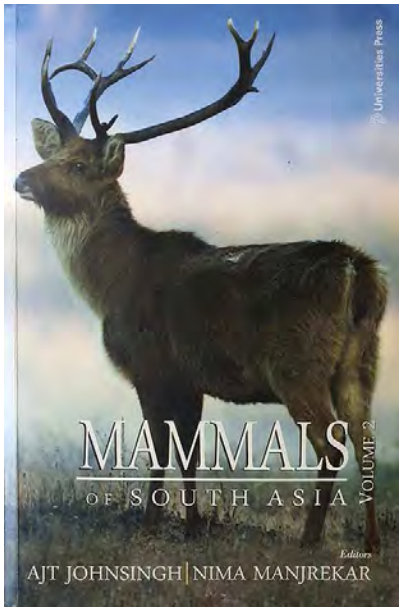
P.K. Sen

Sunderlal Bahuguna

Newsletter & Journal of The Rhino Foundation for nature in NE India (2020) 10: 59–60. ISSN 0973-6530

BOOK REVIEWS

1. **MAMMALS OF SOUTH ASIA**, VOL. 2. Edited by AJT Johnsingh and Nima Manjrekar. Published in 2015 by Universities Press, Hyderabad, India. (24 x 16 cm), pp. lxxv, 739. ISBN: 978 81 7371 589 1. Paperback. Price. Not mentioned.



This is the volume 2 of the two-volume set. The volume 1 was reviewed by me in the previous issue of this publication. The foreword of this volume has also been written by George Schaller. This volume has 36 chapters including introduction. It has covered sirenia, cetacea, proboscidea, perissodactyla, artiodactyla and rodentia. Lagomorpha was not treated as a chapter but part of little-known mammals' chapter although some are very well known such as the Indian hare and some pikas. A chapter has been devoted to diseases and parasites while another chapter is a checklist. Each chapter is written by persons having in-depth knowledge of the subject. The book is an important addition to the mammals of the region, somewhat like a 'handbook'. It is very well edited by experienced Dr Johnsingh and ably supported by Nima Manjrekar. There are very few editorial mistakes. However, there are some mistakes at the level of individual authors, which are, however, apparent in otherwise a voluminous work.

Some are pointed out below:

Pp. 43–44. The Ganges river dolphin never occurred in the upper reaches of Manas in Bhutan. Their maximum limit is southern fringe of Manas and Beki rivers, generally in monsoon. Moreover, short-distance inside Bhutan there are rapids. The following river names have been wrongly spelt: Gangadhar, Puthimari, Bornadi, Panchnoi, Jia-Bhoreli, Kolong and Dikhow. There is no river called Jia Galhaur. The map did not show range of *Platanista gangetica* in southern Assam's Barak valley region and also upper Assam south of the Brahmaputra.

P. 74. In the map some major elephant range such as southern Kamrup, Karbi Anglong and Goalpara in Assam and also Tripura were not shown. A major range was shown in north-east Mizoram and adjacent areas of Manipur and southerm Assam where elephants were not reported during the last 50 years! The western part of West Bengal has also not been shown.

P. 117. Presence of kiang in Bhutan is doubtful.

P. 177. The muntjac became extinct in Indian Sunderbans but is still seen in Bangladesh part although vey rare.

P. 181. The map of muntjac range excluded large areas of Mizoram, southern Assam, Manipur and Naga-land but why? In the excluded area, muntjac is the most abundant deer.

P. 196. In Bhutan, chital also extends to the foothills of Royal Manas National Park. In Assam currently it occurs up to Beki river in Manas National Park.

P. 225. The range of sambar in Bangladesh not shown.

The Assamese macaque occurs in southern Mizoram also but not shown on map.

P. 246. The barasingha's past range also included entire northern Bangladesh and southern Assam.

P. 273. The range map of hog deer excludes entire Meghalaya, Mizoram and central and southern Assam. While it was common in southern Assam it was present in good numbers in Garo Hills and in the plain areas of Karbi Anglong. During floods in Kaziranga, a large number move to the hilly tracts of Karbi Anglong. In Mizoram, stray individuals are still met with.

P. 277. The hog deer is also found in Nameri National Park, and Burhachapori, Pani-Dihing, North Karbi Anglong and Sonai-Rupai Sanctuaries in Assam, and in Mahananda Sanctuary and Buxa Tiger Reserve in West Bengal.

P. 278. The hog deer in Manipur's Keibul Lamjao National Park are probably of the race *annamiticus*.

P. 289. The range in North-east India on map was pathetic. Such books are reference materials for decades, neither can it be revised soon nor second edition published within a short time. Hence, best efforts should be given in the text and maps. When so much of knowledge is available in books and articles including *Journal of Bombay Natural History Society* the authors should have given a sincere effort instead of putting "?".

The species is not confined to evergreen forests of north-east India including north Bengal but relatively more abundant in tall grassland and in deciduous forests as well as subtropical forest.

P. 290. The gaur is not yet extinct in Bangladesh.

P. 324–325. The easternmost range of blackbuck was Manas river in Assam (Choudhury 2011).

P. 353. The lowest elevation record of serow in north-east India is below 50 metre asl in case of red serow. There are regular sightings around 80–150 metres at the edge of the foothills.

P. 354. Different forms of serow occur throughout North-east India excluding the floodplains but the map excluded bulk the range.

P. 453. Bharal occurs all along the northern edge of Arunachal Pradesh till the northern tip of Myanmar.

P. 653–679. Stump-tailed and pig-tailed macaques, red fox, Malayan sun bear, clouded leopard, wild pig, wild water buffalo and Indian pangolin deserved full chapters rather than inclusion in 'little-known mammals'. All are well known and there is enough knowledge for full chapters.

Reference

Choudhury, A. U. (2011). Easternmost limit of the range of blackbuck *Antilope cervicapra* with historic records from Assam and North Bengal, India. *J. Bombay nat. Hist. Soc.* 108(1): 58–60.

— *Reviewed by Anwaruddin Choudhury*

ERRATA

(Newsletter & Journal No. 9)

Description of a new subspecies of hoolock gibbon *Hoolock hoolock* from North East India,

p. 53, left column, line 6 of 'Discussion',
For Table 2
Read Table

p. 59, top row extreme right (marked as d),
For Mizoram
Read Namdapha

ISSN 0973-6530

The *Newsletter & Journal* of
THE RHINO FOUNDATION
FOR NATURE IN NORTH-EAST INDIA

No. 10 • October 2020 ***SILVER JUBILEE ISSUE***

Journal Section
(Peer-reviewed articles)

Contents

Newsletter & Journal of The Rhino Foundation for nature in NE India (2020) 10: 63–75. ISSN 0973-6530

THREE YEARS MONITORING OF THE AMUR FALCON *FALCO AMURENSIS* AT A ROOSTING SITE IN ASSAM IN NORTH-EAST INDIA

ANWARUDDIN CHOUDHURY[1], ANIL KUMAR GOSWAMI[2] AND **DEBENDRA LUITEL[3]**

The Amur Falcon *Falco amurensis* is a long-distance migrant. The migrating falcons pass through Assam and other areas of northeastern India. En route they roost at some select sites in Nagaland, Manipur, Assam and Meghalaya often in thousands and lakhs (one lakh= one-tenth of a million). This study covered one site, i.e., Umru II or Umrukhuti in West Karbi Anglong district of Assam for a period of three seasons, 2017–19. In 2017, the falcons were first seen on 4th October and by 4th December all birds have departed. The number of falcons kept on increasing every day till 8th November when the estimated number reached a staggering figure of about 210,000. In 2018, the falcons arrived on 6th October at Umru and by 28th November all birds had gone. The number of falcons kept on increasing till 7th November when the estimated number reached a high figure of about 105,000. In 2019, the falcons were first seen on 8th October at Umru and by 28th November all birds had gone. The number of falcons kept on increasing every day till 12th November when the estimated number reached the highest figure in the three seasons, of about 318,000. This was the first such exercise on these falcons, which should be replicated in other roosting sites. During field works, an awareness campaign was implemented and the formerly serious problem of poaching of the Amur Falcons became insignificant.

