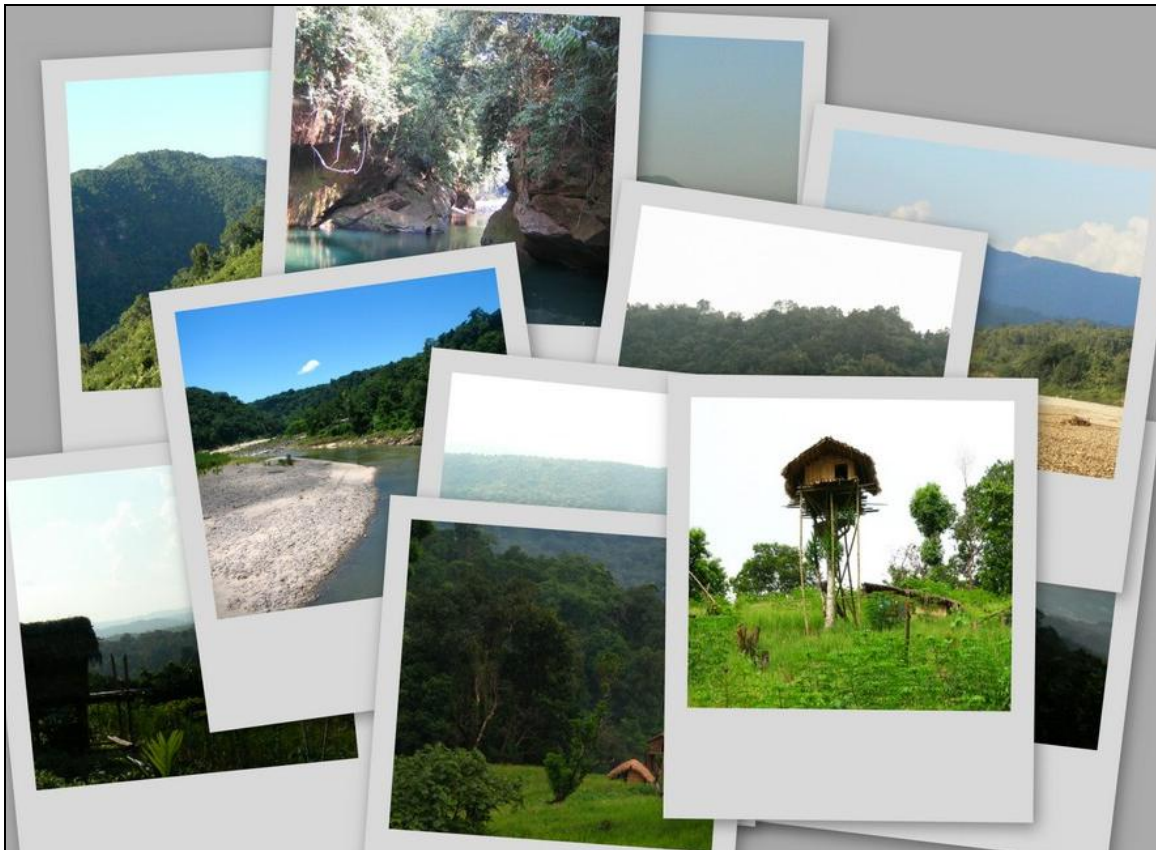


Annual report of the Wildlife Team

Meghalaya Field Office

Samrakshan Trust 2006-2007



Section	Topic	Page nos.
Part 1	Background 1.1 Conservational significance of the region 1.2 Map of the landscape	3-6
Part 2	Elephant research in Garo Hills 2.1 Literature review 2.2 Elephant monitoring methodology	7-13
Part 3	Project Findings 3.1 Analysis of the data. 3.1.1. Seasonal patterns in elephant movement 3.1.2. Solitary individuals vs. herd visits 3.1.3. Raids vs. visits 3.1.4. Orchards vs. jhum & paddyfields 3.2 Elephant crossing points on the Simsang River	14-20
Part 4	Other activities 4.1 Training conducted for the informants 4.2 Expansion to new akings 4.3 Incidents pertaining wildlife in 2006-2007 4.3.1. Elephant mortalities 4.3.2. Logging incidents 4.3.3. Other large mammal visits to the akings	21-28
Part 5	Recommendations for future work	30
Part 6	Appendix (species inventories)	31-34
Part 7	References	35-36

Background

A significant portion of the State of Meghalaya in India is reported to be under forest cover (ca. 70 %, [Kumar *et al.*, 2002]). These forests can be classified into: tropical evergreen forests, tropical semi-evergreen forests, tropical moist and dry deciduous forests, grasslands and savannas, sub-tropical pine forests and temperate forests (Haridasan & Rao, 1985, cited in Khan *et al.* 1997). Garo hills, spread over a third of the area of the State, harbour one of the densest populations of Asian elephants in the country (Williams & Johnsingh, 1996). The only substantially protected area of the State, the Balpakram National park (hereafter, NP), is situated in the south Garo hills district. This region has been envisioned as one that holds a prospect of long-term survival of Asian elephants (Williams & Johnsingh, 1996). The area that forms the core of Samrakshan Trust's future activities consist of thirty-three villages, locally called *akings*, interspersed between the Park to the north, Baghmara Reserve Forest (hereafter, RF) to the south-west and Siju wildlife sanctuary (hereafter, WLS) and Rewak RF to the north-west (refer Fig. 1).

