CONSERVATION LEADERSHIP PROGRAMME: FINAL REPORT

3276 THE CONSERVATION OF BORNEAN HORNBILLS IN MALAYSIA

THE KINABATANGAN WILDLIFE SANCTUARY, MALAYSIA

Project Aim: To provide breeding opportunities for endangered hornbills.

(1st August 2017 to March 2019)

Figure 1: A female and male Rhinoceros hornbills inspecting the nest box.

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Report completed: 15/03/2019 by Ravinder Kaur d/o Kirpal Singh

Supported by: HUTAN/KOCP, Sabah Biodiversity Centre, Sabah Wildlife Department, Sabah Forestry Department, Beauval Zoo, Chester Zoo, Phoenix Zoo, Suntory – Bornean Conservation Trust Japan, IdeaWild, Opticron, Thomas Leiden (Leiden Foundation), CLP Learning Exchange Programme.

Table of Contents **Page**

Section 1……3
Section 2……5
Section 3……9
Section 4……11

Project Partners & Collaborators

1. Dr. Marc Ancrenaz (PhD and Vet) and his staff from HUTAN/KOCP – provided scientific advice, boats and vehicle, climbing gear and additional manpower.
2. Sabah Biodiversity Centre – permits and permission to work in the field.
3. Sabah Wildlife Department – permits and permission to work in the field.
4. Sabah Forestry Department– permits and permission to work in the field.
5. Beauval Zoo – Funder and nest box design advisor
6. Chester Zoo – Funder and nest box design advisor
7. Phoenix Zoo – Funder, nest box design advisor and donated camera traps & 1 drone
8. Suntory – Bornean Conservation Trust Japan – Nest boxes and camera traps
9. IdeaWild – Donor of equipment (data loggers)
10. Opticron - Donor of equipment (1 binocular & 1 scope)
11. Thomas Leiden (Leiden Foundation) - Donor of equipment (2 binoculars)
12. CLP Learning Exchange Prog – Katala Foundation and Ravin's CLP team – PRIDE campaign.
13. University Malaya – Prof Rosli Ramli, student supervision (Ravinder Kaur), scientific advice and additional funds through Ministry of Higher Education (MOHE) - Fundamental Research Grant Scheme (FRGS).

Section 1:

Summary (max 200 words)

Kinabatangan is a regenerating forest and the population of critically endangered Helmeted Hornbill *Rhinoplax vigil* and vulnerable Rhinoceros hornbill *Buceros rhinoceros* are declining. Being secondary hole-nesters, hornbills do not create tree cavities. Hence, the purpose in this project is to provide breeding opportunities for the hornbills.

Five artificial nest boxes have been created, tested and installed. The first hurdle was to design a box that can mimic the conditions inside natural nests **(please see Appendix 1).** Currently, nest boxes are being monitored using camera traps and important species are visiting; endangered Wrinkled hornbill *Rhabdorrhinus corrugatus* and vulnerable Rhinoceros hornbills *Buceros rhinoceros.*

The team has also completed a 10km2 plot survey, to search and locate hornbill nests or natural tree cavities systematically. Fifteen trees with cavities were located and identified, but there were no signs of nesting **(please see Appendix 2).** The project team encountered problems revisiting the area. Therefore, from 15 natural cavities that needed restoration works, only 6 were accessible and restored by the team.

New nests were also located; endangered Wrinkled hornbill *Rhabdorrhinus corrugatus*, vulnerable Wreathed hornbill *Rhyticeros undulatus,* least concern Oriental Pied *Anthracoceros albirostris*, near threatened Bushy crested *Anorrhinus galeritus* and vulnerable Black hornbills *Anthracoceros malayanus*.

Introduction (max 500 words)

This study was conducted in the Lower Kinabatangan Wildlife Sanctuary (LKWS), Sabah, an area that covers 27,960 hectares. The sanctuary was officially gazetted as a Wildlife Sanctuary by the Sabah State government in 2005. The area consists of largely secondary forests but it is fragmented and surrounded by oil palm plantations and mills, roads, villages, orchards and small scale farms. These patches are connected to 15,000 hectares of forest that are protected as Virgin Jungle Forest Reserves.