Key words: *Falco amurensis,* Amur Falcon, roosting site, Umru, West Karbi Anglong, Assam, India

Introduction

The Amur Falcon *Falco amurensis* is a migratory bird, that occurs in Assam and elsewhere in north-east (NE) India in October and November (Ali and Ripley, 1983). Uncommonly it also passes through in March–April every year during its return migration. Almost all the birds pass through this area to their wintering destination in Africa as passage migrants. These falcons breed in the basin of the Amur River in eastern Siberia, eastern Mongolia and north-eastern China (Manchuria) and migrate to East and South Africa for winter (Ali and Ripley 1983, Choudhury 2000) (Fig. 1).

The migrating Amur Falcons pass through Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and also peninsular India. Then they fly over the Arabian Sea (Ali and Ripley 1983, Choudhury 2000, 2005, Naoroji 2006). Choudhury (2000, 2009) provided details on the migration in Assam and adjacent areas. Their migration is a spectacle as they do it in thousands, often crossing a lakh (one lakh= one-tenth of a million) in numbers. En route their migration they need to take rest at some select sites with suitable vegetation and abundant food. In (NE) India, there are some such sites in Nagaland, Manipur and Assam where they stop over in hundreds and thousands. A large number of 'bird-catchers' / poachers used to catch them with bare hands (Karbi Anglong, Assam) or with nets (Nagaland)

Corresponding author
[1]DR ANWARUDDIN CHOUDHURY,
7 Islampur Road, Guwahati 781 007 (Assam), India.
Email: acbadru56@gmail.com

[2]DR ANIL KUMAR GOSWAMI,
Silpukhuri, Guwahati 781 003 (Assam), India.
Email: akgoswami@gmail.com

[3]DEBENDRA LUITEL,
Umrukhuti, West Karbi Anglong, 781003 (Assam), India.

or shot them with guns or slingshots. Recently a similar stop over site was discovered in Bihar near Valmiki Tiger Reserve (Choudhury 2016).

In Assam, there are many districts where Amur Falcons could be seen during migration, such as Cachar, Dhemaji, Hailakandi, Lakhimpur, Morigaon, Sonitpur and Tinsukia; however, there are some sites that they roost overnight in very large numbers. These are: Habang (Umwang) and Umru II or Umrukhuti in West Karbi Anglong district and Umrangso in Dima Hasao (North Cachar Hills) district. Habang, later as "Habang and Umru" is also listed as an Important Bird & Biodiversity Area (Islam and Rahmani 2004, Rahmani *et al.* 2016).

Godwin-Austen (1872–1878), Koelz (1951, 1952, 1953, 1954), Ripley (1951, 1952, 1953, 1982), Ali and Ripley (1983), Grimmett *et al.* (1998) and Choudhury (2001) did not mention Amur Falcon's occurrence in Nagaland. Its first account in that state in a published form was found in Choudhury (2003).

In Manipur, however, Amur Falcon's occurence was documented by Ali and Ripley (1983). They also fly across most of the states of the region during autumn.

Some other past references of Amur Falcon (then treated as a subspecies of Red-legged Falcon *F. vespertinus*) include Baker (1932) who wrote "recorded thousands passing through Cachar in September/October and returning by March/April"; Butler (1880) "huge flock of some thousands passing Belgaum (Karnataka) on 24 November" and Davidson (1900) "immense scattered flocks in November–December in some years all along the coast near Karwar" (also in Karnataka).

Three recent references to Assam were the yearly and final reports of the monitoring and estimation exercise at Umru II that provided important insight about the Amur Falcon (Choudhury et al. 2018, 2019, 2020).

In this work, the main objective was to monitor the arrival and departure of Amur Falcons during autumn and estimate daily the population at one site, i.e., Umru II, for three consecutive years, 2017, 2018 and 2019. Awareness campaigns were done in both Umru II and Habang areas in West Karbi Anglong district of Assam (Fig. 2).

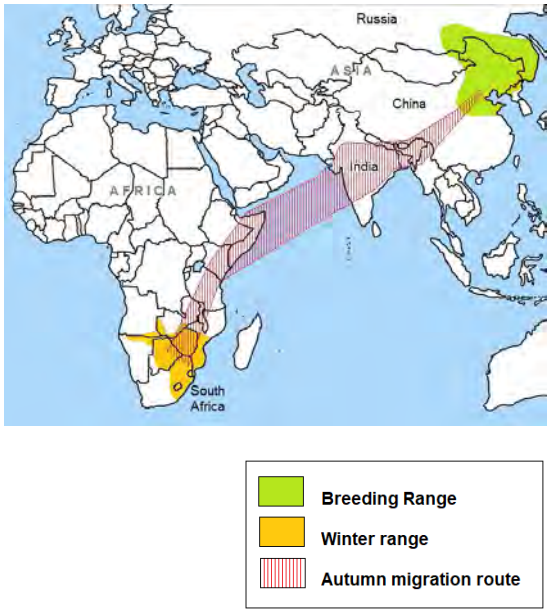


Figure 1. Map showing the range of Amur Falcon and its autumn migration route.

Carto: *Anwaruddin Choudhury*

Study Area and Methods

Umru or more specifically Umru II, also called Umrukhuti (25º 47´, 92º 09´) is located in West Karbi Anglong district of Assam. The area is part of a plateau having elevation of 750–850 m asl at Umru II. The topography of Umru II is rolling country with a high ridge on eastern side and a *nullah* on the western side, which also marks the interstate border between Assam and Meghalaya. On the other side is the Tyrso village of Ri-Bhoi district of Meghalaya.

The natural vegetation is of tropical deciduous type with bamboo brakes. The landscape is short grass with cultivations and farms, hutments and some trees and shrubs. The ridge is well forested with Khasi pine *Pinus kesiya* (old plantations) while Tyrso on the Meghalaya side is a large village with cultivations and patches of woodland. Most of the villagers in Umru II are Nepali while some are Khasis. In Habang, in addition to Nepali and Khasi

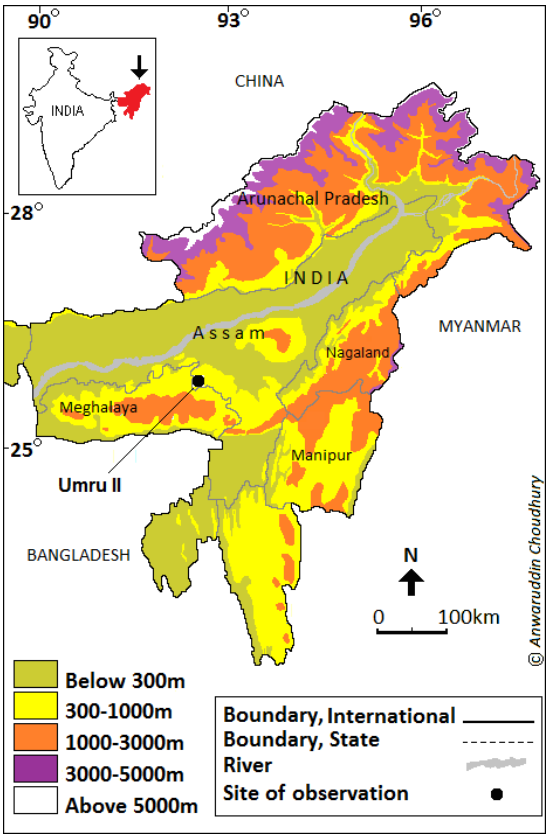


Figure. 2. Map showing the study site.

there are Karbis. Habang has the Forest Range Office under which Umru II falls.

The monitoring was done by (1) Counting the roosting/in flight birds daily; (2) record any disturbance such as use of nets, slingshot or other materials, and catching with bare hands, and follow-up action, and (3) any other aspect. Besides the first author, two persons of the village including the third author were trained about how to estimate large number of birds, especially when they are in thousands. The birds were estimated during roosting, especially in the early morning as well in the evening when the birds arrive. Sometimes, it goes beyond dusk when visibility is a problem. But as long as visibility allowed, counting was also done in the evening/around dusk.

The falcons were also estimated in flight for cross-checking with the roosting estimates. For birds in flight and also when in their roost, the method popularly used in mid-winter waterfowl census has been used (Wetlands International, 2010). It includes counting of a part of the total mass of birds in view, and then extrapolation for the whole flock. More specifically, blocks of 100 or more, even a thousand are generally used for birds in flight or at roost. "The first block is counted one by one, and the mental image of this first block can then be used to assess the number of blocks in the flock containing the same number of birds" (Wetlands International, 2010) (see Fig. 3). The monitoring continued till the last bird left the site. This exercise was undertaken in all the three seasons, 2017, 2018 and 2019.