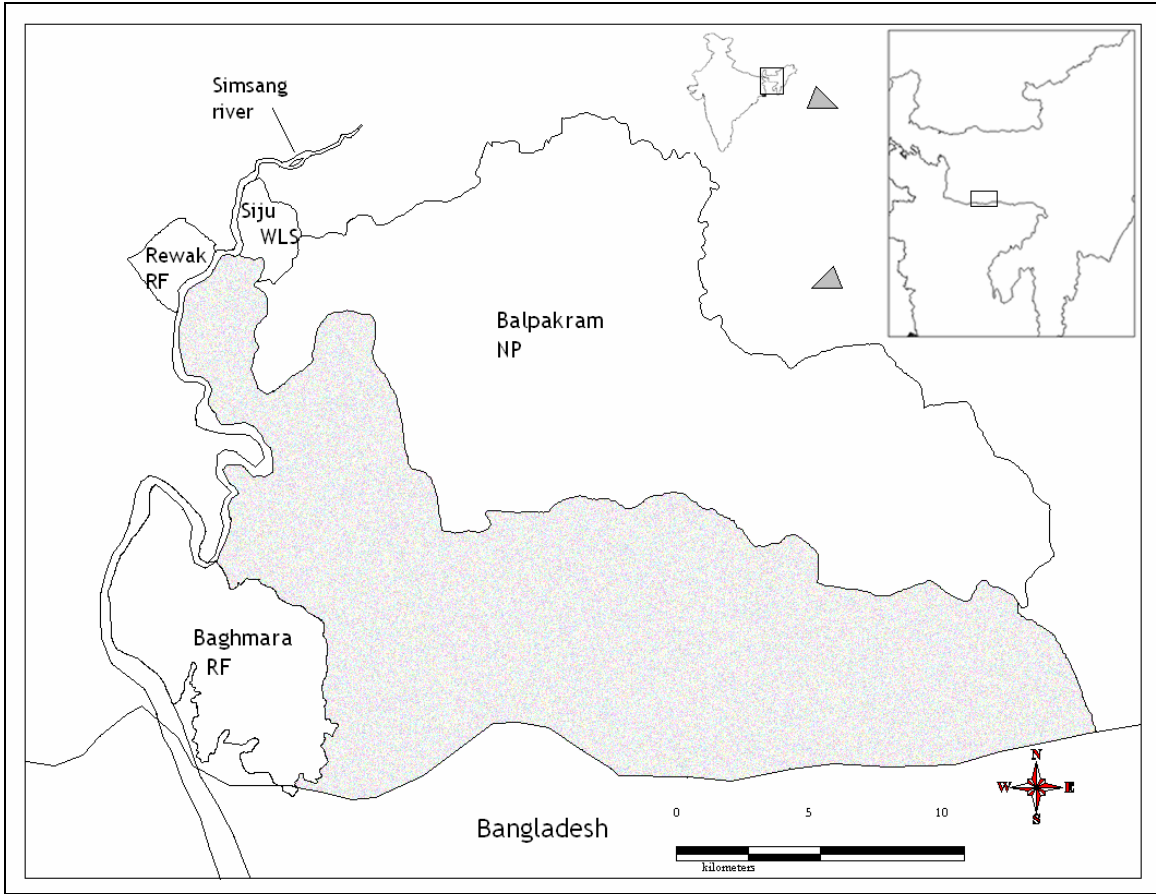


Figure 1. The Baghmara Balpakram Community Conservation Landscape (BBCCL). The shaded portion depicts the location of thirty-three akings in the landscape. (Protected areas boundaries sourced from Wildlife Institute of India, Dehradun).



Figure 2. The landscape, swathed with jhum cultivations at different successional stages, orchards, paddy fields, secondary and primary forests.

The landscape is mottled with patches of secondary forests, settlements, paddy and jhum fields, orchards and water-bodies (Fig. 2). Species such as the tiger, clouded leopard, Himalayan yellow-throated marten, hoolock gibbon, serow, Asian elephant, Chinese pangolin and other mammals that inhabit the protected areas have been reported from community forest reserves in these areas as well. Therefore, it is important to conserve these reserves to provide buffers and corridors for wildlife in the adjoining protected areas.



Figure 3. A slow loris, Malayan giant squirrel and a monitor lizard sighted in the BBCCL landscape

Samrakshan has been working in the landscape towards overall biodiversity conservation, with the Asian elephant as a flagship species. The principal threat to biodiversity in the Garo hills is the large-scale conversion of forests into land-uses that are not conducive to wildlife. The focus of Samrakshan's initiative is on limiting such conversion to effect a "win-win" situation where farmers benefit from better agricultural yields without having to drastically alter land use and fragment elephant habitats.

Literature review



Figure 4. A lone tusker feeding on bamboo leaves in the BBCCL landscape, close to the Balpakram NP.

In Garo hills, most studies on elephants have discussed methods of estimating number of elephants in the region and studies that focus on human-elephant conflict are few (Gogoi 1981; Williams & Johnsingh, 1996, 2004; Gurung and Lahiri-Choudhury 2000, 2001).

1981, Das Choudhury

Report on the first elephant census conducted by the State Forest Department (FD) and presented at the first meeting of the 'North-east India task force of the Asian elephant specialist group'. A census was conducted in the then proposed Balpakram WLS. The total area covered was 582 sq. km., which included the proposed sanctuary as well as some buffer areas. The total number of elephants recorded was 857 (471 adults, 236 sub-adults and 150 calves). This report was further modified and some additional information added and presented as Gogoi and Das Choudhury, 1982. The elephant numbers were updated to 860.

1981, Gogoi

Discusses the census methods used and the management of wild elephants in the same 'North-east India task force of the Asian elephant specialist group' meeting

at Shillong. Elephant depredation is described as 'serious' in the Garo hills. It also admits that the compensation paid for crop damage is not commensurate with the loss and unless that is rectified the conflict will grow and death and injury to elephants will follow. Human-elephant conflict (hereafter, HEC) reported to be 'round-the-year' with maximum damages caused during the cropping seasons. Measures suggested to decrease conflict include chasing away herds by bursting crackers or beating drums and firing blanks. Use of departmental *koonkie* elephants to chase away wild elephants is suggested as a last resort. Plans are also outlined to start two 'anti-depredation squads' in the state at Williamnagar and Nongstoin.

1985, Kumar & Rao

Elephant numbers are quoted from the 1981 census report prepared by the Meghalaya FD as 860 in Balpakram NP, proposed Wildlife Sanctuary at that time. The report states that elephants raid adjoining jhum fields for crops like tapioca, sweet potato, pineapple, banana and other cultivated plants in the months of February and March.

1992-93, State FD

Census conducted by the State FD estimates 1850 elephants (1460 direct sightings and 390 from indirect evidence) in the Garo hills. South Garo Hills district is estimated to have a population of 910 with 591 of them residing within Balpakram NP.

1996, Williams & Johnsingh

The report presents no new information on elephant numbers; Forest Department census data of 1992-93 is quoted. Dung encounter rate surveys on trails were done in four areas - West Garo hills, East Garo hills, Nokrek-Angratolli RF, South Garo hills and West Khasi hills covering the entire elephant population in Garo hills to determine the respective relative densities. South Garo hills had the highest relative density followed by West Garo hills. Habitat preference analysis based on the dung encounter surveys in the seven habitat types showed that elephants preferred jhum fallows between 3-7 years above all others. Assessment of the HEC was done only for the West Garo hills based on State FD database on elephant depredations, human and elephant deaths as well as an economic evaluation of the level of damage. This included data from 1989 to 1995. Crop damage was found to have occurred mostly between June and December with peaks in July and August and a minor peak in November. Various long term and short terms measures are suggested. Three 'elephant corridors' across Garo hills were identified and evaluated.

1997, Williams & Johnsingh

This uses information from the *mela-shikar* operation of 1980 and analyses the age-sex ratio of the captured elephants. Data from this was modelled to find the effect of removal of different age-sex categories of elephants on the overall population viability of the local population. Occasional removal of some

individuals from the population by the Forest Department is suggested to control the population as well as to be 'shown as making a sincere effort to solve elephant-human conflict'. Capture of young adult females is recommended if the objective is to reduce the current intensity of conflict instead of preserving the population viability in the long-term.

2000, Gurung & Lahiri-Choudhury

Part I is a comprehensive review of the HEC in Meghalaya as part of the Project Elephant initiative for elephant states. Information sources are the official records of Meghalaya FD (elephant census figures, elephant deaths, human deaths caused by elephants, details of forests, claims filed for compensation of elephant damage to crops and property and claims settled) and census office (population figures and ethnic composition of the villages). Villagers were also directly interviewed in some representative villages to gather additional information. The information is from 1992 to 1997. The elephant population in Meghalaya is described as the most threatened and pressurised. This has been illustrated with the fact that most of the elephants exist in forested areas, which have no legal protection. The concept of 'elephant corridors' is considered as a misnomer except for the link between Siju WLS and Rewak RF (which is recommended to be acquired by the forest department). The futility of having narrow linkages between scattered patches of reserve forests across private/community land is considered as an unsuitable strategy. Instead, 'mini-cores' are to be identified and efforts concentrated on those areas. The report quotes PD Stracey from 1967 where he mentions that elephants in the Garo hills have been an 'endemic' problem leading to crop and property depredation and loss of human life. Shortening jhum cycles are identified as the single most important factor behind increasing HEC in the state. Numerous recommendations are made to decrease the magnitude of the conflict such as increased protection and law enforcement of the existing elephant areas, alternative cropping patterns, eco-development, education and awareness and anti-depredation measures.

2001, Gurung & Lahiri-Choudhury

Part II of the report presents a detailed analysis of the conflict in the different habitation areas comprising the elephant range. Compensation details, period of maximum depredation, group structure of the marauding animals, crops affected, nature of damage, frequency of damage, market value of damage and various other factors are analysed based on the existing information.

Rongara Community Development Block in South Garo hills is of special importance as that is where Samrakshan Trust's current efforts are concentrated. Some of the important findings for this area are:

- (a) Elephants were found to be sheltering in the protected areas (hereafter, PAs) during the dry season when there are no crops in the fields. The onset of monsoons and the cropping season see them emerging. Thus the villages on the fringes of the PAs are seen to be more affected by conflict.