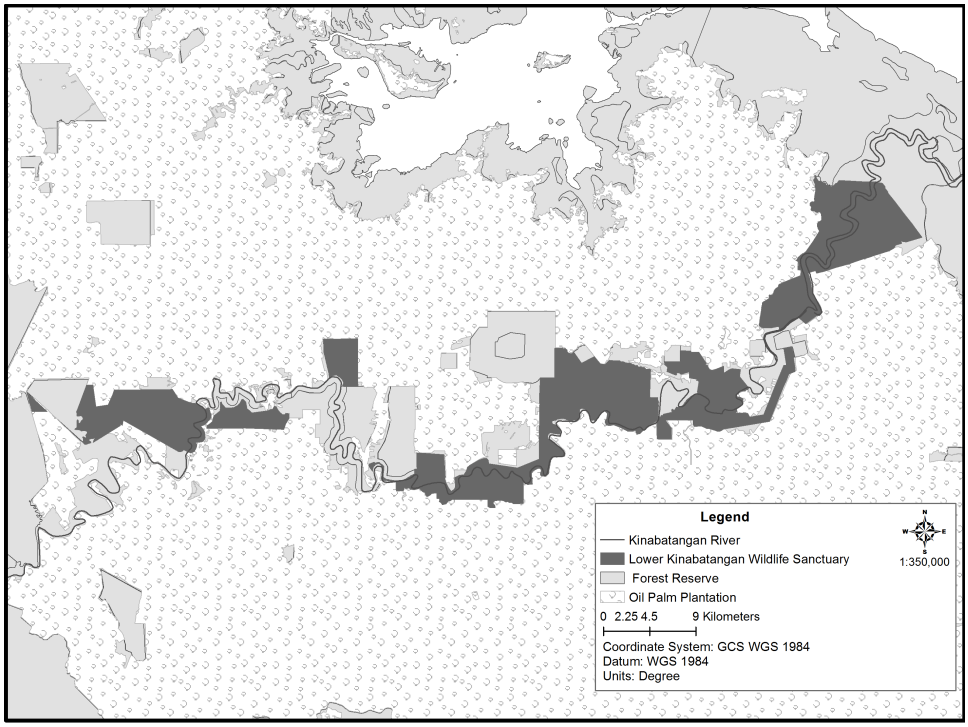

Figure 2: A map of Kinabatangan Wildlife Sanctuary

Hornbills are tree cavity nesters. They are unable to make those cavities and rely on naturally formed tree cavities. Historical logging activities and agriculture expansion has removed large mature cavity bearing trees from the Kinabatangan forest. Hence, the purpose in this project is to provide breeding opportunities for the hornbills while the forest regenerates.

Despite the fragmented state of the forest, eight species of hornbills persist in Kinabatangan, Borneo and they are listed in the IUCN Red List as:

- Critically endangered Helmeted hornbill (*Rhinoplax vigil*),
- Endangered Wrinkled hornbill (*Rhabdotorrhinus corrugatus*)
- Endangered White-crowned hornbill (*Berenicornis comatus*)
- Vulnerable Rhinoceros hornbill (*Buceros rhinoceros*)
- Vulnerable Black hornbill (*Anthracoceros malayanus*)
- Vulnerable Wreathed hornbill (*Rhyticeros undulates*)
- Near threatened Bushy-crested hornbill (*Anorrhinus galeritus*)
- Least concern species; Oriental Pied hornbill (*Anthracoceros albirostris*).

Dr. Marc Ancrenaz from HUTAN/KOCP, a French based ngo in Borneo, pioneered the nest box research and Ravinder and her team joined this collaboration in 2015 to help further this work. Chester zoo and Beauval Zoo, and recently Phoenix Zoo are all funders and have even contributed their time & expertise to the project. Together the team set out to restore natural cavities of hornbills that have deteriorated over time. In addition, artificial nest boxes were installed to provide nesting opportunities for large bodied hornbills.