The lower range of daily estimate of the morning or evening, whichever had more falcons was accepted for inclusion in the report.

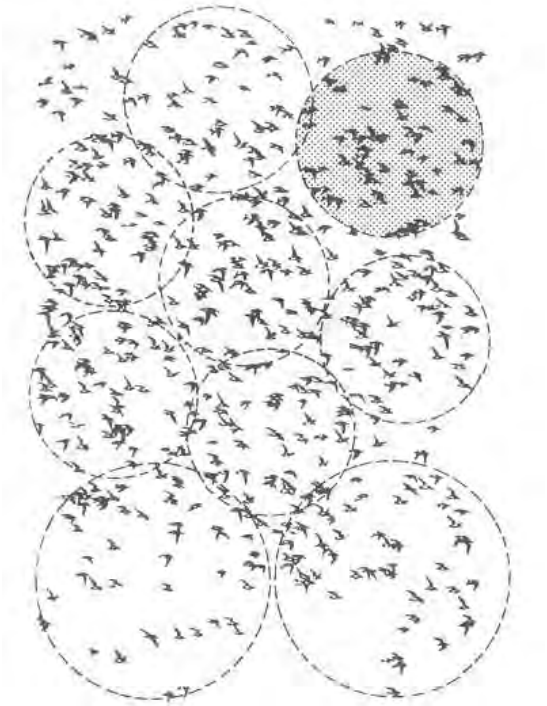


Figure 3. Block counting method (after Wetlands International, 2010)

Results

During 2017, the falcons started arriving on 4 October and by first few days of December all the birds had gone. The number of falcons kept on increasing every day till 8 November when the estimated number reached about 210,000. Estimation was easier till 25 October but became slightly difficult from 26th onwards as the number swelled to around 30,000. From 1st November the number exceeded five figure mark, i.e., one lakh or one-tenth of a million which continued till 19 November. The last birds were seen on 4 December 2017.

In 2018, the birds started arriving in the first week of October and by end of November all birds had gone. The number of falcons kept on increasing every day till 7 November when the estimated number exceeded 100,000. Estimation was easier till 24 October but became slightly difficult from 25 onwards as the number swelled to around 30,000. Unlike the previous year when from 1st November the number exceeded the five figure mark, i.e., one lakh or one-tenth of a million, that year it reached that figure only once (*vs* 19 days in 2017 and 24 days in 2019). The last birds were seen on 28 November 2018 (against 4 December in 2017).

In 2019, the falcons started arriving at the end of first week of October and by end of November all birds had gone. The first birds were seen on 8 October 2019. But it is always possible that if small numbers had come and roosted in a small bamboo brake away from the main areas, they are likely to be missed. The number of falcons kept on increasing every day till 30 October when the estimated number exceeded 100,000. Unlike previous years when only from the first week of November the number exceeded the five figure mark, i.e., one lakh or one-tenth of a million, this year it reached that figure earlier.

In 2019 the numbers were much more than the previous years. The number of falcons kept on increasing fast and by 6 November the estimated number exceeded 200,000. In fact for 13 days it was above two lakhs which included three days when it was three lakhs and above! The decline was also interesting, a sharp fall between 22 and 24 November.

The day by day estimate of all three years are listed in Table 1 and shown in Figure 4. Relatively, more birds were seen in the evening indicating new arrivals, at least up to the maximum peak day. There was a main bamboo grove having the maximum number of birds (more than half) and at least one other grove (near a football field) having a few thousand birds. Then there were several smaller and scattered bamboo groves holding a few hundred birds. In the end, i.e., late November, the birds mostly remained in the main grove (1 in Figure 5) during 2017 and 2018. However, in 2019, many birds also roosted in the grove near the football field (2 in Figure 5). In 2019, when the number of birds was very high almost every bamboo brake or clump had roosting birds! From the day of the highest estimate, relatively more birds were seen in the morning indicating more departures than new arrivals.

Amur Falcons Falco amurensis *in Umru II or Umrukhuti village, West Karbi Anglong district, Assam resting in a shrub after leaving night roost.* (Photo: *Anwaruddin Choudhury*)

Table 1. The daily estimates of number of Amur Falcons in Umru II or Umrukhuti.

	2017	2018	2019
4 October	15	0	0
5 October	22	0	0
6 October	35	8	0 (probably missed a few)
7 October	12	0 (probably missed a few)	0 (probably missed a few)
8 October	52	28	35
9 October	60	300	0 (probably missed a few)
10 October	74	200	40
11 October	80	120	21
12 October	94	95	19
13 October	98	80	22
14 October	103	200	29
15 October	110	600	85
16 October	120	800	130
17 October	250	4,800	280
18 October	400	5,500	950
19 October	600	6,000	5,500
20 October	1000	8,000	9,000
21 October	1,800	8,500	20,000
22 October	1,900	16,000	35,000
23 October	2000	18,000	50,000
24 October	3,000	23,000	55,000
25 October	10,000	32,000	45,000
26 October	30,000	33,000	55,000
27 October	50,000	34,000	80,000
28 October	50,000	42,000	88,000
29 October	60,000	46,000	93,000
30 October	70,000	48,000	107,000
31 October	80,000	55,000	121,000
1 November	100,000	60,000	129,000
2 November	120,000	65,000	132,000
3 November	140,000	70,000	157,000
4 November	180,000	71,000	170,000
5 November	180,000	80,000	190,000
6 November	180,000	95,000	204,000
7 November	180,000	**105,000**	220,000
8 November	**210,000**	95,000	231,000
9 November	180,000	85,000	242,000
10 November	180,000	85,000	286,000
11 November	180,000	80,000	310,000
12 November	180,000	80,000	**318,000**
13 November	180,000	82,000	315,000
14 November	180,000	82,000	297,000
15 November	180,000	82,000	264,000

Cont'd . .

Table 1 (cont'd)

16 November	140,000	81,000	231,000
17 November	140,000	60,000	218,000
18 November	140,000	60,000	210,000
19 November	100,000	50,000	187,000
20 November	50,000	30,000	173,000
21 November	50,000	18,000	149,000
22 November	20,000	10,000	121,000
23 November	2,000	6,000	35,000
24 November	100	2,000	800
25 November	60	700	150
26 November	15	180	15
27 November	3	0 (probably missed a few)	5
28 November	4	24	0
29 November	3	0 (probably missed a few)	0
30 November	7	0	0
01 December	4	0	0
02 December	5	0	0
03 December	3	0	0
04 December	2	0	0

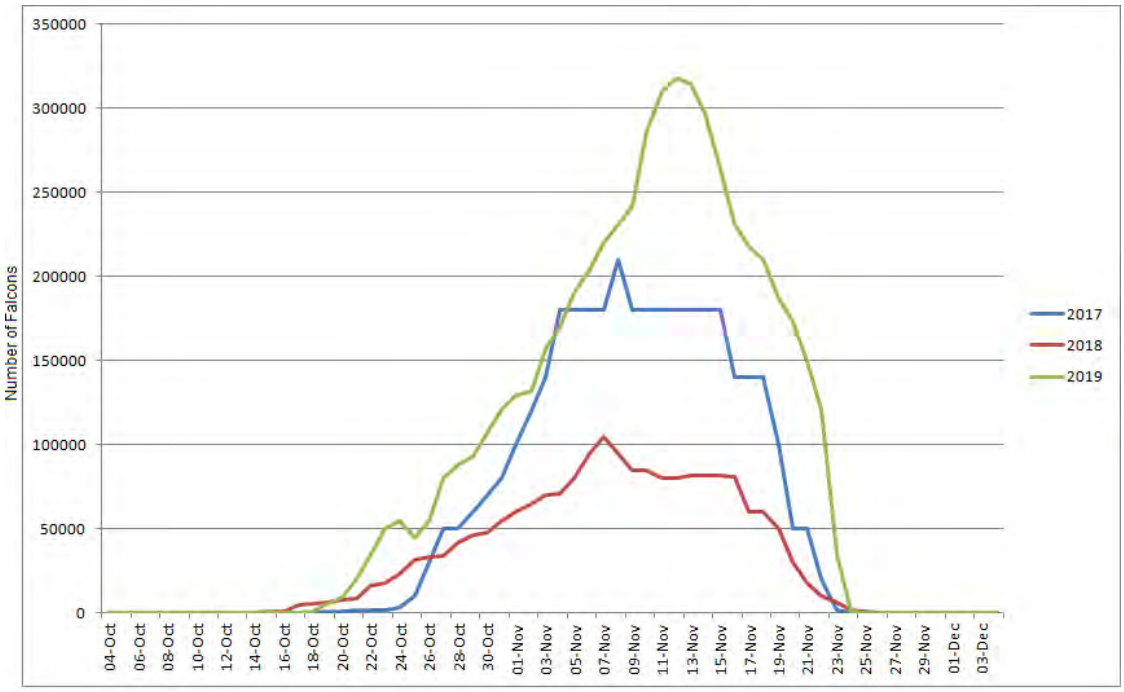


Figure 4. Graph showing Amur Falcon estimates in 2017, 2018 and 2019.