- (b) Depredation was found to be deliberate and not because of transit between two habitat patches.
- (c) Unattached males were more responsible for property damage although family groups also caused damage. All human deaths and injuries were also by adult males.
- (d) Without a change in land-use pattern there is little hope of reducing the level of depredation.

2002, Marak, T.T.C.

Elephant numbers for the entire state of Meghalaya are quoted (1840 elephants) from a departmental census carried out in 1997, which is a drastic decline from the 1993 state figure of 2872. This decline is attributed to the lack of access to various areas in the state by census personnel due to army operations. The compensation scheme for crop damage is reported to be drastically short of funds with an outstanding amount of Rs. 87.84 lakhs as on April 1999. Various management recommendations are made and stress laid on further research. The report suggests maximizing protection efforts in the few months that witness the maximum crop raiding.

2002, State FD

2002 elephant census conducted by the Meghalaya FD provides elephant numbers for the whole State, which is divided into four sectors - Jaintia hills, West Khasi hills and Ri Bhoi, East and West Garo hills and South Garo hills. These sectors are further divided into 'counting zones'. The total elephant population for South Garo hills is reported to be 609 while the entire Garo Hills elephant population is estimated to be 1193.

The 'counting zones' of immediate interest to Samrakshan Trust's conservation effort are

- (a) GH/XIX (Siju-Rongchuagal-Rongcheng-Balpakram) - 95 elephants in 185 sq.km.
- (b) GH/XX (Baghmara-Halwa Dambuk- Balpakram) - 107 elephants in 880 sq.km.
- (c) GH/XXI (Mahadeo-Chimitap-Balpakram) - 84 elephants in 282 sq.km.

2002, Marcot et al.

The report uses elephant census data from the 1993 and 1997 census conducted by the State FD to compare elephant densities across vegetation and land cover categories determined from 1998 remote sensing data and ground truthing. Elephant densities were found to be least in

- (a) >10% bamboo and secondary forest and
- (b) >10% scrub and abandoned jhum fields (fallow jhum 3 - 6 years).

Highest elephant densities were found in areas with >25% semi evergreen forest (old secondary forests 15-30+ years). Seven 'elephant corridors' were also identified all of which were on community land. Does not suggest any answers to overcome problems of the increasing conflict and the identification of elephant movement routes within community land.

2004, Williams & Johnsingh

In addition to the conclusions from the 1996 report already discussed above, questionnaire responses were used to find costs to humans and elephants of the conflict. Perceptions of HEC affected people, their response to elephants, change in land-use patterns, failure of mitigation measures such as compensation exposed the fact that the conflict was assuming serious proportions. The report concludes from the rising deaths of wild elephants that poaching has also increased.

2005, Tiwari et al.

This publication provides a figure of 1700 elephants for the Garo Hills Elephant Reserve. Out of the 3500 sq. km. elephant reserve, only 410 sq. km. is quoted to be under control of the State FD It also states that the setting up of cement and limestone mining operation near Siju WLS would disrupt the movement of elephants between Balpakram and Nokrek NPs. A number of 'elephant corridors' are identified and evaluated based on their ecological significance and conservation feasibility.

Elephant monitoring methodology

Samrakshan Trust has been collecting information on elephant visits to six akings from informants in the akings for the last twenty months to address the existing lacuna on elephant movement patterns in the region. A reliable local person capable of keeping records of elephant visits to the akings has been identified in each of these akings. Samrakshan Trust personnel visit the akings at regular intervals and collate the data collected from the informants' notebooks. The informants then accompany the Samrakshan team to the location where elephant presence has been noted and the GPS location of each spot is recorded. From June 2005 to January 2007, this data have been collected and integrated with the map of the region using GPS-trackmaker software (refer fig. 5). An analysis of the data is presented in the subsequent paragraphs.

The boundaries of the six akings were tracked using Global Positioning System (GPS 12 & e-trex). The boundaries were walked with local people who were aware of the extent of the akings; whenever available the boundaries were verified with the existing maps with the village-heads (*nokmas*) (refer fig. 5). Often, the boundaries were demarcated using streams (locally called *chirings*). Therefore in future the boundaries can be effectively marked using satellite imagery, particularly because boundary marking by actually walking trails is often labour- and time-intensive (personal observation). However, walking the boundaries gives a good idea of the community forest and the extant species in the same. Once the track is available on the GPS, it was uploaded to a computer using the GPS-trackmaker software.

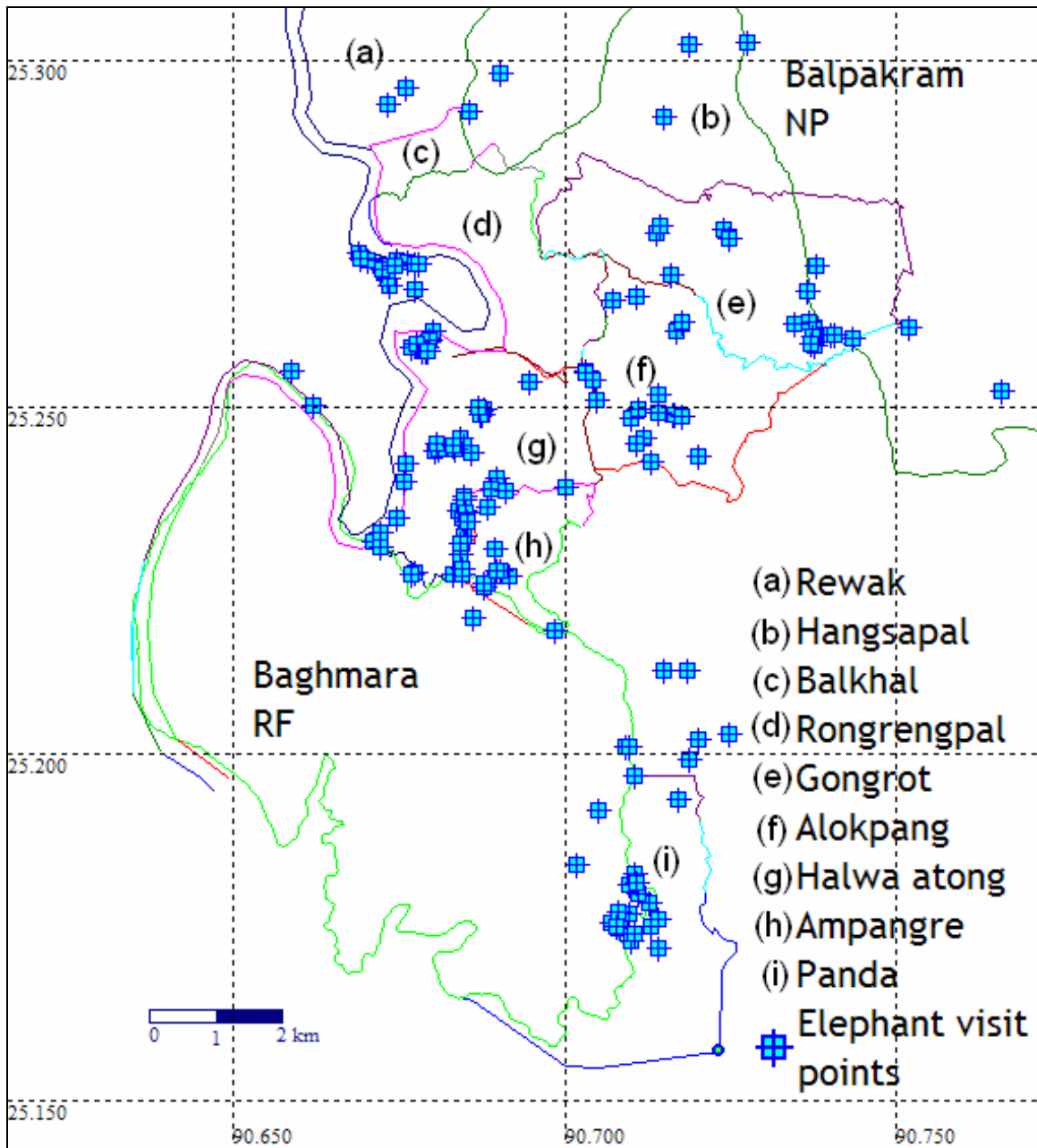


Figure 5. Elephant visit points collected from June-2005 to January-2007 (Data from Rewak, Hangsapal, and Balkhal has been collected for a period of two months, from December 2007) (Boundaries of PAs sourced from Wildlife Institute, Dehradun).

