Laidlaw Scholarship Conservation Education Project Report

16 Jun – 25 Jul 2023

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Introduction

This project was implemented by the second generation of Laidlaw Scholars for their leadership-in-action (LIA) project for the Kasiisi Project. The Conservation Education (CE) team consisted of Eirlys Morgan (University of York) and Yi Xi Kang (University College London).

Over six weeks, we worked with the CE team in Kibale Forest Schools' Program (KFSP), based in Kasiisi, 12km south of Fort Portal, southwest Uganda. KFSP partners with 16 schools mainly in the Kabarole district, and we visited 10 of these schools (Kasiisi, Kigarama, Kiko, Kyanawara, Pere Achte, Iruhuura, Nyabweya, Kitere, Kiamara & Kyakatara).

There were 2 main aims of the CE project: one, to update and develop conservation curriculums to be taught in the partner schools of KFSP; second, to analyse existing beehive data collected from Broodminder devices in various apiaries on the edges of Kibale National Park (KNP).

This report is structured based on the 2 aims, and details the work that was carried out, the challenges the team faced and the status of the aims. Advice for future generations of scholars is also detailed in a last section.

Aim 1: Curriculum Planning

The KFSP staff and first generation of Laidlaw Scholars have planned and written many different curriculums, but these were not organised online and information was not up-to-date. We were tasked with synthesising the existing content and ensuring that the sessions would be interactive so that the kids could learn better.

The CE team first started with researching and planning for pollinator talks. We made sure to include practical activities so that students could practise what they learnt. This was the main focus of the subsequent talks in schools. The first session included explaining what pollinators are, the process of pollination, differences between self and cross pollination, and the types of pollinators. We finished off each session with a word search on pollinators. The word searches were tailored in terms of difficulty based on the school we were going to.

Session two elaborated on the threats to pollinators, namely pesticides and habitat loss (deforestation), and the actions that students and schools could take. The session started with a 'guided comprehension', where students had to fill in the blanks based on a range of words provided. This was generally quite challenging for younger students (P3, P4, and even some P5). We made sure to explain all the sentences and difficult words after, which were also translated by the KFSP staff or wildlife club patrons. At the end of the session, the students also did posters in groups which they put up in their classes (Figure 1.). The pollinator sessions were conducted in Kasiisi, Kigarama, Kiko, Kiamara, Kitere, and Kyanawara.

Figure 1. Students presenting posters they created to share the message 'save the pollinators'.

Besides presenting on pollinators, we also presented on elephants in Nyabweya Primary School. This session was adjusted based on the work completed by the 2022 Laidlaw CE scholars. It covered fun facts on elephants, what it means to be endangered and the differences between savannah and forest elephants. No further sessions were conducted because of the ongoing International Elephant Foundation (IEF) social network analysis which aimed to educate 'key influencers' on specific elephant knowledge. We also adjusted and planned for 2 more comprehensive elephant sessions for these 'key influencers'. Session 2 covers the threats to elephants (habitat loss and poaching), ending off with a debate on '*should elephants be allowed on farmlands*'. Session 3 covers how one should react to elephants and involved a role play where students act either as the elephants or the humans.

In preparation for World Chimp week (10-14 July), we planned a talk to introduce what chimps look like, how they move, what they eat, where they live and why they are endangered. This was adjusted based on the information sheet given to us by the Kibale Chimpanzee Project (KCP) and chimp researchers. A deck of slides was also done up, although this was not utilised due to technical issues. Eirlys also designed a poster (Figure 2.) which was given to all classes of P4, P5 and P6 in every school. Rangers from Ugandan Wildlife Authority (UWA) also assisted in delivering demonstrations on snare removal.

Due to time constraints, the following talks were planned but not presented: waste management (1 session), climate change (1 session) and bees (2 sessions). This is useful for future presentations by the KFSP team as they conduct regular talks in schools throughout the academic year.

