

Protecting a hornbill haven: a community-based conservation initiative in Arunachal Pradesh, northeast India

AMRUTA RANE^{1*} and APARAJITA DATTA¹

Abstract: Pakke Tiger Reserve (PTR) in Arunachal Pradesh harbours four species of hornbills (Great Hornbill *Buceros bicornis*, Wreathed Hornbill *Rhyticeros undulatus*, Rufous-necked Hornbill *Aceros nipalensis* and Oriental Pied Hornbill *Anthracoceros albirostris*). Deforestation and hunting of hornbills are the two major threats to hornbill populations. However, due to protection efforts by the Forest Department and a ban on hornbill hunting since 2003, PTR and its surrounding forests still supports a healthy population of hornbills. A ten-year long-term monitoring of hornbill nests suggested that deforestation in the adjoining Papum Reserved Forest (PRF) which has a lower legal protection status continued to threaten hornbill populations. We also observed increased direct interference competition between hornbill species for nest sites. However, despite degradation, several Reserved Forests outside PTR provide a large area (*ca.* 1,280 km²) of suitable habitat. Therefore, participation of the local community in protection efforts outside PTR was necessary for the long-term conservation of hornbills. Consequently, in 2012, a ‘Hornbill Nest Adoption Program’ was initiated in a three-way partnership between the Ghora-Aabhe Society (council of *Nyishi* village headmen), the Arunachal Pradesh Forest Department and the Nature Conservation Foundation. The main concept is shared parenting: biological parents (hornbills) look after their chicks, local guardians (*Nyishi* villagers, who were hunters previously) protect the nests and urban citizens provide financial support. Currently, nine villages on the southeastern boundary of PTR (in PRF) are participating in the program with eleven villagers working as nest protectors and one youth as local field coordinator. Over 90 urban citizens have supported the programme and we have raised over USD25,000 in two years (2012-2013). The funds are used to employ nest protectors, buy equipment, contribute to a village welfare fund and meet other project running costs. In the first season (2012), 28 nests of three species (Great, Wreathed and Oriental Pied Hornbill) were located, 17 nests were active, 8 nests were inactive and 3 were not visited. Of the 17 active nests, 11 were successful (65%

¹Nature Conservation Foundation, 3076/5, 4th Cross, Gokulam Park, Mysore 570002, India.

*Corresponding author email: amruta@ncf-india.org

nesting success). In 2013, 23 nests of three species were located from the nine participating villages with 12 active nests. Nesting success was higher in 2013 (91.6%). Three additional nests (one Great and two Rufous-necked Hornbills) were located in another village. From the data for the first two years, it appears that there are more Great Hornbill nests and that Great Hornbill nests are more successful in these outside areas. The reasons are unclear; however it is possible that most Great Hornbill nests are located in areas further away from human habitation within the Reserved Forest, while nests of Wreathed and Oriental Pied Hornbills are more prone to disturbance as they are situated in more degraded habitat with greater human activity/presence. We hope to collect long-term ecological information on nesting success and ensure conservation of hornbill nests and populations in the Reserved Forest and foster community involvement in conservation activities.

Keywords: *Anthracoceros albirostris*, *Buceros bicornis*, Hornbill Nest Adoption Program, Nyishi tribe, Pakke Tiger Reserve, *Rhyticeros undulatus*

INTRODUCTION

Pakke Tiger Reserve (PTR) is among the few Protected Areas in northeast India which support healthy populations of four sympatric hornbill species: Great Hornbill *Buceros bicornis*, Wreathed Hornbill *Rhyticeros undulatus*, Rufous-necked Hornbill *Aceros nipalensis*, Oriental Pied Hornbill *Anthracoceros albirostris* (Datta 1998; Dasgupta and Hilaluddin 2012). Following a four-year study on various aspects of hornbill biology and their role as seed dispersers (Datta 2001; Datta and Rawat 2003, 2004, 2008), we initiated long-term monitoring of hornbill nests and roosts inside PTR starting in 2003. Around 62 hornbill nests and three roosts have been monitored over a ten-year period in the reserve (Datta and Rane 2011a). The nesting success ranged from 80% to 100% in most years, except for 2005, when it was 62% (Datta and Rane 2011a).