Analysis of data from the akings

Studies across the world use indices such as 'raid frequency index' (Hoare 1999) to quantify human-elephant conflict. This index has been defined as elephant raids per village per month or elephant raids per growing season. For analysis of the elephant-visit data, the mean number of elephant-visits to the gittims (hamlets within akings) in each month was the variable of interest. This data was further categorized into:

- ❖ Visits by solitary individuals vs. visits by herds,
- ❖ Visits for feeding vs. visits for movement, and
- ❖ Visits to orchards vs. visits to jhum and paddy fields.

A non-parametric hypothesis-testing approach was used for statistically analyzing the observational data from the six akings. The data being compared were not found to be normally distributed. Therefore, the mean numbers of visits for the specified categories were compared using Wilcoxon's signed rank test, which does not assume normal distribution in the data. The p -value, which is basically the probability of the pattern in the data being observed by chance, indicates the strength of the conclusion derived from the analysis.

For hypothesis testing, the null hypothesis was that the means for the selected categories are not different and the alternative hypothesis as one of the categories having a greater or lesser mean than the category with which it is being compared (statistically, a one-tailed test). The hypothesis was chosen based on the p -value and the conclusion from the data was based on the hypothesis.

Seasonal patterns in elephant movement

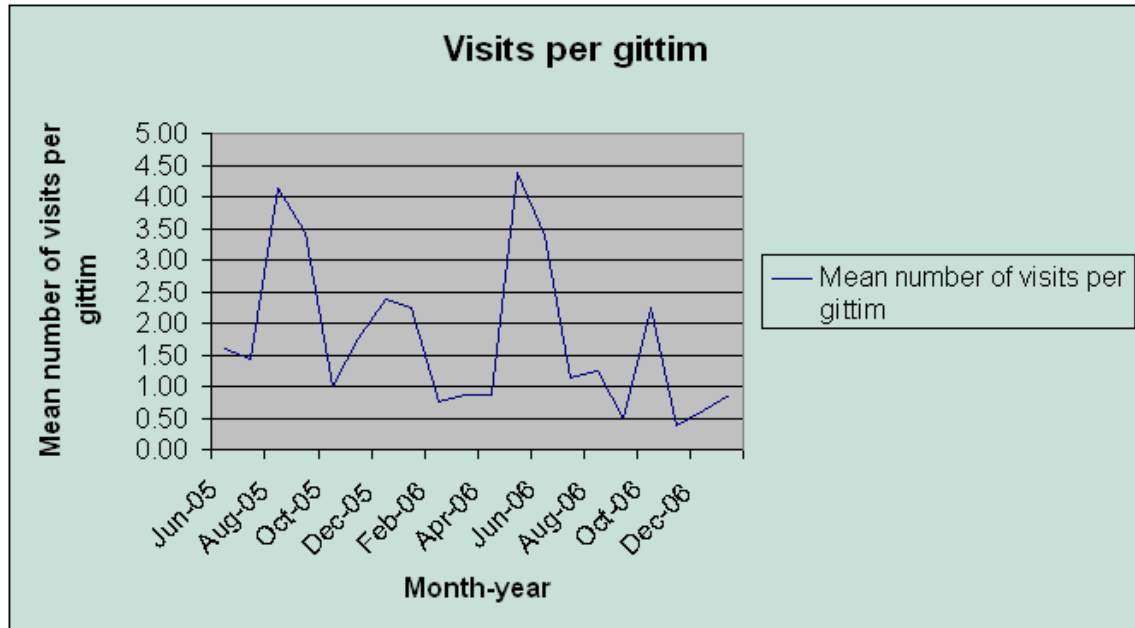


Figure 6. The x-axis represents the months in which the elephants visited the gittims (hamlets) and the y-axis represents the mean number of visits per gittim ($n=8$). Note the twin-peaks during July-August and a minor peak during October-November.

A total of 267 incidents of elephant-visits occurred in the eight gittims in the twenty months during which data was collected. The mean number of elephant-visits per gittim per month were plotted and it was found that two peaks occur in crop-raiding annually. These peaks—a major peak in July-August and a minor one in Oct-November coincide with the harvest of wet-paddy and jhum rice. These results are coherent with what was found from the neighbouring district (West Garo hills). Most crop-depredation events in the region occurred between June and December, with a major peak in July-August and a minor peak in November (Williams & Johnsingh 2004).

Solitary individuals vs. herd visits

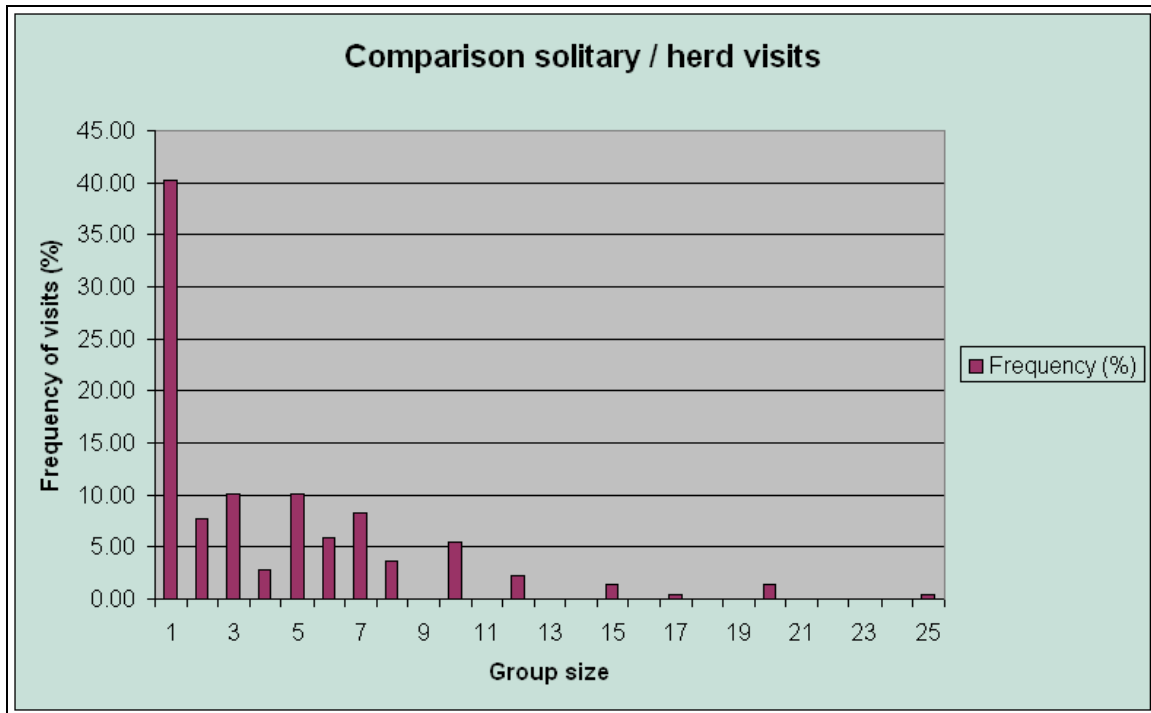


Figure 7. Note the high frequency of solitary-elephant visits to the akings, however the mean number of visits (\pm standard deviation) (5.94 ± 5.4) was *not* greater than the mean number of visits by herds (8.41 ± 6.86) (2-sample Wilcoxon signed-rank test, p-value > 0.75).