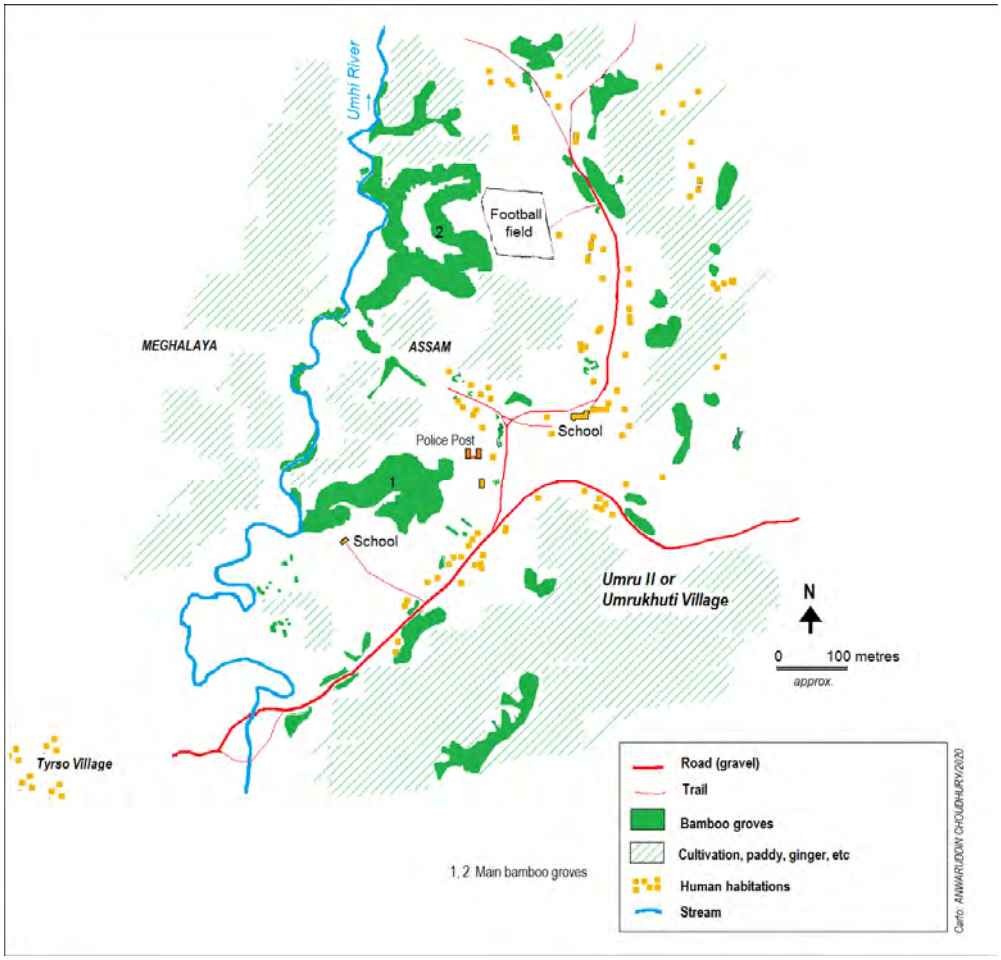


Figure 5. Sketch map of Umru II or Umrukhuti village showing the bamboo groves and other features.

Conservation Issues

Poaching. Poaching of Amur Falcons in the form of illegal catching with bare hands was an annual phenomenon in Habang (Umwang). Habang is the earlier site of roosting of falcons that presently roost at Umru II. Every year people waited for the autumn, when they caught this bird in hundreds for local consumption and for sale in the markets including that of Shillong city. Shillong is the capital of Meghalaya and owing to its relatively close proximity there was a good market for falcons.

The method used was to tie up the upper parts of a few bamboo clumps and then sit there with sacks in the evening. Somehow they tried to catch a single bird and, when successful, the alarm call of this bird attracted other falcons, which were then caught in dozens with the bare hands. The catching, however, was reduced drastically when the first author in association with the Forest Department carried out an awareness campaign in the late 1990s (also see discussion; for details see Choudhury 2009). Subsequently, some forest staff

Amur Falcon male in Umru II or Umrukhuti village. (Photo: *Anwaruddin Choudhury*)

were posted for protection of Amur Falcons every autumn.

When the birds started to shift to Umru II in around 2011, similar catching started, which continued till 2013 and to a reduced scale uptill 2015. In 2016, before commencement of this study, this first author with the help of the Forest Department carried out an awareness campaign at Umru II for the first time and the number of birds caught was insignificant. In the autumn of 2017–2019, there was no known catching or killing, although a few might have been killed/injured by slingshot elsewhere in nearby areas. In the Meghalaya area also, the villagers are now keen to protect the birds and have formed a bird watching club, as a good number of tourists have started to visit. However, some people, perhaps potential poachers, were observed visiting the areas near bamboo groves. They were chased away by the villagers of Umru II who now formed a bird protection group to work within Assam, which had support from the first author as well as the Forest Department.

With the intervention of the first author who was also the Development Commissioner for Hill Areas of Assam and Commissioner & Secretary to the Government of Assam in Hill Areas Department a police camp was established in 2018 making Umru II a better secured area.

Habitat loss. For roosting in Habang (Umwang) and Umru II, the Amur Falcons almost exclusively use bamboo brakes unlike many other areas (in Umrangso the birds roost in shrubs and low trees). While dispersing from their night roost, they perch in shrubs, trees and high electric wires/power lines. Hence, their existence in the area much depends upon continued existence of bamboo brakes. Since awareness meetings of 2017, the cutting of bamboo was reduced to low levels (only for household use); in 2018 and 2019 again the preservation of bamboo brakes and planting of more bamboos were highlighted. There was some loss of bamboo in one area but in the meetings, the villagers were told to avoid such removal except for the basic needs. There should not be any commercial exploitation for sale in the markets, which is also illegal.

Amur Falcons in Umru II, resting in a tree after a drizzle (top). (Photo: *Anwaruddin Choudhury*)
Posters being launched at Umru II village on 12 November 2017 (bottom). (Photo: *Bhubaneswar Sharma*)

Discussion

Amur Falcons arrival and departure at Umru has almost maintained a regular trend. During 2017, they started arriving in around 4th October and by 4th December all the birds had gone. In 2018, the birds started arriving in the first week of October and by end of November all birds had gone. In 2019, the falcons started arriving on 8th October and by end of November all birds had gone.

However, the number of birds may fluctuate greatly. The highest single day estimate was 210,000 in 2017, 105,000 in 2018 and a high 318,000 in 2019. There were 19 days in 2017 when the daily estimate was more than 100,000, which came down to just one day in 2018 but rose sharply to 24 days in 2019. In fact, the numbers were so high in 2019 is evident from the fact that on 13 days the count was above 200,000. In 2019 the numbers were much more than the previous years. The number of falcons kept on increasing fast and by 6 November the estimated number exceeded 200,000. In fact for 13 days it was above two lakhs which included three days when it was three lakhs and above! The decline was also interesting, a sharp fall between 22 and 24 November.

To avoid over-estimation as far as possible, only the lower limits of estimates were accepted. For, e.g., the estimate of the peak number present on 8th November 2017 was between 210,000 and 250,000 but the lower number has been taken for reporting.

Awareness meetings were held with the villagers, students, teachers, Forest Department officials and staff during the study period. In these meetings, talks were held with the stake holders and posters were distributed at Umru II and surrounding areas. Till 2015 there were some capture/killing but from 2016 onwards, when the first author held awareness meetings with the village headman and others, it has almost stopped.