Overall, the talks aimed to improve knowledge and pique interests among youths in conserving Uganda's natural environment. Deforestation, driven by one of the world's fastest rates of population growth, is a pressing issue in Uganda. Educating the younger generation is of paramount importance as they are the future stewards of the country. This is the key aim of KFSP, and we believe that the curriculums designed will be of great help to them.

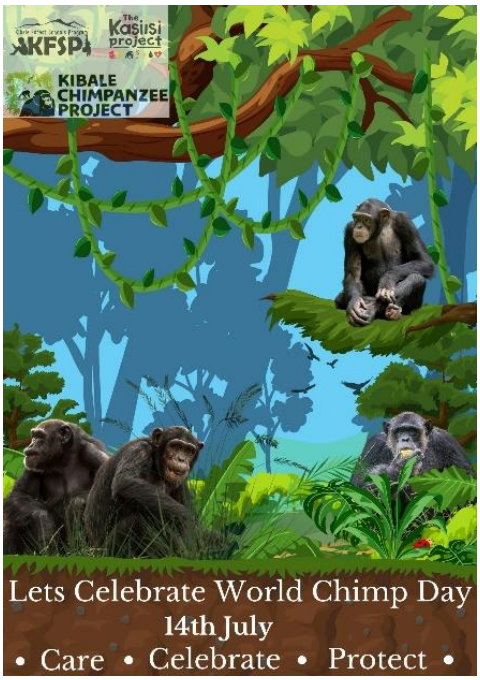

Figure 2. Poster created for world chimp day to be distributed across all 16 schools.

Aim 2: Broodminder Data Analysis

KFSP has worked with Broodminder to install sensors within beehives in apiaries since 2015. Hourly collection of temperature, humidity and in some cases weight of hives, have been collected since 2020. This meant that we had 3 years of data to work with.

We started by creating a new demographics of all the hives in the Kasiisi One farm. Thereafter, we wrote a code to calculate the percentage time the hives were within brood zone for both temperature (33-37) and humidity (50-70%). The percentage was then converted into a health score out of 20 (Figure 3.).

	Device	meanT	medianT	rangeT	meanH	medianH	rangeH	Number of datapoints	BZ_temp_%time$n	BZ_hum_%time$n	Temp_score$n	Humidity_score$n
1	42:09:E8	33.57313	34.030	12.58	72.37294	72	28	4923	76.98557790	70.95267	16	15
2	42:0A:21	34.84813	34.830	4.70	69.76563	70	23	4574	99.89068649	97.52951	20	20
3	42:0A:44	33.62407	33.910	14.22	71.32568	72	34	4575	74.73224044	83.51913	15	17
4	42:13:7B	34.61749	34.620	7.16	71.73078	72	20	2979	98.62369923	81.53743	20	17
5	42:16:7C	34.42612	34.830	19.20	69.46820	71	24	4575	90.84153005	96.41530	19	20
6	42:16:9C	24.93734	25.170	23.85	70.46473	71	28	4919	8.39601545	80.09758	2	17
7	42:1A:98	33.44174	34.100	17.07	71.67768	72	25	4902	74.98980008	78.96777	15	16
8	42:1A:D9	33.50279	33.740	17.41	76.28072	76	28	4574	77.65631832	24.02711	16	5
9	42:1A:E0	34.52302	34.560	8.32	73.20521	73	26	4917	99.36953427	65.28371	20	14
10	42:1A:E1	34.19154	34.200	11.85	74.88823	75	23	4581	97.33682602	43.17835	20	9
11	42:1A:E6	34.24884	34.370	9.79	76.64170	77	22	5314	93.24426044	20.53067	19	5
12	42:1A:F2	32.39697	32.735	9.42	78.47543	79	17	1058	43.95085066	13.61059	9	3
13	42:1C:CD	32.75077	34.520	23.59	72.63668	74	36	4569	72.31341650	58.67805	15	12

Figure 3. Information on temperature, humidity, percentage time in brood zone and the score for the 13 devices in the Kasiisi One apiary from 1 Mar 2022 to 31 Aug 2022.