Studies on human-elephant conflict report that adult male elephants raid crops more often than herds (Sukumar 1990; Sukumar 1991; Balasubramanian 1998; Hoare 1999). In one of the studies in south India, per capita damages to crops by adult males and herds comprised 62 % and 38 %, respectively and the difference in economic terms was about 20-fold (Sukumar 1989, cited in Sukumar, 1991). Out of the 267 elephant-visits to the akings, 112 were by solitary individuals, 155 were by herds and However in South Garo hills, the number of visits by solitary individuals was not higher than those by herds (Wilcoxon signed-rank test, $p > 0.75$). The high p-value (0.85) indicates that the mean number of visits by individuals was *not* greater than mean number of visits by herds. However, to certainly conclude if individual males are raiding crops more often than herds, one needs to know the proportion of males in the elephant population in the region. Therefore, the reasons for the pattern in data can be speculated as:

- a) The number of males in the elephant population itself may be relatively low due to poaching of male elephants for tusks. Therefore, though solitary males raid crops more often, it is not clearly evident in the data, or
- b) In reality, male elephants may be raiding crops as often as herds.

Collecting data for a longer period will reveal more robust patterns.

Raids or Visits

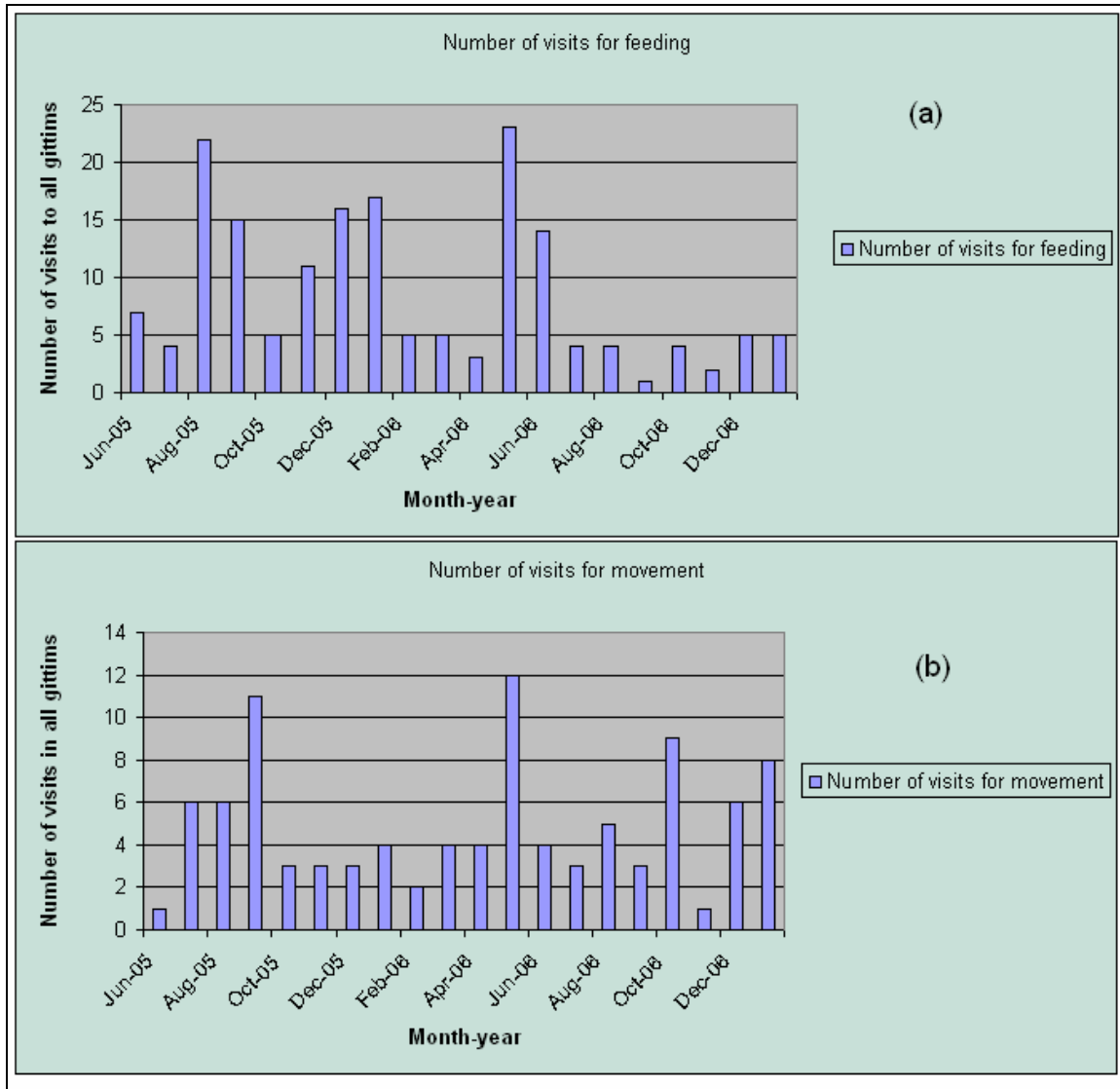


Figure 8. Comparison of visits for feeding (a) and movement (b). Note that the peaks for the respective categories are not all at the same months. Further, the number of visits for feeding was greater than the number of visits for movement (2-sample Wilcoxon signed-rank test, p -value < 0.025)

It is important to know if in each of their visits, elephants are feeding on crops or just passing through. Hoare (xxxx) reports that most studies do not categorise elephant visits into 'feeding' or 'movement'. 'Visits' are events in which elephants are merely passing through and the damage caused therein is due to trampling, whereas in 'raids', elephants actively feed on crops and worsen the damage. A total of 172 visits for feeding and 98 visits for movement were

recorded from the eight gittims in the six akings. Events recorded as visits for both feeding and movement were included in both the categories. Data from the akings was classified into these categories and it was found that the visits for 'feeding' were greater than visits for 'movement' (mean \pm standard deviation [$8.6 \pm 6.77 > 4.9 \pm 3.05$], 2-sample Wilcoxon signed-rank test, p-value < 0.025). However, the inherent observer-bias existing in the informants is that most elephants are reported to have visited the akings only when they were feeding on the crops in the akings. Therefore, it is very likely that visits for feeding were recorded more often than visits for movement.