However, this awareness campaign was not the first one in NE India. An awareness drive was carried out in 1996 at Habang by the first author as head of The Rhino Foundation for nature in North East India (NGO) along with local Forest Department and after that the catching / killing came down drastically, to very low numbers. However, cutting of bamboo brakes by villagers for supply to paper mills and other commercial use forced the bulk of the birds to shift to Umru II in about 2011, which has remained the main stopover area. The shifting was complete by 2014. Now very few or none roost in Habang, but some are seen there during the day in flight.

Elsewhere in the region, the first author carried out an awareness drive in Chongtongya in Mokokchung district, Nagaland in 2004 (Anon 2004). Amur Falcons used to roost near Chongtongya village where thousands of the birds were killed or captured every year. A meeting was held in February 2004, at which the '*Gaon Burhas*' (village headmen) of at least 10 surrounding villages including that of Chongtongya participated. After that meeting the killing and capture of falcons dropped, because the *Gaon Burhas* are highly respected in the villages of Nagaland. But in the nearby Doyang reservoir area, the killing continued till recent years, when the Forest Department with NGOs such as Bombay Natural History Society, and local organisations (Friends of the Amur Falcon and others) carried out awareness campaigns.

In Nagaland, three Amur Falcons were tagged with satellite tracking chips in 2013; they returned to the state in 2014. The birds travel almost 22,000 km (13,670 miles) every year (Bhattasali 2014) and have added to the existing knowledge on their

Prof. Dr Anil Kumar Goswami, Adviser of the project and noted scientist delivering a talk.

migration including stop overs and the route. Subsequently, a few falcons in Manipur also were tagged and monitored. One bird had covered 5,700 km in five days and seven hours between before losing contact while in Zambia (Leivon 2019). This exercise is being done by State Forest Departments with assistance from the Wildlife Institute of India. The tracking of these falcons confirmed that some birds, at least, return through north-east India during spring migration.

There is no other apparent threat to the birds at Umru II but unregulated tourism may be an issue in the years to come. So far it is not very significant but with the growing popularity of this area and the improved road connectivity with the two capital cities of Guwahati and Shillong, this issue may be kept in mind while developing tourism. There is a need for some resting places with good toilet facilities for visitors. The visitors apparently find discomfort, at present, through the lack of such basic amenities

How accurate were the counts? The method used was an established one used for decades for international waterfowl counts. The falcons allow in flight estimation as they circle overhead for quite some time before finally landing for roosting in the evening. In the early morning, counting at roost site is also not impossible. To count this number of birds 'live' reasonably accurately, in flight over a short time period in worsening light is quite daunting. It is theoretically possible that counts might be so difficult to perform accurately that there would have large errors. But, if this were happening, the graphs would show lots of wild fluctuations - one day the count would be far too low, the next too high, etc. In fact, fig. 4 shows the sort of shape that suggest the counts are reasonably accurate – consistency between year and mostly gradual changes from one day to the next (a few cases of abrupt day-to-day changes would be expected based on weather – and there are indeed a few such cases). There is perhaps no other way to look at this aspect on the available counts. But one way that could be useful in future count would be to have multiple observers counting the same section on the same evening, and see how well their totals correspond. Estimation was easier till untill the numbers swelled to around 30,000. Hence, the level of accuracy is much higher in more than half of the days of estimation.

Relatively, more birds were seen in the evening indicating new arrivals, at least up to the maximum peak day. There was a main bamboo grove having the maximum number of birds (more than half) and at least one other grove (near a football field) having a few thousand birds. Then there were several smaller and scattered bamboo groves holding a few hundred birds. In the end, i.e., late November, the birds mostly remained in the main grove (1 in Figure 5) during 2017 and 2018. However, in 2019, many birds also roosted in a

Amur Falcons leaving the main roosting site at Umru II. (Photo: *Anwaruddin Choudhury*)

grove near the football field (2 in Figure 5). In 2019, when the number of birds was very high almost every bamboo brake or clump had roosting birds! From the day of the highest estimate, relatively more birds were seen in the morning indicating more departures than new arrivals.

Conclusions

1. This study has provided vital information on migration timing and volume of Amur Falcons over a three-year period, perhaps not done at any other autumn migration stopover roosts in a systematic way.

2. The day by day estimate of falcons at a roosting site has been attempted for the first time anywhere. Similar systematic observation and estimation should be done for some other sites as well such as Umrangso in the nearby Dima Hasao (North Cachar Hills) district, and Nagaland and Manipur.

3. It is not possible to know the total number of birds using the area in a season because a day's estimate includes both newly arrived birds and those already present from previous days. Currently there is no way to estimate turnover, although if a sufficient number of birds were tracked on migration this could yield insight on typically how long they spend at each stopover roost. But 210,000 being the highest minimum estimate on a single day in 2017, it is probably safe to assume that in that autumn more (possibly many more) than 300,000 roosted at Umru II. Similarly, in 2018, the total of birds roosting there was perhaps at least 150,000 and in 2019, at least 400,000.

4. The estimate of around 210,000 falcons on a single day in 2017 was very significant as it was nearly a fifth of the global population estimate. Ferguson-Lees et al. (2001) estimated a world population of more than 1,000,000. But the highest of 2019 was 318,000 falcons would be more than a quarter of the world population. This sounds inherently implausible, given that there are other large roosts in use elsewhere at the same time. Apparently, the global population is higher than that estimated now in 2001, consistent with the successful protection at this and some other roosts.

5. The map showing the flight route of three satellite tracked falcons from Nagaland (named as Naga, Pangti and Wokha) did not fly past or land at Umru II (Dutta 2013). The Manipur birds also have not been reported and this is unlikely also as the flight is generally directed towards south-west and the location of Tamenglong, Manipur is far south-east of Umru. The first author visited Tamenglong area in 2001 after large gatherings and captures were reported.

The map in Meyburg *et al.* (2017) showed that one of the tracked falcons used a route via Myanmar and barely touched NE India at its extreme south, in southernmost part of Mizoram. The map in Dixon *et al.* (2011) also showed that the tracked bird followed Vietnam, Myanmar, Manipur and Mizoram, and was nowhere near Umru or Assam. If all major sites, i.e., Umru, Umrangso (both in Assam), Doyang, Chongtongya (Nagaland), Tamenglong (Manipur) and site near Valmiki Tiger Reserve (Bihar) are estimated simultaneously a solid indication of the minimum possible global population would come out, although to know the total global population would require understanding of turnover at roosts.

6. The bulk of the falcons roost in the main grove (1 in Fig. 5) and when the numbers increase many roost in the other grove (2 in Fig. 5). However, in 2019, when the number was particularly high, especially when it was more than two lakhs for several days, the birds were widely dispersed and besides the two main groves, almost every patch of bamboo and even some shrubs in the area had the roosting birds.

7. The peak periods were slightly variable during the three years.

Poster developed for generating awareness.

Acknowledgements

This project was largely supported by Oil & Natural Gas Corporation Ltd. (ONGC), which is gratefully acknowledged. We thank the Environment & Forest Department of Assam, especially the Hamren Forest Division of Karbi Anglong Autonomous Council, for their participation in the field. Sri D.D. Misra, Director, Human resources, ONGC (now ret'd) was of tremendous support. In fact, he himself is an environmentalist and took keen interest on Amur Falcons. Sri J.K. Das, Chief Manager, Human resources, of ONGC (now ret'd) at Guwahati was constantly in touch and also participated in one of the field programmes. Of Environment & Forest Department, Jatindra Sharma (Divisional Forest Officer, Hamren), Akhil Kumar Talukdar (Assistant Conservator of Forest), Dhan Singh Terang (Assistant Conservator of Forest), Longkham Teron (Ranger), Yubraj Chhetri (Forest Guard), Khogen Terang (Forest Guard), Telesfor Kerketta (Forest Guard), Megh Bahadur Thapa (Muster Roll worker), Rojen Engleng (Muster Roll worker), Babulal Subedi (Muster Roll worker), and Bapuram Parajuli (Muster Roll worker) are thanked for their support in the field.