Protection efforts in PTR have been strengthened since 2006 (Velho 2010; Velho et al. 2011) and anthropogenic disturbances to the habitat as well as hunting incidents for hornbills are rare, especially in the lower foothill areas (pers. obs.). Instances of nesting failure or nest abandonment were unrelated to human disturbances and we found no loss of nest trees due to cutting. Apart from this, a ban on hornbill hunting with heavy fines was instituted by a local Nyishi institution (Village Forest Development Council) set up in 2003 and reinforced later by the Ghora-Aabhe Society (council of village headmen) that was set up in 2006. Through another earlier program by the Arunachal Pradesh Forest Department in collaboration with the Wildlife Trust of India, people were

provided with substitute fibreglass beaks of the Great Hornbill to wear as part of their traditional headgear instead of real ones.

An analysis of our ten-year nest monitoring data showed that (1) the few nests that were monitored outside PTR in the Papum Reserved Forest (PRF) were usually abandoned due to human disturbance or the nesting trees were eventually cut down, (2) there was inter-specific competition for nest cavities with nest takeovers, which was not observed previously during 1997-2000 (Datta and Rane 2011a), and (3) there had also been tremendous loss of the foothill forest habitat in adjoining Assam from 1995-2005 and degradation of the forests outside PTR due to anthropogenic activities (Kushwaha and Hazarika 2004). Yet, the existing Reserved Forests in Arunachal Pradesh cover a large area ($>1,000 \text{ km}^2$) and are important habitat for hornbills and need to be protected better. We tend to consider only Protected Areas as being important for wildlife, and often treat the forest areas outside as 'sinks' not worth considering. Lastly, our nest monitoring effort had not involved the *Nyishi* community, although we had earlier employed a few *Nyishi* in our research work. Our work had also been restricted to the lower elevation areas in PTR and we had not located any nests of Rufous-Necked hornbill, which occur only in the higher elevations (above 800 m asl). Therefore, there was a need to find a way to protect nests outside the park in the adjoining Reserved Forest, include villagers in the conservation effort and expand the scope and impact of the program for long-term protection of all the sympatric hornbill species in the area.

The 'Hornbill Nest Adoption Programme' was initiated in 2011. The idea was to initiate a community-run conservation programme, where there is people's participation in protecting their surrounding wildlife. Hunting, deforestation and fragmentation are the main causes of wildlife depletion; however until forest-dependent communities are aware and involved in conservation projects, there are limited chances of long-term success. The concept of adoption of hornbill nests is based on Dr Pilai Poonswad's hornbill conservation programme in Thailand, which has been running successfully for many years (Poonswad et al. 2005). The main concept is based on 'shared parenting'; Hornbill nests have three sets of parents: the biological parents (i.e. the breeding hornbill pair), the foster parents - the local guardians who monitor and protect the nests (the *Nyishi* villagers who were hunters before) and urban citizens who wish to financially support wildlife conservation and simultaneously understand conservation issues. The main objectives of this programme are to (1) ensure monitoring and protection of hornbill nests in the Reserved Forest (RF) area, (2) involve the local community in the protection effort, (3) obtain ecological data on hornbill nesting patterns and breeding success and (4) understand and address challenges in community-based conservation efforts outside Protected Areas.

MATERIALS AND METHODS

Study area

Pakke Tiger Reserve (PTR) (862 km²; 26°54'–27°16' N, 92°36'–93°09' E) is located in western Arunachal Pradesh and is part of the Eastern Himalaya Biodiversity Hotspot. The elevation in the park ranges from 200 – 1,500 m asl. The climate is tropical with an annual rainfall of ca. 2,500 mm. The main forest type is tropical semi-evergreen. Towards the south and south-east, the sanctuary adjoins Reserved Forests and the Nameri Tiger Reserve (349 km²) of Assam (Figure 1). To the east, lies the Pakke River and Papum Reserved Forest; to the west, it is bounded by the Bhareli or Kameng River, Doimara Reserved Forest and Eagle Nest Wildlife Sanctuary, and to the north by the Kameng River and the Shergaon Forest Division. Papum Reserved Forest (1,064 km²), Doimara Reserved Forest (RF) (216 km²) and Amartala Reserved Forest (west of Doimara RF) all fall under the Khellong Forest Division. The combined forested area covered by these Reserved Forests is 1,280 km². They are similar to PTR in terms of climate and forest type. However, they have been extensively logged in the past and resident forest-dependent communities harvest timber and non-timber forest produce from these forests. In addition, hunting has also been prevalent here (Sethi and Howe 2009). Parts of the Reserved Forests were converted to plantations and include villages and settlements. These forests together with PTR provide a large contiguous habitat to hornbills and other wildlife. Selective logging on a commercial scale occurred in Papum Reserved Forest until 1996 (Datta 1998).