Orchards or jhum and paddy fields

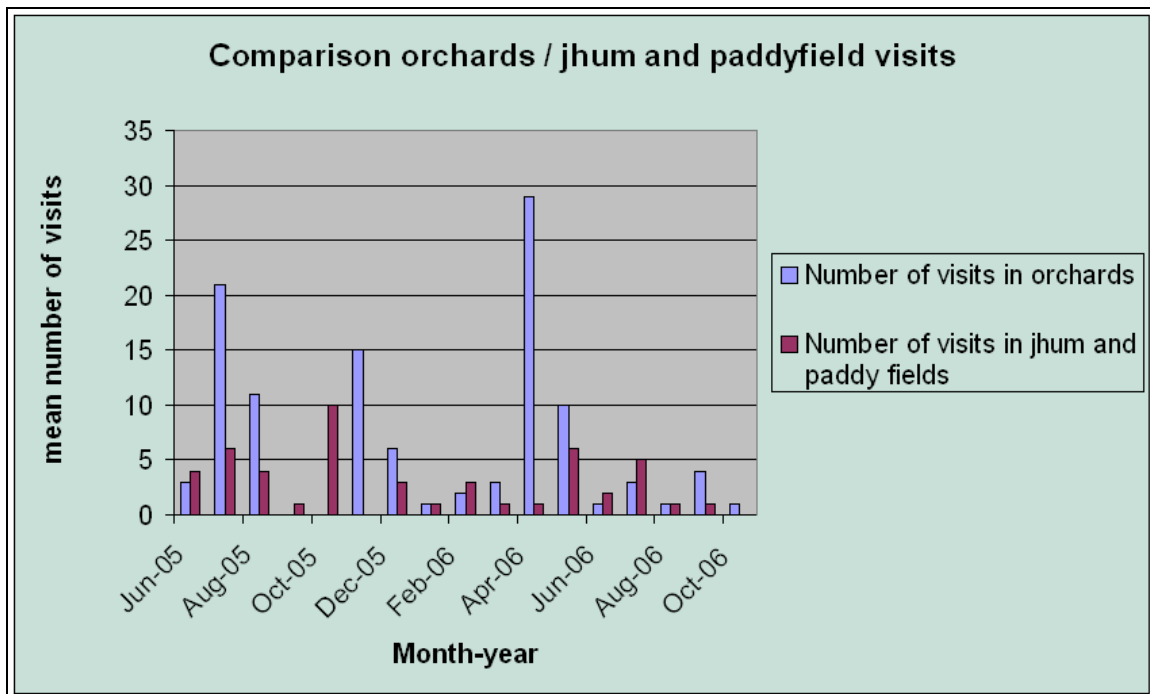


Figure 9. The data indicate that elephants in the region to some extent visit orchards more than jhum and paddyfields (*t*-test, p-value < 0.2).

A total of 150 elephant-visits of the 267 visits could be categorized into visits to orchards and visits to jhum and paddyfields. During the twenty months of data collection, 98 visit to orchards and 52 visits to orchards and jhum and paddyfields were recorded. Although not very significantly, the data indicate that elephants frequent orchards more than jhum and paddy fields ($4.9 \pm 7 > 2.6 \pm 2.7$, 2-sample Wilcoxon signed-rank test, p-value < 0.2). The implication of this is that orchards are not only detrimental to wildlife in terms of loss of habitat but also increase human-elephant conflict in the region.

Elephant crossing points on the Simsang River

In March 2005, a survey was undertaken to record elephant crossing point on the Simsang River. The outcome of the survey was particularly important to understand if the river acts as a barrier to elephant movement in the landscape. The GPS points recorded between Alok pang aking and a section of the Baghmara RF were mapped using GPS-trackmaker software. The outcome of the exercise was that crossing points used during the rainy or dry seasons as well as point that were rarely or occasionally used were marked out (refer fig.10).

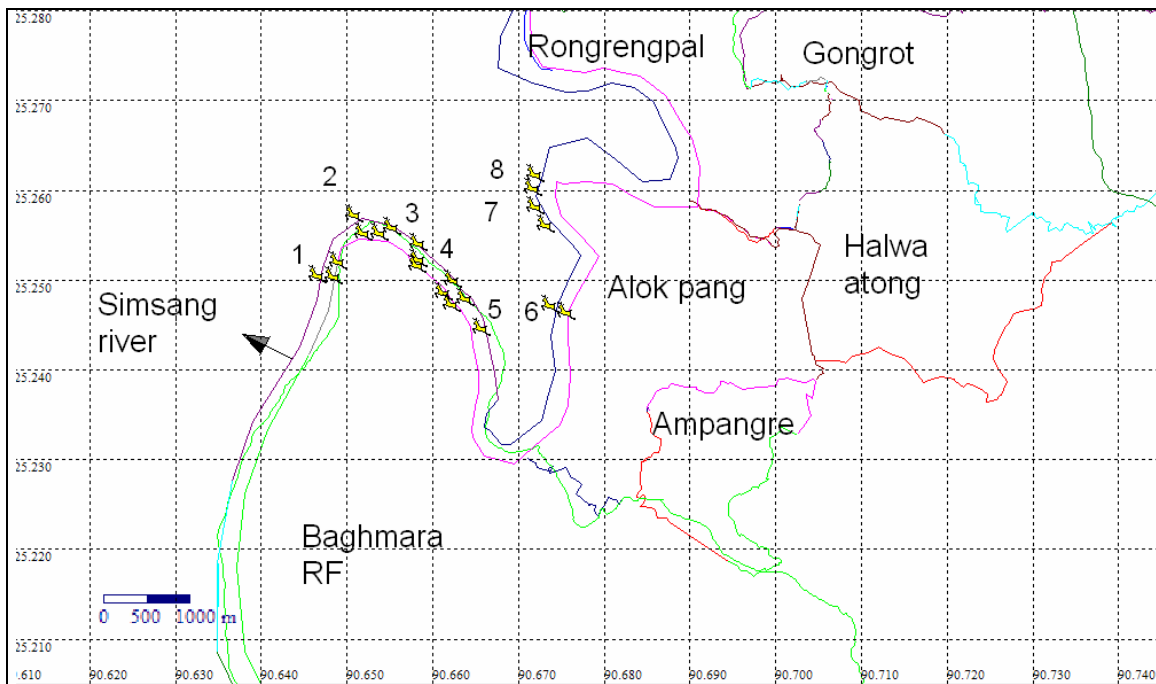


Figure 10 Elephant crossing points adjoining Alok pang aking and Baghmara RF (For description of the points, refer text) (The boundaries of the PAs were sourced from Wildlife Institute of India, Dehradun)

Observations made by the team about the crossing points:

- 1) This point is used for crossing only in the rainy season for feeding on bamboo shoots.
- 2) In this location, elephants come from the Baghmara RF to the community land that is opposite the Simsang River and feed. Many dung piles were found here on both sides of the river.
- 3) This is one of the important paths that are used regularly, both during the dry and rainy season. There is the only one location using which elephants move from Baghmara RF to the particular aking. Many dungpiles and footmarks were found at the location.

- 4) This location is also used by elephants to cross and feed in community land and move back to Baghmara RF.
- 5) This point is also frequently used by elephants to move back and forth between Baghmara RF and community land.
- 6) This point is one of the oldest paths used by elephants. This particular location at Alok pang is an Areca (betel-nut) orchard.
- 7) This location is opposite of Bulawe hamlet of Alok pang aking. The elephants cross this point only after sunset, feed on the paddy in the fields and move back before sunset the following day.
- 8) This point is not often used by elephants to cross the river, although in the year 2005 a person confronted an elephant at this location.

Trainings conducted during 2006-2007

An informants meeting was conducted on 30th November 2006. The main objective of the meeting was to improve the understanding of the informants about the elephant monitoring work. Clarity with respect to Samrakshan's elephant monitoring work in the akings was achieved to some extent. The idea to hold get-togethers in each village to make people aware of Samrakshan's work was a productive outcome of the meeting. The meeting provided a good platform for the next one to be held in March / April 2007 in which informants from ten akings would come together.

Expansion of elephant-monitoring exercise

The highest priority during the term was given to spreading the elephant monitoring process to newer akings in the landscape; elephant monitoring was spread from six to 11 akings during this year. The information from the new akings together with the existing information from six akings will provide a landscape overview of elephant movement patterns and conflict in the region. This was particularly important as the new akings selected adjoin the National park, Siju wildlife sanctuary and Rewak reserve forest. Data from these akings will indicate if conflict is relatively higher closer to the more protected areas. A brief description of each aking is given below:

Hangsapal

A substantial portion of this aking is surrounded by Balpakram NP (Fig. 6) and is relatively well forested (approx. 70%). Also on a reconnaissance visit to the aking, skin of Chinese pangolin (fig. 7) and a stump-tailed macaque (fig. 8) captured to pet were encountered. Further, the villagers report a tiger in one of the hamlets in the aking.