Ratul Talukdar (The Rhino Foundation for nature in NE India NGO), and the Field Assistants, namely Subhas Bista, Hashimuddin Choudhury and Bhubaneswar Sharma deserve special mention. Others who deserve mention include Laksman Chetry (the ex-Village Headman or *Gaon Burha*), Gyan Bahadur Chetry/Kharka and many other villagers including women and children of Umru II (Umrukhuti) for their active participation.

Special thanks to Asad Rahmani and J.W. Duckworth for their critical comments. Last but not the least is the support extended by our family members.

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Newsletter & Journal of The Rhino Foundation for nature in NE India (2020) 10: 76–77. ISSN 0973-6530

Short Communication

FIRST RECORD OF AUSTEN'S BROWN HORNBILL *ANORRHINUS TICKELLI* FROM MEGHALAYA IN NORTH-EAST INDIA

HEISAKARU LATO[1]

Four species of hornbills were reported from Meghalaya. These were Rufous-necked Hornbill *Aceros nipalensis*, Wreathed Hornbill *Rhyticeros undulatus*, Oriental Pied Hornbill *Anthracoceros albirostris* and the Great Pied Hornbill *Buceros bicornis* (Choudhury 2014). Narpuh Wildlife Sanctuary had two species, the Oriental Pied and the Great Pied Hornbill till this author sighted and photographed Austen's Brown Hornbill *Anorrhinus tickelii* and some one else Rufous-necked Hornbill. While for the Rufous-necked Hornbill it was the first photographic record for the state of Meghalaya while for the Brown Hornbill it is a new state record. I here report observations of the first record and photography of the Brown Hornbill.

Austen's Brown Hornbill is perhaps the rarest of the hornbills found in northeastern part of India. It is dark brown in colour with rufous-brown underparts with white-tipped tail. It was during January 2020, while trekking inside the Narpuh Wildlife Sanctuary at around 12:00 noon we were distracted by the strange shrieking calls of a flock of birds (flock of size 10 to 12) at 25°07'43.22"N 92°25'43.21"E at 708 m asl. We were climbing a small hillock at an overview of one village in the fringe of the sanctuary, the silent walk along with my Range Officer and two Muster Roll staff. Such calls were never heard during my numerous treks inside the Narpuh Wildlife Sanctuary. The calls were so distinct that we suddenly started to look up in search of the direction of the calls, just then

Austen's Brown Hornbill male Anorrhinus tickelli *photographed in Narpuh Wildlife Sanctuary. The first record for the state of Meghalaya.*

(Photos: *Heisakaru Lato*)

[1]HEISAKARU LATO
Divisional Forest Officer (wildlife), Jaintia Hills, Jowai 793150
Email: heisa22lato@gmail.com
Mobile: 9436998340

Narpuh Wildlife Sanctuary

30 metre from our track, on a tree (probably artocarpus species) 10 to 12 birds were perching in that giant tree. After a few minutes, while we were busy trying to identify with our pair of binoculars/tele lenses what are those strange calling birds, the whole flock left the tree and flew to the adjacent trees, within a flick of a second a group of three came back perching. It was at this time that I started taking photographs of the birds.

Immediately, I realized that from their beak that this is another type of hornbill available inside Narpuh Wildlife Sanctuary, till that time, we had sighted Rufous-necked Hornbill and the Great Poied Hornbills. On enquiring from the staffs who were frequent visitors, they mentioned that it's the first time they sighted such birds. As a Manager of this particular P.A I was thrilled of the sighting at the same time feel elated that NWS is also one of the habitats of these rare endangered species of birds.

The sighting happened to be a very significant one for the state of Meghalaya being first state record. Previously its presence was surmised without any details (Choudhury 2014). In the account of Important Bird & Biodiversity Areas also there is no mention of the species in Meghalaya (Islam and Rahmani 2004; Rahmani *et al.* 2016). It was also not reported from Meghalaya in standard works (Ali and Ripley 1983; Kazmierczak and van Perlo 2000; Grimmett *et al.* 2011) or past works (Godwin-Austen 1872, 1873).

There are, however, records of Brown Hornbill form adjacent Cachar and Dima Hasao (North Cachar Hills) districts of Assam (Choudhury 2000).

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Newsletter & Journal of The Rhino Foundation for nature in NE India (2020) 10: 78–83. ISSN 0973-6530

Short Communication

FOREST STATUS OF INNER LINE AND KATAKHAL RESERVED FORESTS IN HAILAKANDI DISTRICT, ASSAM USING FOREST CANOPY DENSITY MODEL

AMIR SOHAIL CHOUDHURY[1] AND PARTHANKAR CHOUDHURY[2]

Introduction

Forest is one of the most important earth's natural resources. It provides a safe refuge to a variety of wild animals (Sahana *et al.* 2015). Unfortunately, across the globe and in particular Indian and South-east Asian landscapes, the forest cover is fast decreasing due to a variety of human activities such as road construction, land reclamation for settlement and croplands, and so on. On an average, annual net forest loss was projected to be 5.2 million hectares of land during the last decade (Sahana *et al.* 2015), which is an alarming note for all types of biota. Thus, assessing forest status is crucial in forest management for the policy makers. Remote sensing and geographic information systems (GIS) have attracted increasing attention in recent years due to their capacity to monitor forest more efficiently with more feasibility than field surveys and less time. Modeling forest canopy density (FCD) is one of the few viable approaches for monitoring forest status. In fact, by recognizing canopy closure, FCD is used as essential tool to determine the need for afforestation and reforestation. (Biradar *et al.* 2005, Rikimaru *et al.* 2002, Sahana *et al.* 2015). Furthermore, many studies on protected areas and reserve forests across the world have shown the importance of this tool in determining forest status and health (Azizia *et al.* 2012, Baynes 2007, Deka *et al.* 2012, Jain *et al.* 2020, Sahana *et al.* 2015, Srivastava *et al.* 2019, Roy *et al.* 1997).

Fig 1. Location of the Study Area, i.e., Hailakandi District in extreme southern Assam.

The Hailakandi District is located in the southernmost part of Assam. Cachar tropical wet evergreen forest intermixed with semi-evergreen forest and tropical deciduous forest (Champion and Seth 1968) characterizes forest area of the district. Furthermore, the forest areas here act as a cradle for a variety of wildlife, including eight non-human primates, three of which are 'Endangered' and three of which are 'Vulnerable' (IUCN 2001), making the area crucial from the conservation point of view. However, due to anthropogenic activities, many of the fine primary forest areas have already been lost, and the remaining areas are fast depleting. Except

[1]AMIR SOHAIL CHOUDHURY,

Corresponding author

[2]DR PARTHANKAR CHOUDHURY,
Wildlife conservation and research laboratory
Department of Ecology and Environmental Science
Assam University, Silchar 788011,
Email: parthankar@rediffmail.com

for the Forest Survey of India publications, no quantitative evaluation of forest state has been undertaken in this area (FSI 1997, 1999, 2001. 2003, 2005, 2009, 2011, 2013, 2015, 2017, 2019). However, these do not provide vivid description on the reserve forest areas of Hailakandi. In the absence of data on any focused study of the area, this article aims to give quantitative data on forest status of this district. This study has implications from the forest conservation point of view, as this will determine the fate of numerous forest-dependent biotas in Hailakandi.

Materials and methods

Study area

The Hailakandi District is located in the southern part of Assam covering an area of 1,327 km^2. It is bounded by Cachar District to the north and east, Karimganj District to the west, and the state of Mizoram to the south (Fig 1). The district includes flat plains for the most part, with hills primarily in the south. The northern foothills of Mizo (Lushai) Hills form the primary hilly tract. The Dhaleswari (a tributary of the Barak) and a small part of the Barak River are Hailakandi's major rivers (Choudhury *et al.* 2019).

Inner Line Reserved Forest (RF) and Katathal RF encompass 538 km^2 of area. Established in 1875, the Inner Line is the oldest forest reserve in the state (Hunter 1879) and is the second oldest in India, first being the Bori RF in Madhya Pradesh, established in 1865. Some villages are also found on the fringes of the Inner Line and Katakhal RFs, which have been designated as forest villages. Common tree species of these two reserve forests are *Dipterocarpus turbinatus, Palaquium polyanthum, Ficus religiosa, F. benghalensis, F. glomerata, Sapium baccatum, Vitex heterophylla, Dillenia pentagyna, Kayea floribunda, Gmelina arborea, Lagerstroemia speciosa, Albizia lebbeck, A. procera, A. odoratissima, A. saman, Artocarpus chama, A. heterophyllus, A. lakoocha, Azadirachta indica, Emblica officinalis, Mangifera indica, Melia azedarach, Mitragyna rotundifolia, Sapindus mukorossi, Semecarpus anacardium, Syzygium cuminii, Tetrameles nudiflora* and *Toona ciliata.* In addition, large bamboo clumps of *Melocanna bambusoides, Bambusa vulgaris, B. balcooa* and *Neohouzeaua dullooa* occurs widely.