Project members

1) Ms. Ravinder Kaur – 36 years old
Team Role: Team leader, observer, fund raising, study design & statistical analysis.
- Conservation Biology (BSc) from University Malaysia Sabah and a Masters in Science (MSc) (Ecology) from the same University. Tail end of PhD in University Malaya. Worked in Malaysian Nature Society on the hornbill project for four years, in 2005-2009, as the project coordinator.

2) Mr. Helson Bin Abdullah – 27 years old
Team role: Observer, tree climber, boatman and forest guide (to navigate through the forest).
- Studied up to O levels. A local based in Kinabatangan and he has had several jobs such as a tourist guide in the Kinabatangan forest (four years) and as a fishermen.

3) Mr. Sanjitpaal Singh - 36 years old
Team role: Observer, fund raising, photographer (visual documentation)
- Has a Diploma in Integrative Journalism and works as a professional photographer (www.fullcirclepix.com/www.jitspics.com). Has won several international awards.

4) Mr. Amidi Majinun – 20 year old
Team role: Observer, tree climber, boatman and forest guide (to navigate through the forest).
- Studied up to O levels. Worked with ngo HUTAN/KOCP in the Swiftlets recovery project.

Section 2:

Aim and objectives (max 200 words)

This project aims to address the loss of natural cavities due to deforestation. It will provide breeding opportunities to many of the hornbill species, especially large bodied hornbills that usually nest in large mature trees found in primary forests.

The objectives of the project are:

1) **Restoration of natural cavities**. Locate natural cavities and restore.
2) **Design and set up artificial nest boxes**. Different designs will be tested, equipped with data loggers and camera traps for detecting internal temperature changes and hornbill visits.
3) **Locate natural nesting sites of hornbills**. Regular nest monitoring deter poaching. Direct observation of breeding pairs help better understand the breeding ecology of the birds.

Changes to original project plan (max 200 words)

Objective two and three were achieved. We encountered problems with objective one. The team completed a 10km2 plot survey, to search and locate natural tree cavities systematically. Though not nests of hornbills, these fifteen trees with cavities were located and identified, and will be monitored in the long run. However, the project team encountered problems revisiting the study site for nest restoration works, as the area was being heavily investigated by Sabah Wildlife Department (there had been an incident of illegal hunting of an elephant). Then, due to flooding, certain areas were inaccessible. Therefore, from 15 natural cavities that needed restoration works, only 6 were accessible and restored by the team.

Methodology (max 500 words)

1) Restoration of natural cavities.
Natural tree cavities that have potential to be modified to become suitable cavities for hornbills or abandoned nest cavities are chosen for cavity restoration works. The restoration works involve carpentry and creativity, to remedy the common problems such as a collapsed cavity floor, a low occurring funk hole and a narrowed cavity entrance. Based on the condition of the nest tree, appropriate measures are taken such as the addition of soil in a sunken cavity floor, to raise the cavity floor while narrowed entrances can be filed to become larger and large entrances are made narrow with the addition of plywood.

2) Design and set up artificial nest boxes
Artificial nest boxes were designed based on the recommendation of Kemp (1995) (Figure 3).

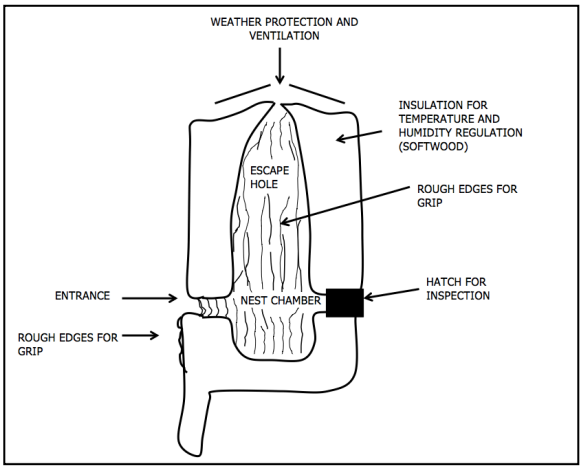

Figure 3: Artificial nest box dimensions based on an illustration by Kemp (1995).