Physical hive checks are conducted every week for 5 hives in the farm, and a large amount of information is recorded. We were tasked with creating a health score for each of these hive checks, and we based it on the important parameters such as the number of brood, pollen, uncapped honey and capped honey combs. These were strong indicators of colony health which were used to make another health score (Table 1.). The reason for this is to allow comparisons between the Broodminder health score and the hive check health scores and observe any significant differences or patterns that emerge.

Table 1. The health score for physical hive checks developed by us.

Observation	**Number**	**Score**	**Tick**
Approx # of brood combs	0	1	
	1-2	2	
	3-4	3	
	5-6	4	
	7 and more	5	
Approx # of pollen combs	0	1	
	1	2	
	2	3	
	3 and more	5	
Approx # of uncapped honey combs	0	1	
	1	2	
	2	4	
	3 and more	5	
Approx # of capped honey combs	0	1	
	1	2	
	2	4	
	3 and more	5	
Pests observed (for small numbers, if hive is completely infested, discard it)	Brown and black beetles	-2	
	Ants	-2	
	Toads, geckos and snakes	-2	
	Spiders and wasps	-3	
	Maggots	-3	
	Varroa Mites	-5	
	Rats/mice	-10	
Total Score			

Due to time constraints, we were unable to start the data analysis on the Broodminder devices for the other apiaries, but with the system set in place, the scores can be calculated quickly for the other apiaries.

Achievements & Challenges

Foreign accents proved to be a much bigger challenge than initially anticipated. This was especially prevalent in schools with little exposure to foreigners (termed *Mzungus*) such as Kiamara, Nyabweya and Kitere. We made sure to speak extremely slowly, but the KFSP staff and teachers still needed to translate many sentences for us. After realising the difficulties for students to understand us, we developed more engaging forms of learning such as a role play to depict the difference between cross and self-pollination.

Technical issues were also a big challenge, especially for the Chimpanzee presentations in week 4 (leading up to World Chimp Day on 14 July). This was because we conducted the presentations to the entire school (barring Primary 1 & 2 in some schools) which meant that we had to conduct the talks outdoors. The projector was not designed for outdoor usage and we had to conduct the talks without any visual aid despite planning a deck of slides. Therefore, we had to be creative and think of ways to engage students: one way was a demonstration of how chimpanzees walked (Figure 4.).

Figure 4. Yi Xi demonstrating to the students how chimps walk on all fours 'knuckle walking.'

The talks on climate change and waste management in particular were highly difficult to write and plan due to the moral dilemma of coming from developed countries with a much higher carbon footprint. We felt that we were not in the best position to deliver these talks and asked that we did not have to present on these talks. However, we still assisted the KFSP

staff in planning the curriculum by sourcing and organising facts about climate change and waste management.

Cultural differences were extremely pertinent when it came to teaching styles. Ugandan teaching largely focuses on rote memorisation. Many students were extremely shy and few students would respond to questions when asked. This prompted us to think of simpler ways of phrasing questions. Encouragement was also given to anyone who would respond, even if the answer was incorrect, by having the class applaud the students who volunteered. Activities such as wordsearches were also new to many students, and some time had to be spent explaining to the students.

In spite of these challenges, the students and teachers of the wildlife clubs still learnt a lot from the talks. This could be seen from the worksheets which the students did, with high levels of enthusiasm and participation (Figure 5.) The word searches (P5) for World Chimp Day were particularly well received as it promoted group work and was something new for them. The posters were also done extremely successfully in Kitere, where each class (P4, P5, P6) designed 4 posters for actions that could be taken to save the pollinators (Figure 1.).

Figure 5. Students completing worksheets on pollinators.

The analysis of the Broodminder data is also highly successful as it can be implemented to the hives in the various apiaries. Flexibility is also present in the code which allows for the study of different time frames. Seasonality is an important aspect of monitoring bee hive health, as the bees are generally more active during the dry season when there are more flowers in bloom. Hence, we foresee that what we have done would be of great help to the bee project and for farmers to predict how healthy their hives will be in the future.