Initiation of the conservation programme

The idea of the Hornbill Nest Adoption Programme was discussed with the Ghora-Aabhe Society and the park management of PTR in February 2011. There was a positive response and initially, it was decided to give an honorarium of Rupees 1000 (approx. USD17) for every nest that the villagers locate in PRF. By June 2011, three villagers had located eight nests (Datta and Rane 2011b). Subsequently, we had a meeting in late June 2011 with the Ghora-Aabhe members and the Arunachal Pradesh Forest Department to finalise a tripartite agreement to initiate the program fully from the breeding season of 2012. It was decided to involve nine villages along the southern boundary of PTR in the effort to protect hornbill nests in the adjoining PRF (Figure 2). The Ghora-Aabhe Society and the Village-level Welfare Committees had meetings to select a person from each village who would be the 'Nest Protector'. A *Nyishi* youth with formal education was selected to be the local field co-ordinator. A formal meeting was arranged on 28 November 2011. In this meeting, all nest protectors signed a formal confirmation in presence

of their respective village heads, on participation in the program. They also agreed on their job responsibilities. They were to work in groups of two (with the experienced people helping the younger ones), and start searching for nests starting in January every year. The nest protectors work for eight months (January to August), which encompasses the entire breeding season. Hornbill chicks fledge by July-August. The nest watchers have volunteered to locate and monitor new hornbill roost sites in the non-breeding season (September to February). Equipment (binoculars, shoes, leech socks, backpacks, field notebooks, pens, caps, raincoats), training in nest observations and a data recording and exposure trip was arranged for all nest protectors. The team is a mix of old, experienced people (ex-hunters) with knowledge of the forest (60-70 years) and of younger men (20-30 years) with formal education. In 2013, two more youth joined the team.

Field monitoring method

Hornbills in the area start nesting from mid-March and end by end-July to the beginning of August. Eighty-five percent of nest cavities are located in a single tree species; the emergent softwood *Tetrameles nudiflora* (Datta 2001; Datta and Rawat 2004). However, it is important to look for nests from January onwards as pairs will be seen flying around inspecting and cleaning potential cavities and engaging in courtship behaviour. Periodic visits were made to known nests during February-March to determine whether nesting had been initiated (visits by hornbill pairs, inspection and cleaning, followed by female entry and cavity sealing). New nest trees were located by intensive nest searches between February and May each year in a variety of ways: by following lone males, searching potential trees for cavities, locating middens (piles of regurgitated seeds and fecal matter below active nests), the presence of seedlings of hornbill food plants and old feathers, calls heard during watches at nearby nests, and/or observation of a male hornbill on a feeding visit to a cavity. We attempted to record the exact date of nest entry by the female through regular visits (every 1-3 days) during the initiation of breeding (March–April). Nest trees in which nesting had been initiated were checked occasionally throughout the breeding season to monitor if the nest had remained active. Nests in which there was no activity and no seal in the early part of the breeding season were not monitored after April. Some new nests were located in the middle of the breeding season. Towards the end of the breeding season (mid-June to August), we attempted to visit all nests in 2-3 days to obtain information on nest exit dates of female and chicks to obtain an estimate of length of nesting cycle, nesting success and number of chicks fledged. Overall nesting success was defined as the percentage of initiated nests that fledged young. However, not all nests could be monitored at regular and frequent intervals for obtaining exact

nest entry and exit dates. At some nests, chicks were observed coming out of the cavity. Where direct observations of chick emergence was not made, we inferred nesting success if the nest was active throughout the breeding season and the nest seal was found to be broken and opened at the end of the breeding season (July-August) or if a chick was observed in the vicinity of the nest tree with the adult hornbill pair.

RESULTS AND DISCUSSION

First season: January-August 2012

Nesting success

In the first season, 28 nests were located, of which 17 were active (pair occupied the nest cavity) and 11 were successful, while eight nests were inactive (Table 1). Three additional nests were not visited, either because they were far away and difficult to access in the monsoon or because they were found towards the end of the breeding season. As this was the first year, regular diary writing and intensive monitoring did not happen as planned for all the nests, therefore, a nest was recorded as successful if (1) chicks were seen outside the nest with both parents in July-August, (2) the male was, or the pair were, seen feeding chicks in the nest until mid-July or (3) the nest remained sealed and active until mid-July.