3) Locate natural nesting sites of hornbills.

Maps with a grid overlay were prepared using Arcgis software and then uploaded into the Garmin GPS devices. The maps within the GPS helped guide the observers to remain inside the

plots and walk within the area using a 'S' shape transect to ensure greater coverage area. In terms of effort required, the 250mx250m plots were selected (Figure 4) because it was a manageable size for the observers.

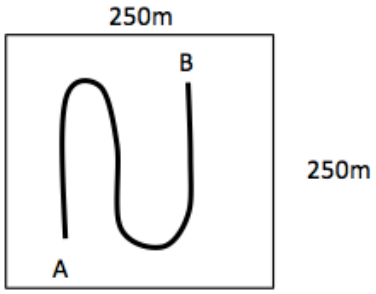

Figure 4: The 'S' shape transect walked on by observers in a 250mx250m plot.

The observers walked on the 1.2km transects in each of the systematically chosen plots (0700-1630hrs). The observers also used a compass to navigate through the plots and into neighbouring plots. In each 250mx250m grid, the team searched large trees for cavities and cavity-bearing tree were recorded and geotagged. A blue paint was also used to mark the tree for future visits.

Outputs and Results (max 500 words)

- During plot surveys, 15 cavity bearing trees located, geotagged and identified to species/genus level **(Please see Appendix 3).** 33 ficus tree species, important food plants of hornbills were also located.
- 6 dilapidated natural cavities remedied and four were reused producing nine Oriental Pied hornbill fledglings.
- Artificial nest boxes that mimic natural nest internal conditions were successfully developed.
- Five artificial nest boxes installed and being visited by four hornbills species; endangered Wrinkled hornbill *Rhabdorrhinus corrugatus* and vulnerable Rhinoceros hornbills *Buceros rhinoceros,* least concern Oriental Pied *Anthracoceros albirostris*, near threatened Bushy crested *Anorrhinus galeritus.* **(Please see Appendix 4).**
- New nests located; endangered Wrinkled hornbill *Rhabdorrhinus corrugatus*, vulnerable Wreathed hornbill *Rhyticeros undulatus,* least concern Oriental Pied *Anthracoceros albirostris*, near threatened Bushy crested *Anorrhinus galeritus* and vulnerable Black hornbills *Anthracoceros malayanus*.
- Detailed nest observations of Helmeted hornbills and diet preferences obtained.

Communication & Application of results (max 200 words)

The following were ways to raise awareness about hornbills, their treats and their importance among Malaysians. In addition, data collection about the species plant based diet, especially of the critically endangered Helmeted hornbills will be very useful for reforestation efforts in Borneo and for zoo keepers that handle hornbills in captivity.

1) https://www.birdlife.org/worldwide/news/world-first-rhinoceros-hornbills-give-artificial-nest-box-seal-approval

2) https://www.thestar.com.my/metro/focus/2017/06/28/phd-student-first-malaysian-to-get-uk-award-for-hornbill-research/

3) Scientific paper submitted to Forktail Journal about nesting and feeding behaviour of Helmeted hornbills.

4) Public talks – Borneo Bird Festival at IMAGO Mall
https://www.borneobirdfestival.com/meet-the-speakers/meet-the-speakers-2/
5) Public talks at Wildlife Department Peninsula Malaysia.
http://www.wildlife.gov.my/index.php/en/mutakhir/251-program-expert-lecture-series-bil-4-2017-save-the-hornbills

Monitoring and Evaluation (max 200 words)

Camera traps were utilized to capture pictures and video of visiting hornbills to nest boxes and restored nest cavities. In addition, the use of restored cavities by hornbills indicates successful efforts in providing more nesting opportunities.
Data loggers were used to measure internal temperature and humidity levels of nest boxes, to ensure the desired range was achieved i.e. low temperatures and high humidity levels.
Data sheets were used during weekly monitoring of active nests, to record diet preferences and behaviours.