Finally, robust communication between the CE (scholars) team and KFSP was instrumental in ensuring effective implementation of the talks in partner schools. Similarly, the breakthrough with the analysis of the Broodminder data could only have been accomplished with the help of the KFSP and KP team.

Advice and recommendations for future scholars

Effort was made to pick up basic greetings in Rutooro (the local language), which many students and teachers were impressed by. Particular attention should be paid to remembering and asking for someone's pet name (*Empaako*) as this is a highly important aspect of Batooro culture and a sign of respect for elders. We found that this made the teachers and students warm up to us a lot quicker.

In terms of the implementation of the talks, we suggest that scholars focus only on 1 or 2 topics for talks, as this would ensure that they are more familiar with the topics and can answer questions from the students. Interactive methods of teaching are also popular among the students, especially activities that involve some kind of movement. The kids loved seeing us *Mzungus* 'act'! However, it is important to ensure that the activities are adapted to suit a range of English standards, as some schools have noticeably different language abilities. Shorter sentences and simpler words are also preferred over convoluted sentences.

Going out into the field was also a very enriching experience and we highly recommend that future scholars spend enough time getting to understand the local context. For us, this involved going to the Kasiisi farm for hive checks (Figure 6.), elephant incursion checks in the village (Figure 7.), and the school visits. Engaging in these activities increased our understanding of the local culture and way of life, which are key components if one wants to talk about conservation. Trying to conserve the environment without the support of the locals is bound for failure. This is one aspect which KFSP is particularly good at – maintaining close relations with locals – and all scholars should try to understand how this is done.

Figure 6. Yi Xi with KFSP beekeeper Vallence during a hive check.

Figure 7. Elephant incursion checks at a village neighbouring KNP. These bee hive fences are used as a deterrent strategy against elephants as they are afraid of bees.

In terms of future activities for scholars, updating the hive check scores and Broodminder data analysis script would be important, given that there would be 1 full year of hive health scores. The hive check scores were created based on just studying a few particularly strong hives and might not be fully representative of weaker hives. If a database has not yet been completed, this should be updated and made the most efficient so that compilation of hive check data can be automated and given a score.

While many different curriculums were planned, we were unable to start on those of the grey parrots, which were reintroduced into KNP, and birding in general. Other possible activities could include an introduction to indigenous trees (complemented by the tree guide, a work in progress by Yi Xi), a 'bioblitz' (where all species seen are identified or recorded) within school compounds, or the creation of small gardens around schools (the health team was involved in the Perma Garden in Rwenkuba Primary School). The planning for World Chimp Day should also be started earlier, so that activities could be trialled and changed. The entire team visited all 16 schools over 4 days, which was an impressive feat, but this only involved giving talks. Greater emphasis could be placed on the visual depiction of chimpanzees (as the projector did not work outdoors) so that every child knows what a chimpanzee looks like.

Overall, the 6 weeks spent in Kasiisi has been fantastic, and both of us thoroughly enjoyed our stay. We strongly recommend future Laidlaw scholars to consider the Kasiisi Project as their leadership-in-action project for the second summer.

Acknowledgements

This project could not have been completed without the help of the following people: firstly, Atwoki Derrick for his continuous patience, answering our questions, sharing knowledge and guiding us to create the best curriculums for the students; Atwoki Joshuah and Araali Kenneth for their support and teaching with us whenever we visit schools for talks; the rest of the KFSP team for the advice given and answering any questions we have; Dr Zarin Machanda and Dr Emily Otali for introducing us to the CE team and giving us flexibility in our approach to CE; Abwooli Patrick, Ateenyi Juice and Amooti Eddy for driving us to the schools despite their long distance; lastly, Marianne Staniunas for her immense support and enthusiasm in the bee project and Broodminder data.

The staff of the Kasiisi guesthouse, Chefs Izaac and Anderson, Ateenyi Faith, Ateenyi Jane, Akiki and Abwooli, have also taken exceptional care of us and ensured that we were well fed and happy. We are also grateful to all the students in the schools we presented in who gave us their respect and listened to our presentations. Finally, we are grateful to the Laidlaw Foundation for funding our expenses and travel.