

Communicating conservation: using acoustics and education to develop understanding of endangered slow lorises *Nycticebus pygmaeus* and *Nycticebus javanicus* and gibbons *Nomascus gabriellae* and *Hylobates moloch* in Viet Nam and Java.

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Understanding a threatened species' behavioural ecology and involving local people in reducing anthropogenic pressures are critical to effective conservation programmes. My study aimed to promote understanding of threatened Vietnamese and Javan primates through two research strands:

- 1) Study the vocal communications of the Endangered pygmy slow loris (*Nycticebus pygmaeus*) to establish whether it includes an ultrasonic repertoire;
- 2) Develop and evaluate an innovative drama-based conservation education resource for use with rural teenagers to enhance their knowledge and affinity for native primates.

Working in collaboration with the [Endangered Asian Species Trust](#) (EAST) and [Little Fireface Project](#) (LFP), I conducted my field research concurrently in Cát Tiên National Park, Viet Nam and Cipaganti, West Java, Indonesia from May to July, 2016.

The ultrasonic strand

I conducted my ultrasonic study of *N. pygmaeus* at Dao Tien Endangered Primate Species Centre in Cát Tiên NP. The recording equipment was a Wildlife Acoustics Echometer 3+ with SMX-UT ultrasonic external microphone with directional horn and windshield. Using semi-active constant recording methods (LFP protocols 2016, unpublished), I studied 22 captive rehabilitant individuals and three newly released, radio-collared individuals in half-nightly sessions over a two-month period. My research was limited by site conditions, particularly:

- The need to maintain a recording distance of >12m to respect the sensitive nature of *N. pygmaeus* and the ultimate goal of wild release;
- Dense secondary monsoon forest which attenuates ultrasonic soundwaves over short distances and limited visual observations.

To locate the released pygmy lorises, I used GPS coordinates of their day-time sleep sites to select fixed recording stations on trails close to the study individual's last known location.

I collected 70+ hours of ultrasonic recordings, comprising >5000 calls. Using RavenPro v.64.1.4 software, I have analysed sonograms of the first 750 calls by eye. Research constraints meant I was unable to collect behavioural observations to complement ultrasonic recordings, or to establish categorically that the pygmy lorises were within recording range. Therefore, my approach is to identify and exclude those calls that can be attributed to other animals known to emit ultrasonic calls (bats, insects, rodents), and then assess unusual calls in the light of knowledge of mammalian call structure and available camera trap data.

My preliminary analysis provides some advancement in the scientific study of slow loris ultrasonic communication. It is already apparent that if *N. pygmaeus* uses ultrasonic calls, they differ in frequency from those of *N. javanicus*. I have identified several ultrasonic calls that cannot be attributed to insects or known mammal calls, and so are worthy of further investigation. I recommend that future study is conducted in more open agricultural habitat in the Cat Tien National Park buffer zone, allowing visual observations to be matched with ultrasonic data.

The education strand

Promoting awareness in teenagers is important because attitudes gained at this age can influence behaviours in adult life. But conservation education programmes in Asia often neglect them due to a non-targeted approach and a scarcity of appropriate tools to engage older children. I created a three month education course and teaching resources that focus on six animals. My curriculum combines:

- Investigative learning using scientific techniques to develop students' knowledge of the animals' behavioural ecology,
- Puppetry to inspire their feelings of affinity for the animals.

The course culminated in the students writing and performing wildlife-themed puppet shows in seven local villages where illegal hunting is an on-going concern. The course was delivered in one Vietnamese and two Javan schools, to enable evaluation of its impact in different cultures.

I collected data from 71 participating students in the form of freelists and creative writing (students' scripts and short stories) at the beginning and end of the course. Using quantitative and qualitative tests, I analysed the words students used to describe gibbons and slow lorises before and after participation, and evaluated changes in their knowledge and feelings of affinity towards each species.

Cultural domain analysis indicated that participants shared a collective understanding of gibbons and of slow lorises at the end of the course. Statistical analysis of the saliency of each word showed a significant increase in knowledge and emotional expression by students post-education for each species. Content analysis of the types of words they used demonstrated an increase in the use of taxonomic and behavioural-ecology words, indicating an increase in knowledge about the two species. It also showed an increase in empathetic and anthropomorphic words, indicating an increase in feelings of affinity towards gibbons and slow lorises. Consistent results were found for the schools in Java and Viet Nam, showing that the curriculum is applicable across cultures. My research demonstrates that combining investigative learning with drama is an effective method for developing teenagers' knowledge and feelings of affinity for native primates, important precursors for inspiring behavioural change.



Figures 1 and 2: Puppet shows performed by students from Klub Alam, Cipaganti, Java (left) and Thanh Binh High School, Viet Nam (right), using puppets of the six animals they studied in the Whoop Troop course.