Achievements and Impacts (Max 500 words)

- 15 cavity bearing trees located, geotagged and identified to species/genus level helps scientist understand:
  a) What types of species of trees are likely to form cavities and can be considered for reforestation efforts.
  b) Informing management about the availability of trees with cavities.
  c) Allows future nest restoration works to be conducted.
- 6 dilapidated natural cavities remedied and four were reused means we have provided more nesting opportunities for the hornbills. It also proves how important nest cavity restoration efforts can be and how it can be carried out in other locations to ensure the species can survives. 9 individual Oriental Pied hornbill fledglings were produced thanks to this effort.
- Artificial nest boxes that mimic the internal conditions of natural nests have been developed and it is the first of its kind (based on our literature review, there are no hornbill nest boxes that provides a similar internal microclimate condition of a natural tree cavity i.e low temperature, high humidity levels).
- Five artificial nest boxes installed and being visited by four hornbills species especially endangered Wrinkled hornbill *Rhabdorrhinus corrugatus*. The interest shown by this species is very encouraging, as it visited one nest box in 2015 and was never seen visiting the nest boxes again until we placed up the new designs under the CLP funding.

- New nests located; endangered Wrinkled hornbill *Rhabdorrhinus corrugatus*, vulnerable Wreathed hornbill *Rhyticeros undulatus.* The discovery of these nests allows further studies to be conducted about the bird's behavior, nest tree choice and diet preferences. These species are extremely rare and nothing much has been published on this species.
- Detailed nest observations of the rare critically endangered Helmeted hornbills and diet preferences obtained. Such data has not been published and our scientific paper would be one of the most important publications to science about this species.

Capacity Development and Leadership capabilities (Max 250 words)

To be accepted into the CLP circle has been uplifting and empowering to the team. It is not easy to do conservation work in a developing country. We are grateful that CLP provided scientific advice and moral support through its network of CLP alumni and staff.

For Ravin, it was an opportunity to lead a team and to enhance her scientific writing skills. It was also good training for her to manage money and people. It built her confidence. Conservation involves more men than women and this project made her learn to step up and speak up. Winning the CLP award also brought positive attention to her project and she is now known and recognised by the Malaysian government as a hornbill specialist. For Sanjit, it was an opportunity to photograph the hornbills and produce more award winning shots. He ended up exhibiting his photography works in Chester Zoo in 2018. For Helson, his carpentry work with the nest boxes received lots of praises and attention and it gave him the confidence to start his own woodcraft business.

Section 3:

Conclusion (max 250 words)

The project has successfully provided nesting opportunities for hornbills. With the nest restoration efforts, nine fledglings of Oriental Pied hornbills have been produced. Though they are listed as least concern on IUCN red list, hornbills are ecologically important because they are excellent seed dispersers and will contribute to the regeneration of the forest. In addition, the artificial nest boxes show promising signs, with many visiting hornbills exhibiting interest (e.g. courtship feeding between a pairs recorded in front of the nest boxes). We believe it is a matter of time before the boxes are utilised. The new nests located allows for more research to be conducted especially concerning the rare hornbill species e.g. endangered Wrinkled hornbill *Rhabdorrhinus corrugatus* and vulnerable Wreathed hornbill *Rhyticeros undulatus.* It also provides job opportunities because we employ local people to watch these nests and collect data every week over a 4-6 month period. The constant monitoring of nests also deters poachers. Poachers seeking to hunt critically endangered Helmeted hornbills *Rhinoplax vigil* have actually shot other hornbills by mistake because they were unable to tell the species apart. Therefore, it is important to have hornbill nests located and monitored by locals, to provide safe nesting for all the eight species of hornbills in Borneo.