The climate of the area is tropical monsoon type. The average temperature varies from 37° C in summer which is hot and wet to 7° C in winter, generally cool and dry. The annual precipitation is 2400–2800mm, with most of the rain occurs during summer (April to October) (Choudhury 2013).

Database preparation

Level 1 Landsat 8 OLI of 2020 (path/row = 136/43) (USGS 2020) having 30 m spatial resolution was used to assess the forest status, and its atmospheric correction was done using dark object subtraction method in semi-automatic classification plug-in of QGIS. The FCD model involves four biophysical indices like advance vegetation index (AVI), bare soil index (BSI), shadow index (SI) and thermal index (TI) (Fig 2).

Advance vegetation index (AVI)

AVI is similar to normalized vegetation difference index (NDVI) which is used to monitor non-vegetation and vegetated area. However, AVI is more sensitive to forest foliage and extract better canopy characteristics (Sahana *et al.* 2015, Roy *et al.* 1996). It is calculated using the formula,

$AVI = [(NIR+1)(DN_{max}-Red)(NIR-Red)]^{1/3}$

AVI = 0 if NIR<Red after normalization where NIR is Near Infrared band, DN_{max} is Maximum digital number

Bare soil index (BSI)

This index helps in separation of bare land or spare land with dense canopy. It is generated by using the formula,

$$ESI = \frac{(SWIR + RED) - (NIR + BLUE)}{(SWIR + RED) + (NIR + BLUE)} * 100 + 100$$

where SWIR is Short Wave Infrared Band

Shadow index (SI)

The shadow produced by the forest crown is highlighted, which helps in differentiation of mature forest, young forest and open land. SI is derived from the low radiance of visible bands, which is calculated using formula,

$SI = [(DNmax-Blue)\ (DNmax-Green)\ (DNmax-Red)]^{1/3}$

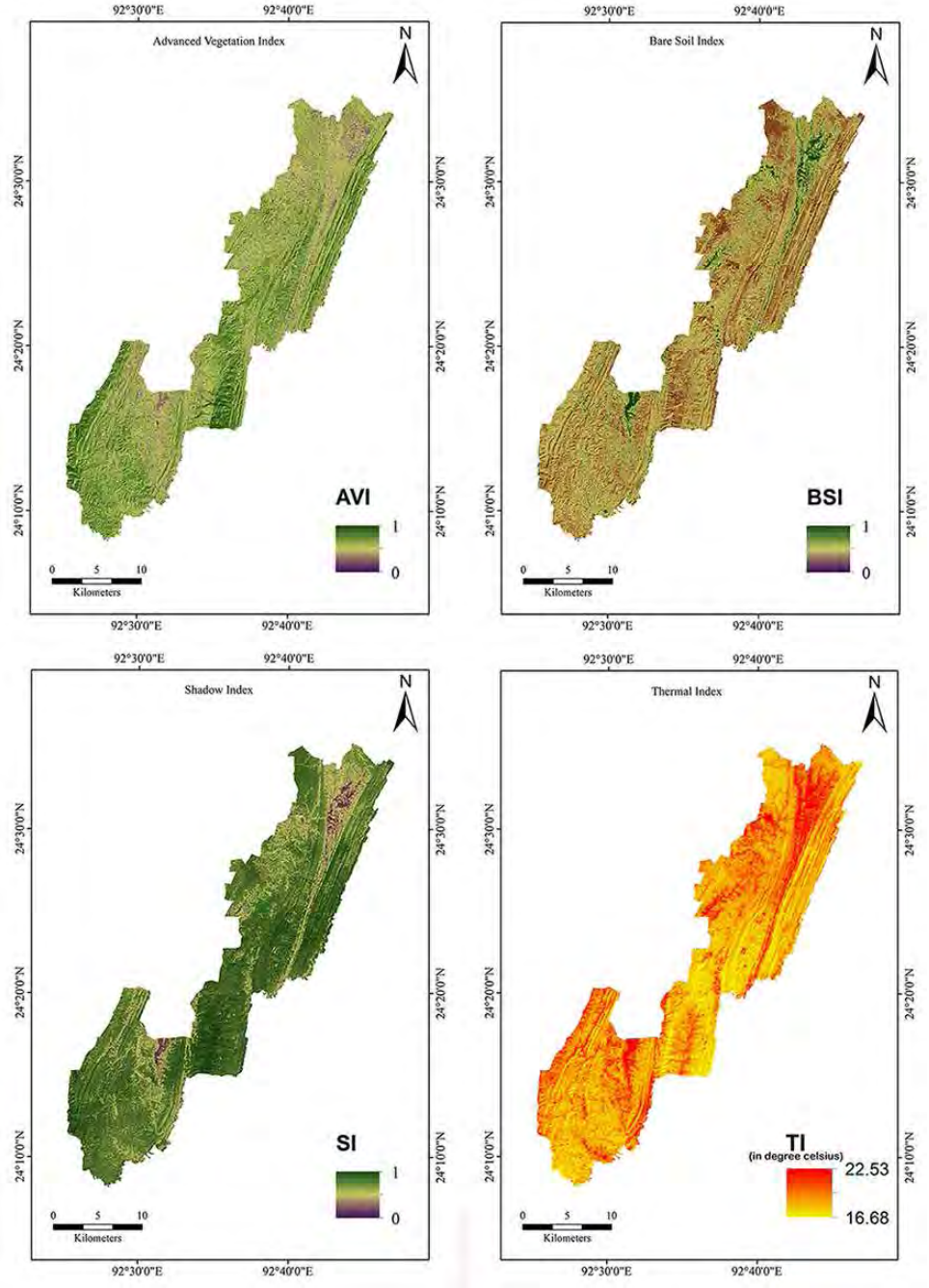

Fig. 2. Biophysical indices of Forest Canopy Density Model

Thermal index (TI)

Forest canopy obstructs and absorbs sunlight energy and leaf surface evaporation, both these phenomenon reduces heating than bare land. The Thermal Infrared Band TM data is the source of thermal information. Spectral radiance for thermal band is calculated following (Sahana *et al.* 2015),

$L_l = M_L Q_{cal} + A_L$

where L_l is TOA spectral radiance, Q_{cal} is quantized and calibrated standard product pixel values (DN), M_L is radiance multiband, A_L is radiance add band Spectral radiance (L_l) to temperature (Kelvin) was converted using,

$$T_B = \frac{K_2}{\ln\left(\frac{K_1}{L} + 1\right)}$$

where K_1 is calibration constant 1, K_2 is calibration constant 2, T_B is surface temperature

Vegetation density (VD)

Vegetation density was obtained by integrating AVI and BSI using principal component analysis (PCA). It is then normalized between zero and hundred percent scale point (Rikimaru *et al.* 2002).

Scaled shadow index (SSI)

SI was normalized using linear transformation in order to integrate with TI. SSI helps to detect forest canopy stands from low vegetation (Rikimaru *et al.* 2002).

Forest canopy density (FCD)

FCD was estimated by integrating VI and SSI in percentage scale unit of density, using the formula (Rikimaru *et al.* 2002),

$FCD = (VD*SSI+1)^{1/2}-1$

Then, it was classified as dense forest with density having 80–100%, moderate forest with density 60–80%, open forest having density ranges from 40–60%, while rest were identified from the knowledge of field survey as cropland, barren land/fallow land and river.

Result and Discussion

In the Katakhal RF, highest land cover is of open type that covers 55 km² (39.58 %), followed by moderate forest, which covers 50 km² (36.09 %), and dense forest, covers only 0.39 km² (0.28 %). In addition, cropland covers 25.85 km² (18.49%) of the whole area, and barren/fallow covers 7.76 km² (5.55 %) (Fig 3).

In the Inner Line RF, moderate forest holds the highest land cover, with 263.24 km² (66%). The second highest percentage is open forest, which covers 100 km² or 25 % of the total area. The dense forest, with an area of 8 km², has the smallest land cover (2%). Cropland covers 21 km² (5.25%) of the land, while barren/fallow area covers 5.59 km² (1.40 %) (Fig 3).