Out of the 28 nests, 11 were of the Great Hornbill. Out of these, nine were active, one inactive (Margasso) and one nest found in 2012 was not visited in 2012 for logistical reasons. Finally, seven nests were successful (87.5% success), and the outcome of one nest was unknown, as that nest was visited only once during the beginning of the season. Seven Oriental Pied Hornbill nests were found. One was inactive (Moboso 2), while six were active. However, only three nests were successful (50% success). Five Wreathed Hornbill nests were found; two were inactive (Jolly, Moboso 2), three were active and only one successful (33% success) (Table 2). Four other nests (Lanka) showed signs of use/activity from previous years but were inactive so we could not determine which species they belonged to (Table 2). The overall nesting success was 65%.

Five nests were unsuccessful; one Great Hornbill nest got burnt down during a forest fire (Darlong). A Wreathed Hornbill pair abandoned the nest tree during the forest fire, although the tree was not destroyed (Goloso). Two nest trees were cut down, one Wreathed Hornbill nest in Bali basti and one Oriental Pied Hornbill nest in Darlong. One Oriental Pied Hornbill nest was abandoned mid-way for unknown reasons (A2/Moboso 1).

Nest entry and exit dates

The nests were observed more frequently during March-April and end of June to early August to record dates of female entry into the nest and chick exit from the nest. As this was the first year, we had some problems in getting all the nest protectors to write/record data and observations regularly and accurately on each visit they made. The breeding season for the Great Hornbill started between 2 and 22 March and ended between 2 and 31 July. Oriental Pied Hornbill started nesting from 10 to 14 April and they came out around 28 June to 4 July (Table 3). For the Wreathed Hornbill, nest entry and exit dates were missed.

Second season: January-August 2013

In the second season, we had 23 nests in total: eight Great, five Wreathed and ten Oriental Pied Hornbill nests (Table 4). Three additional nests, one of the Great Hornbill and two of the Rufous-necked Hornbill were reported by villagers from Lasung-pate, which was not part of the current nine participating villages in the programme (Table 5). Our team of nest protectors visited the area in July and found that at one nest, the chick had been killed, while the other nest was not shown by the villager as it was very far away. One Great Hornbill nest that was active near this village had also been partially cut which had resulted in nest abandonment by the pair, although the nest tree is still standing. Twelve nests were active (five Great, one Wreathed and six Oriental Pied Hornbill) in the main participating villages (Tables 4 and 5). Female entry into the nest took place between 18 March to 4 April for the Great Hornbill, on 21 March for the single Wreathed Hornbill nest and between 12 April and 29 April for the Oriental Pied Hornbill (Table 6). The success and exit date of chicks is given in Table 6.

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place between 18 March to 4 April for the Great Hornbill, on 21 March for the single Wreathed Hornbill nest and between 12 April and 29 April for the Oriental Pied Hornbill (Table 6). The success and exit date of chicks is given in Table 6.

In PRF, nesting was initiated in 17 out of 25 nests (68%) in 2012 (barring the three nests that were not visited), while in PTR in the same year; nesting was initiated in only 47% of nests (15 active and 17 inactive). Nesting success in PTR was 93% (14 out of 15 active nests) and much higher than that observed in PRF (65%). This is to be expected as, despite improved protection at nest trees, there are diverse human pressures in the area outside, with villages, settlements and resource-dependency of the local community. It is therefore unrealistic to expect 100% protection in the first year. Most of the nests that were unsuccessful (direct tree loss due to felling and fire) were also located very close to three villages, where it is more difficult to ensure protection. In addition, it is important to note that in total 11 nests were successful of which seven were of the Great Hornbill, which is more threatened and which used to be the main target of hunters in this area. The maximum number of nests observed was of the Great Hornbill and nesting success of its nests was very high in the PRF (87.5%). This indicates that despite the continuing problem of occasional felling of trees, the ban on hunting and the nest protection through this program has helped the species successfully breed in these forest areas outside PTR. It remains unclear why fewer nests of the Wreathed Hornbill have been located and why nesting success of this species has been much lower. It is possible that the Wreathed and Oriental Pied Hornbills are more adaptable species and may nest more often in locations/trees that are closer to villages which results in greater chances of them being cut down/disturbed.