Problems encountered and lessons learnt (max 500 words)

- *Which project activities and outcomes have been problematic and in what way, and how has this been overcome?*

The preparation of the artificial nest box went well because the team did a thorough literature review and even spoke to the experts that have experience creating these nest boxes in their countries (e.g. Thailand Hornbill Project). Since even the experts agree that the existing nest boxes are not providing ideal temperature and humidity readings, the team decided to enhance the designs under the CLP project. We believe hornbills are not nesting in the boxes yet because they are concerned by the camera traps and will bring them down in March 2019. This is because they peck at the camera traps and spend a considerable amount of time looking into the camera traps as opposed to the nest box entrance.

The project team encountered problems revisiting the study site, as the area was being heavily investigated by Sabah Wildlife Department (there had been an incident of illegal hunting of an elephant). Then, due to flooding, certain areas were inaccessible. Therefore, from 15 natural cavities that needed restoration works, only 6 were accessible and restored by the team. The team will strive to obtain more funds to continue this good effort.

The presence of a local ngo, HUTAN/KOCP played a pivotal role. Working with local communities takes time, because one needs to build trust. The CLP team was introduced to the locals through HUTAN/KOCP and this made the work and ideas brought forth more acceptable by the locals. It also helped in the process of obtaining forest and research permits with the government officials.

The CLP team was a diverse team. Each of us brought different skills to the table.

Though plans are made, the forest conditions and wildlife are unpredictable. Always start the activities early and anticipate problems. It is rarely ever completed as planned.

- *Briefly assess the specific project methodologies and conservation tools used.*

There are many artificial nest box designs and how to create them available on the Internet and in scientific publications. They should be carefully reviewed to avoid repeating the mistakes of others.
Searching for something in the forest using grids are very important, because even if you do not find what you were looking for, you can actually report about the area searched and this is also an important piece of information.

- *Please state important lessons which have been learnt through the course of the project and provide recommendations for future enhancement or modification to the project activities and outcomes.*

Local people support can help take the project to greater heights. Need to always work with locals and always make sure you include other important stakeholders at the very beginning, as they may be needed to complete activities more easily. Whenever there is press coverage about the project, make sure it highlights the efforts of local people as this motivates them to be more involved and committed to your project.

In the future (max 200 words)

We need more artificial nest boxes created and installed. The artificial nest boxes that have been installed need to be monitored and maintained in the years to come. Therefore, it is

imperative to obtain funds, to continue this project. It is also essential to locate more nest sites of hornbills and establish a nest guardianship programme that is sustained through donations (e.g. nest adoption programmes in Thailand), especially nests of the critically endangered Helmeted hornbill *Rhinoplax vigil*, as they are being hunted for its red ivory. In addition, dilapidated nests need to be restored. Lastly, we need to raise awareness about the laws that protect hornbills to prevent hunting and instil love and pride in the hearts of local people, so they are more inclined to defend their wildlife if the need arises in future.

Financial Report
Please see attachment

Section 4:

Appendices

Output	Number	Additional Information
Number of CLP Partner Staff involved in mentoring the Project	-	-
Number of species assessments contributed to (E.g. IUCN assessments)	-	-
Number of site assessments contributed to (E.g. IBA assessments)	-	-
Number of NGOs established	1	Ravinder set up a social enterprise called Gaia, to continue wildlife conservation work in Malaysia.
Amount of extra funding leveraged ($)	2	Fundamental Research Grant (Malaysian Government grant) & Chester Zoo
Number of species discovered/rediscovered	-	-
Number of sites designated as important for biodiversity (e.g. IBA/Ramsar designation)	-	-
Number of species/sites legally protected for biodiversity	-	-
Number of stakeholders actively engaged in species/site conservation management	-	-
Number of species/site management plans/strategies developed	-	-
Number of stakeholders reached	-	-
Examples of stakeholder behaviour change brought about by the project.	-	-

Examples of policy change brought about by the project	-	-
Number of jobs created	2	Helson and Amidi are locals in the village and they have become full time employees of the hornbill project.
Number of academic papers published	1	In progress
Number of conferences where project results have been presented	1	ATBC for quantifying trees with cavities using zero-inflated models

Bibliography

The nesting behaviour of Helmeted hornbills – in review by Forktail Journal.

Address list and web links

www.xploregaia.com

jitspics.com

Distribution list

NA