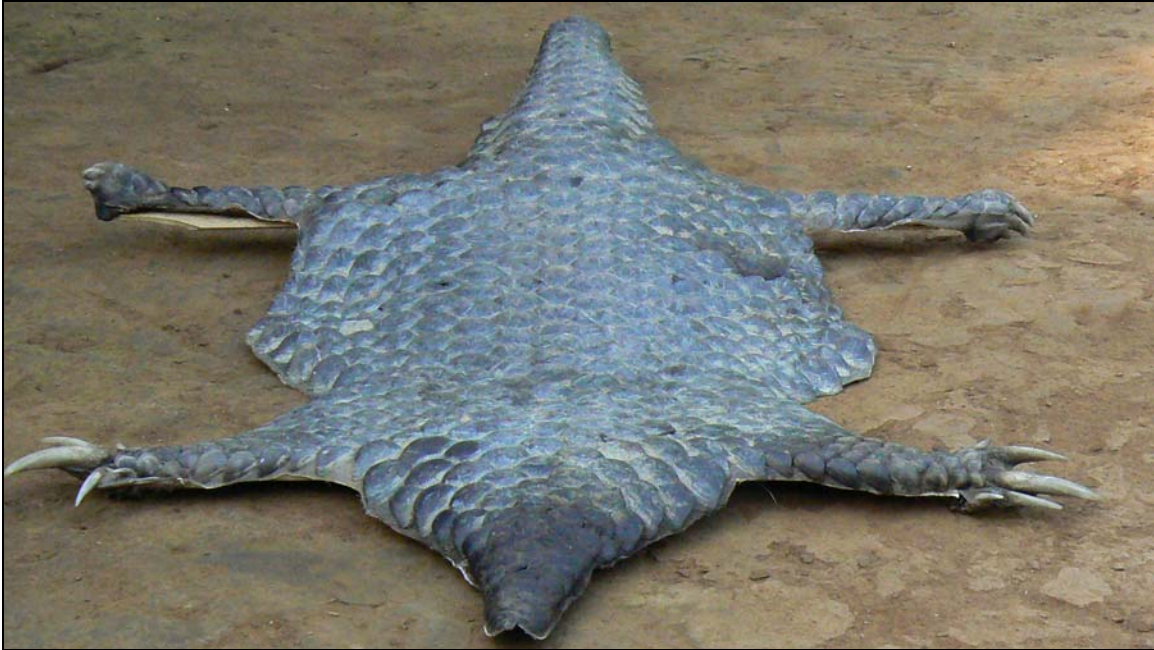


Figure 11. Skin of Chinese pangolin found in one of the houses in Hangsapal aking.



Figure 12. Stump-tailed macaque baby captured by the locals to tame in Hangsapal aking.

Siju

This aking adjoins the Siju WLS and one of the hamlets, Araiteka, has few (twenty) families and is relatively more isolated than other akings. An

unidentified otter (fig. 9) and leopard pug-marks were recorded from the Simsang river beach that lies in the aking. Black-capped langurs and stump-tailed macaques have been spotted in the other hamlet in this aking (Dajong.gittim).



Figure 13. Unidentified otter pugmarks found along a stream in one of the akings in the BBCCL landscape

Rewak

The aking is located opposite to the Rewak RF on the other side of Simsang River. A tiger killed a 3-year old cow in this aking in February 2007 (fig. 10). These incidents indicate that large carnivores are using the community lands adjoining the PAs.



Figure 14. Pug-mark of a tiger that took a cow in the Rewak aking.

Balkhal

Balkhal is a relatively small aking (approx. 3 sq. km.) adjoining the NP on the east and Simsang river to the west. Villagers report many elephant-visits to the aking. Further the forest cover is also low (approx. 20 %) in the aking and is characterized by paddyfields and streams.

Incidents pertaining wildlife in 2006-2007

Elephant mortalities

During 2005-2007, ten elephant deaths / killings were recorded from akings in the region. Amongst these, the case of two elephants being killed at the same spot in one of the akings (Table 1) and the meat being consumed by several families in the village is the one that stands out. Traditionally, Garos have not been known to consume elephant meat and most people revere elephants, affectionately referring to them as 'mama dalgipa' (big uncle). This incident may further hinder elephant-conservation themes in south Garo hills.

Table 1. Elephant mortalities in the year 2005-2007 in the BBCCL landscape.

	Elephant 1	Elephant 2	Elephant 3	Elephant 4	Elephant 5
Sex	Male	Male	Female	Not known	Male
Tusker	Yes	No	No	Not known	Yes
Approx. age	Twenty years	Eight years	Twenty years	Three years	Thirty five years
Date of death	12 th April 05	8 th May 05	20 th May 05	1 st week June	3 rd week June
Exact location	Balpakram National Park, Taidang stream.	Angratoli Reserve Forest.	Wakalkona gittim, Dambuk Apal Aking.	Near Gaobari river.	Near Gaobari river.
Probable cause of death	Spear wound	Internal Injury	Spear wound	Drowning in Gaobari river.	Drowning in Gaobari river.
	Elephant 6	Elephant 7	Elephant 8	Elephant 9	Elephant 10
Sex	Not known	Likely male	Male	Not known	Not known
Tusker	Not known	Not known	Yes	No	Not known
Approx. age	30 years (secondary information)	About 20 years	30 + years (Foot diameter 25-30 cm.)	15 + years (Foot diameter 15-20 cm.)	About 2 years (secondary information)
Date of death	Mid-September 2006	Mid-October 2006	1st week of November 2006	1st week of November 2006	2 nd week of February 2007
Exact location	Goka aking community forest	Badambari aking adjoining Indo-Bangladesh border	Dambuk aga aking	Dambuk aga aking	Taidang aking
Probable cause of death	Not known	A wound was found at the temple, probably a bullet wound; therefore the elephant was killed either for ivory or due to crop damage.	Secondary information obtained from a resident of the aking reveals that the elephant was killed for ivory.	The elephant was killed most likely for meat. The village consumes the meat Note: Elephants 8 & 9 were found dead together in the same location.	The body was burnt by Forest Department, leaving little evidence to the cause of death. The villagers however report that the calf fell of a 25 m cliff.



Figure 9. This elephant was found dead along with another younger one in Dambuk Aga, an aking close to the Indo-Bangladesh border

Other large mammal incidents

Two incidents of tigers killing cows occurred during 2006-2007. Secondary information revealed that the first incident occurred in Halwa bilda aking, adjoining Baghmara reserve forest during September 2006. An adult cow, weighing about 65 kg. was attacked by a tiger and dragged to the reserve forest. The second such incident occurred in Rewak aking and tiger scat and pug-marks were found by the wildlife team in the location. Presence of sloth bears has been reported from Panda and Gongrot akings during this year. These incidents indicate presence of large carnivores in the region.

Logging incidents from Baghmara Reserve forest

Table 2 (a) Logging by Border Security Force in the Baghmara Reserve Forest, South Garo Hill (as reported to the Meghalaya Forest Department). (Information was forwarded in the name of Association of Nojarik Nodongdil.)