In 2013, nesting was initiated in 52% of nests in PRF, while it was similar in PTR (51%). However, nesting success was much higher in PRF (91.5%) with 11 of 12 active nests having successful chick fledging, while in PTR it was 76.5%. There were also no direct losses/nest abandonments of active nests that are monitored by our nest protectors from the ten villages in the program. The higher success in the second year of the programme is an encouraging sign indicating that protection efforts are helping. After the loss of four nest trees in 2012, we had numerous meetings to discuss ways to prevent further losses to trees and ensure greater vigilance to detect and prevent fires and check tree felling. The nest protection teams have had discussions with their own community members in their respective villages to prevent instances of felling of nest trees and extracting wood/timber in the vicinity of existing nest trees. The two nests (one of a Great and Rufous-necked Hornbills

respectively) that have been affected by disturbance (felling and one instance of hunting) were located near a village (Lasung-pate) that is not yet a part of the programme and these nests were not monitored by our team. We hope to attempt a dialogue with them in the future, on curbing hunting and persuading them to join the nest protection programme.

CONCLUSION

While protecting hornbill nests and ensuring recruitment of hornbills every breeding season with a few villagers is an important first step towards starting a community-based conservation initiative, there are larger challenges with regard to ensuring habitat protection by the community in the long-term. Habitat degradation, weed invasion and deforestation due to anthropogenic activities continue to threaten Papum Reserved Forest. This also means resource (water, soil, firewood, bamboo, timber, non-timber forest produce) limitation for the human population in near future. There is a genuine dependency of the community on forests that needs to be addressed as there have already been instances of conflict with individual villagers over felling trees. The resident *Nyishi* community in the villages in most of PRF is supportive of conservation programmes. In April 2012, during an awareness campaign in Seijosa town, we initiated a discussion with the Ranger of the Territorial Division of the Arunachal Pradesh Forest Department and members of the Village Forest Development Council, Seijosa, about initiating a habitat restoration programme in PRF. This restoration programme would not only assist in improving hornbill and other wildlife habitat but also natural resources for villagers. We believe that the initiation of this programme would also result in greater appreciation of the importance of protecting the habitat. We also plan to use the funds for community welfare from the nest adoption program to address urgently felt needs of the larger community. We also plan to undertake a detailed socio-economic survey to understand their dependency on forest resources, development needs and attitudes and perceptions to wildlife. Unless people residing in and around forest areas understand conservation, decide to protect them and have a functional system in place for implementing conservation policies, long-term conservation of hornbills and other wildlife will be difficult to achieve.

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Table 1. Nesting status and nest outcomes in 2012 for nine participating villages.

Village Name	Nest Protector	Number of Nest	Inactive	Not visited	Active	Successful
Jolly	Tajek Wage	5	1	0	4	4
Lanka	Suraj Bagang	6	4	2	0	0
Moboso 2	Pahi Tachang	6	2	1 (GH)	3	3
Margasso	Tajeng Tachang	2	1*	0	1	?
Goloso	Rungfe Paffa	2	0	0	2	1
A2	Tade Tok	1	0	0	1	1
Moboso 1	Gingma Tachang	1	0	0	1	0
Bali Basti	Taring Tachang	2	0	0	2	1
Darlong	Budhiram Tai	3	0	0	3	1
	TOTAL	28	8	3	17	11

* This nest tree got cut down subsequently in January 2013.

Table 2. Hornbill species breeding summary for 2012 season.

Hornbill Species	Number of Nest	Inactive	Not visited	Active	Successful
Great Hornbill	11	1	1	9	7
Oriental Pied Hornbill	7	1	-	6	3
Wreathed Hornbill	5	2	-	3	1
Not known	6	4	2	-	-
TOTAL	28	8	3	17	11

Table 3. Nest entry and exit dates for successful nests in 2012.