Between these two forest reserves, condition in Inner Line RF seems marginally better. However, in both the cases, proportion of dense forest is very low, whereas moderate and open forests occupy a significant portion of land in their respective total land cover, indicating that these reserve forests have been exposed to multiple anthropogenic disturbances, as evident by the presence of crop-lands and barren/fallow lands within the reserve forest. One of the major issues is the increase in human settlement in the vicinity of these reserves. People settled around these forests as a response to past forest policies, but over the time, the population of these areas has grown significantly, and so has the need for land. To fulfill this, majority of the villagers began encroaching upon the forest (Choudhury and Choudhury 2017).

The other major issue is the illegal practice of slash-and-burn agriculture by the local tribes that leaves behind the land barren for subsequent years. (Mazumder 2014). The villagers frequently carry out fire-wood and bamboo harvesting from both the reserves. In addition to above, illegal timber felling which is mostly done for preparation of woodcrafts and making doors and windows, the reserve forest has become bereft of tall and mature trees (Choudhury and Choudhury 2017).

Conclusions

The study demonstrates the efficacy of the forest canopy density (FCD) model in generating quantitative data on forest cover in Hailakandi district's Inner Line and Katakhal RFs. The study also finds that both the Inner Line RF and the Katakhal RF lack effective forest management, and both need immediate intervention by government agencies

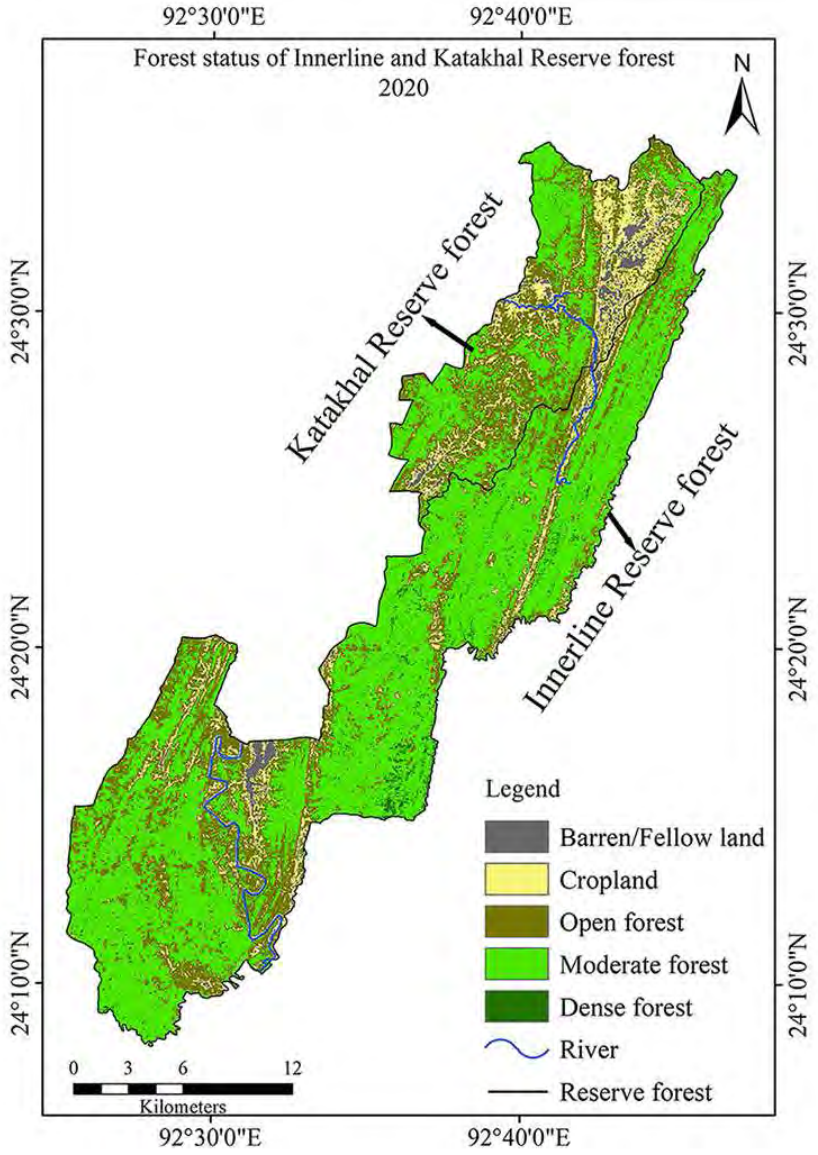

Fig. 3. Forest cover of Inner Line and Katakhal Reserved Forests, Hailakandi District, Assam.

so that afforestation and reforestation programmmes can be taken up.

Acknowledgments

Authors are grateful to the Department of Ecology and Environment Science, Assam University, Silchar for allowing them to pursue this research work.

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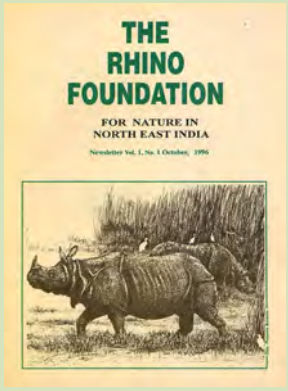

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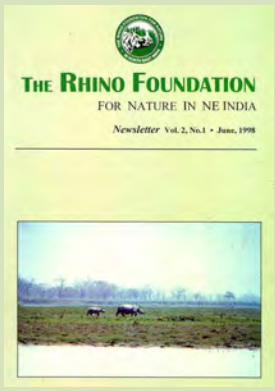

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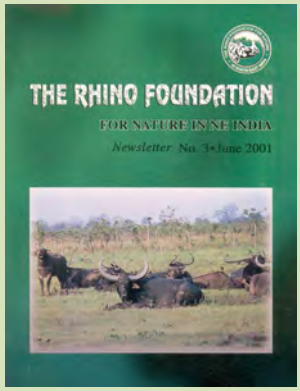

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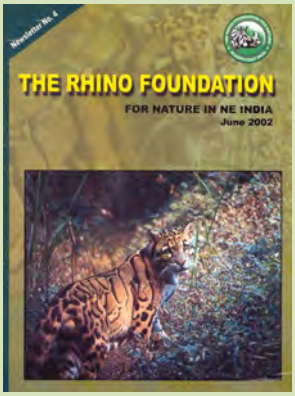

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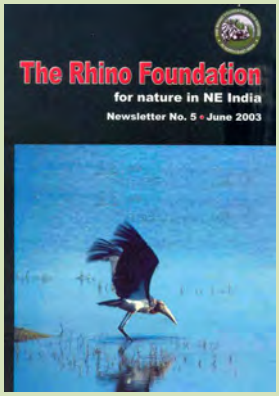
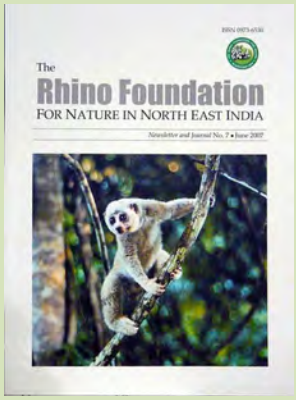


No. 5

No. 6

Newsletter-cum-Journal



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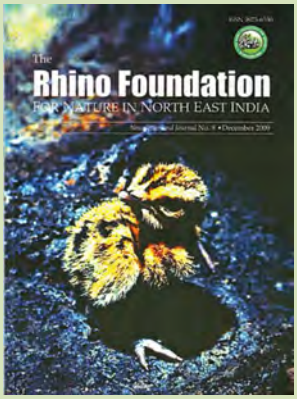

No. 8

No. 9

Endangered

Photo by ANWARUDDIN CHOUDHURY

A wild water buffalo *Bubalus arnee* bull in Manas National Park, Assam. Listed as Endangered by IUCN, its world population is less than 4,000. Wild water buffaloes range is highly fragmented over a wide area in northeastern and central India, Nepal, Bhutan, Thailand and Cambodia. It has been extirpated from Bangladesh, Vietnam, Laos and its presence is doubtful in Myanmar.

Published by THE RHINO FOUNDATION FOR NATURE IN NE INDIA
Guwahati, Assam, India.