Sr. no.	Date of Letter	Observation Date	Location	Time	Vehicle No.
1	6 th September 2004	25 th July 2004	Near Rangasora Bibra	1:30 pm	AS 01 P 1204
2	15 th October 2004	18 th September 2004	Between (B/w) Baghmara and Ampangre Bibra	11:00 am	TN 38 F 2191
3	3 rd January 2005	29 th December 2004	B/w Baghmara and Ampangre Bibra	4:20 pm	AS 01 L 9880
4	30 th January 2005	25 th January 2005	B/w Baghmara and Ampangre Bibra	9:50 am	MB PI 5161
5	2 nd April 2005	31 st March 2005	Near Ampangre Bibra	10:50 am	AS 01 2308
6	5 th April 2005	29 th March 2005	Near Pilot Project	10:50 am	AS 01 P 5161
7	19 th April 2005	13 th April 2005	Near Pilot Project	10:00 am	AS 01 S 2087
8	20 th May 2005	14 th May 2005	B/w Pilot Project and Ampangre Bibra	11:45 am	AS 01 S 2087
9	1 st July 2005	8 th June 2005	B/w Ampangre Bibra and Panda Bibra	9:10 am	AS 01 L 9880
10	4 th July 2005	9 th June 2005	B/w Ampangre Bibra and Panda Bibra	4:15 pm	AS 01 P 5161
11	10 th August 2005	6 th August 2005	B/w Ampangre Junction and Panda Bridge	11:15 am	AS 01 S 2087
12	14 th August 2005	12 th August 2005	Near Ampangre Bus Waiting Shed	9:45 am	AS 01 P 0738
13	13 th November 2006	13 th November 2006	B/w Ampangre Bibra and Panda Bibra	10:00 am	AS 01 V 6209
14	22 nd January 2007	22 nd January 2007	Near Pilot Project	9:30 am	9548
15	24 th January 2007	24 th January 2007	B/w Ampangre Bibra and Panda Bibra	9:00 am	AS 01 P 5310

Information forwarded in the name of Samrakshan Charitable Trust. (Table 2 [b])

Sr. no.	Date of Letter	Observation Date	Location	Time	Vehicle No.
1	22 nd January 2007	22 nd January 2007	At Pilot Project	9:30 am	9548
2	24 th January 2007	24 th January 2007	B/w Ampangre Bibra and Panda Bibra	9:00 am	AS 01 P 5310
3	13 th March 2007	10 th March 2007	B/w Ampangre Junction and Panda Junction	9:30 am	AS 01 Y 1403
4	14 th March 2007	12 th March 2007	B/w Ampangre Junction and Panda	11:45 am	AS 01 K 5370

Recommendations for future elephant-monitoring work

- ❖ It will be useful to know what wildlife is present in the community reserves by direct evidence rather than secondary information. Recording presence and movement of species such as the tiger, clouded leopard, yellow-throated marten and other mammals will significantly highlight the conservational significance of the reserves. A camera-trapping exercise in reserves in locations where animal-tracks have already been recorded will be a useful one.
- ❖ It is very important to assist the people from the akings to fill up compensation forms and submit to the Forest Department. Although the department may not immediately respond to the applications, a good follow-up may actually result in some of the compensations being disbursed. Further, this activity will also alleviate the notions of the people from akings who feel that Samrakshan only collects data on human-elephant conflict and does not follow-up the incidents to mitigate the loss.
- ❖ Additionally, Rongshu-agal towards the north-west in the landscape and Taidang aking towards south in the landscape were visited during this year. Hunting activities may be rampant in the former aking, because gunshots were heard and one of the staff was actually offered muntjac meat. Tiger pugmarks were recorded from community forest reserve in Taidang aking. It will be useful to gather additional information on wildlife and hunting patterns from these akings.
- ❖ Presently, the informants are being paid a monthly allowance of 150 rupees. Added to this, if the informants are paid an incentive of a certain fixed amount for every entry into their log-book on elephant visits, they may be more efficient in collecting data as well as more eager in not missing any visits. This is the manner in which informants are paid for collecting/informing elephant data in Valparai, South India (personal communication - Nandini Rajamani)

Appendix (Species encountered in the akings, Balpakram NP, Baghmara RF & Siju WLS)

Sr. no.	Mammals*	Birds	Butterflies	Reptiles
1	Asian elephant (D, Du, F) (BNP, BRF,	Ashy woodswallow	Autumn leaf	Brahminy worm snake
2	Black-capped langur (D)	Asian brown flycatcher	Blackvein sergeant	Common Indian krait
3	Chinese pangolin (Sk)	Asian fairy blue bird	Blue admiral	Draco
4	Common Leopard (P, S)	Asian pied starling	Blue bottle	Unidentified pit viper
5	Hoary-bellied Himalayan squirrel (D)	Bar-winged flycatcher shrike	Chocolate pansy	Skink
6	Hoolock gibbon (D)	Besra	Chocolate soldier	Monitor lizard
7	Indian Muntjac (D)	Black bulbul	Commander	Bronzeback tree snake
8	Malayan giant squirrel (D)	Black-capped kingfisher	Common baron	
9	Orange-bellied Himalayan squirrel (D)	Black-crested bulbul	Common birdwing	
10	Rhesus macaque (D)	Black-crested bulbul	Common birdwing	
11	Sambar (F)	Black-headed munia	Common bushbrown	
12	Slow loris (D)	Black-headed oriole	Common crow	
13	Stump-tailed macaque (D)	Black-naped oriole	Common evening brown	
14	Tiger (P, Sc)	Blue jay	Common grass yellow	
15	Unidentified fruit bat (D)	Blue-bearded bee-eater	Common jezebel	
16	Unidentified lesser cat (P)	Blue-eared kingfisher	Common lascar	
17	Unidentified otter (P)	Blue-throated barbet	Common map	
18	Wild pig (F, Du)	Bronzed drongo	Common maplet	
19		Brown shrike	Common mormon	
20		Burmese shrike	Common pierot	

21	Chestnut-headed bee-eater	Common raven
22	Common hoopoe	Common rose
23	Common iora	Common sailor
24	Common kestrel	Common sergeant
25	Crested serpent eagle	Common tiger
26	Crimson sunbird	Cornelian
27	Crimson sunbird	Danaid eggfly
28	Cuckoo drongo	Great mormon
29	Emerald dove	Great orangetip
30	Golden throated barbet	Grey count
31	Gold-fronted leaf bird	Grey pansy
32	Great barbet	Indian Cabbage white
33	Great hornbill	Lemon pansy
34	Greater racket- tailed drongo	Mottled emigrant
35	Green bee-eater	Nigger
36	Grey-headed canary flycatcher	Pale grass blue
37	Hill myna	Paris peacock
38	Indian pond heron	Peacock pansy
39	Indian scimitar babbler	Red helen
40	Jerdon's baza	Redbase jezebel
41	Khaleej pheasant	Striped crow
42	Laggar falcon	White edged blue baron
43	Lesser necklaced laughing thrush	Yamfly

44	Lineated barbet	Yellow pansy
45	Little spiderhunter	Studded sergeant
46	Long-tailed broadbill	
47	Long-tailed shrike	
48	Maroon oriole	
49	Merlin	
50	Oriental pied hornbill	
51	Pale blue flycatcher	
52	Pompadour green pigeon	
53	Red junglefowl	
54	Red vented bulbul	
55	Red whiskered bulbul	
56	Red-wattled lapwing	
57	River lapwing	
58	Rosy minivet	
59	Rufous treepie	
60	Scarlet backed flowerpecker	
61	Scarlet minivet	
62	Shikra	
63	Small Niltava	
64	Spangled drongo	
65	Unidentified harrier	
66	Verditer flycatcher	

67	Vernal hanging parrot
68	Wedge-tailed green pigeon
69	White wagtail
70	White-bellied drongo
71	White-capped water redstart
72	White-collared blackbird
73	White-rumped munia
74	White-rumped shama
75	White-throated bulbul
76	Wooly necked stork
77	Yellow-browed bulbul
78	Small greenbilled Malkoha

* (D = Direct sighting, Du = Dung, S = Scat, P = Pug mark, F = Footprint, Sk = Skin)

Mammals were identified using Menon (2003), birds were identified using Grimmet *et al.* (1999) and butterflies were identified using Haribal (1992).

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