S. No	Village Name	Nest ID	Hornbill Species	Entry Period (by female)	Exit Period (by chick)
1	Darlong	GHD1	Great Hornbill	Between 18 and 22 March	Between 17 and 19 July
2	A2/Moboso 1	GHA/M1	Great Hornbill	between 15 March and 17 March	Between 2 and 10 July
3	Goloso	GHG1	Great Hornbill	between 18 and 21 March	Between 15 and 17 July
4	Moboso 2	GHM1	Great Hornbill	between 2 and 6 March	Between 10 and 14 July
5	Jolly	GHJ2	Great Hornbill	Mid-March	End July
6	Jolly	GHJ3	Great Hornbill	Mid-March	End July
7	Jolly	GHJ4	Great Hornbill	Mid-March	End July
8	Moboso 2	OPHM3	Oriental Pied Hornbill	Between 10 and 14 April	Between 28 June and 4 July
9	Moboso 2	OPHM5	Oriental Pied Hornbill	Not known	Between 28 June and 4 July
10	Bali Basti	*OPHB1	Oriental Pied Hornbill	Not known	Between 29 June and 2 July
11	Jolly	WHJ1	Wreathed Hornbill	March	Early August

*During initial visits, a pair of Wreathed hornbills were seen at the nest, cleaning and inspecting the cavity.

Table 4. Nesting status and nest outcomes in 2013 for 10 participating villages.

Village Name	Nest Protector	Number of Nest	Inactive	Active	Successful
Jolly	Tajek Wage	5	1	4	3
Lanka	Suraj Bagang	2	2	0	NA
Moboso 2	Pahi Tachang	6	3	3	3
Margasso	Tajeng Tachang	2	2	0	NA
Goloso	Rungfe Paffa	1	1	0	NA
A2	Tade Tok/Gingma Tachang	2	0	2	2
*Moboso 1	Ohey Tayem	1	0	1	1
Bali Basti	Taring Tachang	1	1	0	NA
Darlong	Budhram Tai	2	1	1	1
*Taraboso	Vijay Tachang	1	0	1	1
	TOTAL	23	11	12	11

*Two new nest protectors joined the programme.

N/A = Not available

Table 5. Hornbill species breeding summary for 2013 season.

Hornbill Species	Number of Nest	Inactive	Active	Successful
*Great Hornbill	9	3	6	4
Wreathed Hornbill	3	2	1	1
Oriental Pied Hornbill	10	4	6	6
*Rufous-necked Hornbill	2	1	1	0
**Unidentified	2	2	0	0
TOTAL	26	12	14	11

*In July, one additional Great and two Rufous-necked Hornbill nests were reported by villagers in Lasung-pate which are included in the total count in this table, but were not under protection through the programme.

**Potential hornbill nest cavities shown by one nest protector in Lanka village, but not occupied.

Table 6. Nest entry and exit dates for successful nests in 2013.

S. No	Village Name	Nest ID	Hornbill Species	Entry Period (by female)	Exit Period (by chick)
1	Moboso 2	GHM1	Great Hornbill	1 to 5 April	Between 27 and 30 July
2	A2/Moboso 1	GHA/M1	Great Hornbill	18 March	17 July
3	Jolly	GHJ2	Great Hornbill	23 to 28 March	Between 1 and 3 July
4	Jolly	GHJ3	Great Hornbill	26 to 29 March	Between 1 and 3 July
5	Jolly	GHJ4	Great Hornbill	29 March to 3 April	Abandoned
6	Lasung-pate	GHL1	Great Hornbill	March	Abandoned
7	Jolly	WHJ1	Wreathed Hornbill	21 March	Between 27 June and 1 July
8	*Taraboso	OPHT1	Oriental Pied Hornbill	Before 20 April	Between 21 and 25 July
9	Moboso 2	OPHM3	Oriental Pied Hornbill	25 to 29 April	27 July
10	Moboso 2	OPHM4	Oriental Pied Hornbill	23 to 26 April	17 July
11	A2/Moboso 1	OPH A/M2	Oriental Pied Hornbill	12 to 17 April	21 July
12	A2/Moboso 1	OPH A/M3	Oriental Pied Hornbill	Before 15 April	2 August
13	*Darlong	OPHD2	Oriental Pied Hornbill	Found on 16 June	Between 3 and 8 July
14	*Lasung-pate	RNHL1	Rufous-necked Hornbill	Visited in July, but chick hunted	-
15	*Lasung-pate	RNHL2	Rufous-necked Hornbill	Reported by villager, but not confirmed	-

*New nests found this year. The Great Hornbill nest in Lasung-pate (reported by villager) was visited for re-check in July by our field staff and the nest tree was found partially cut and abandoned by the pair. The chick had been killed at one Rufous-necked Hornbill nest, and another reported Rufous-necked Hornbill (inactive) nest was not visited by our team.

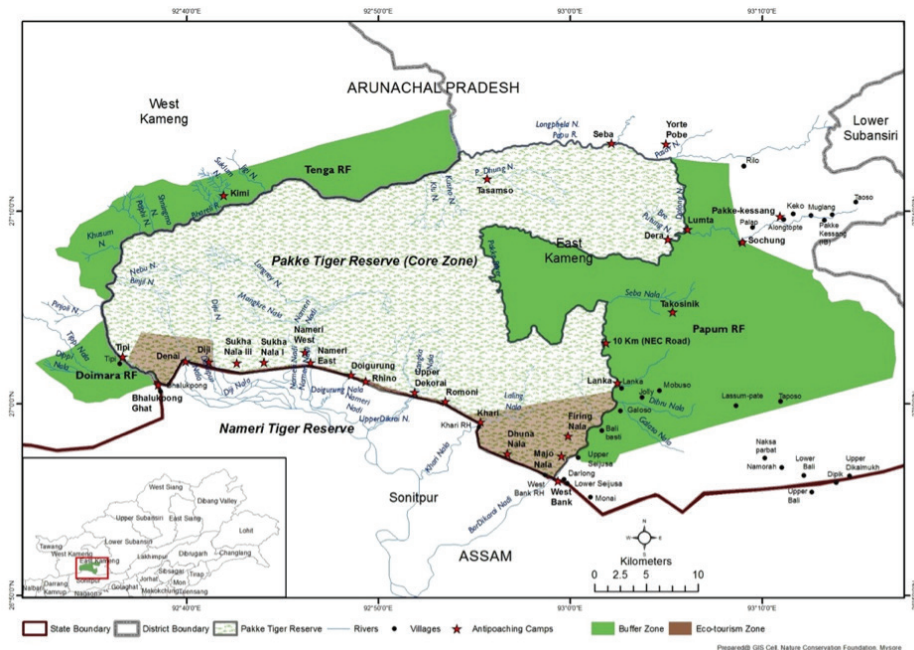


Figure 1. Map of Pakke Tiger Reserve, Papum Reserved Forest and other surrounding forest areas showing villages outside and Forest Department anti-poaching camps inside the reserve. Through the Hornbill Nest Adoption Programme, we are monitoring nests in nine villages in Papum Reserved Forest, while we continue to monitor hornbill nests inside the park since 2003.

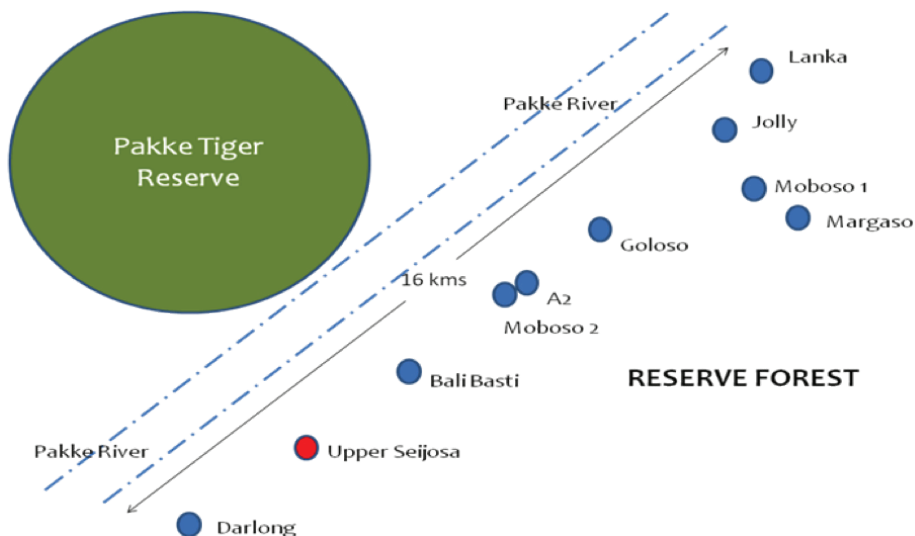


Figure 2. Schematic map showing villages (blue dots) around Pakke Tiger Reserve that are currently participating in the Hornbill Nest Adoption Programme.