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Letter from the Editors

Welcome to the fall edition of *Canopy*, the fist issue published by the MSc in Primate Conservation at Oxford Brookes University cohort of 2009-2010. In this issue you will find information regarding our upcoming Ten Year Anniversary from Vincent Nijman and an overview of the development, implementation, and improvements of the MSc in Primate Conservation Programme over the past decade by Simon Bearder. The following issue reflects a vast array of issues and provides insight into research conducted by the 2008-2009 cohort that illustrate diverse approaches to primate conservation and the need for continued efforts. We have an interview with Madelaine Westwood, the founder of the Great Ape Film Initiative (GAFI), describing her efforts and goals. Eric Neilson provides a great overview and whole-hearted thank you to all of our weekly guest speakers that we have had so far. Tim Lewis-Bale presents a briefing of The Bristol Conservation and Science Foundation's 2nd Annual Symposium that we attended this past semester. Additionally, Halit Khoshen gives a synopsis of the education the keepers working at the Summit Zoo in Panama have received to improve the welfare of the primates in their care.

Many of us are still in the process of developing projects for our dissertations and are looking forward to conducting similar research that will have real world outcomes. We have had a great time getting to know our instructors and fellow classmates both in and out of the classroom. Our cohort is ready to embrace the challenges that lie before us. We hope that you will enjoy the journey and continue striving to save species from extinction.

Cheers,
The Editors

Ekwoge Abwe
Mike Anderson
Halit Khoshen
Alice Martin

By Aoife Healy

Letter from the Course Tutor

Welcome all to a new edition of Canopy,

And welcome to all the new students of the 2009-2010 cohort of the MSc in Primate Conservation. This issue offers you a number of fascinating articles partially resulting from projects finished by students from last year's cohort, and allowing them to share their findings with a larger audience. Reflecting a wide range of interests, topics addressed include animal welfare, captive management, and much needed data collected from the field that focuses on primates in their native habitats.

As you may be aware, the MSc is now in its tenth year, a good a time as any to not only look back and reflect on what once was but also a good time to look ahead and contemplate what the next ten or twenty years may bring. In this issue Professor Simon Bearder provides a vivid account of how the MSc was established, what its aims were, and how progress has been made over the last decade. Here I will look forward, and the first point where we have to stop has to be Friday 23 and Saturday 24 April 2010 – the date of our ten year anniversary conference. As the date comes nearer, what started about a year ago as a vague idea now really starts getting shape. The venue has been booked, grant proposals have been written, an initial programme has been set up and the list of invitees is being finalised. While always intended as a scientific conference we hope that it will be an occasion to celebrate the achievements of previous students, a chance to meet up with old friends, and, of course many opportunities to exchange ideas and experiences. To give guidance the conference will be structured following the six main modules offered on the MSc, i.e. 'Primate Diversity, Biogeography and Status', 'Research Methods', 'Human-wildlife Interactions', 'Genetics and Population Management', 'Captive Management' and 'Environmental Education'. In each session, current and past staff, former students, and leading primatologists from the UK and abroad will present the latest developments in the study of primate conservation. The conference should be about exchanging ideas and sharing experiences, and we make sure that there is plenty of time for discussion, both during the 'official' sessions and in different venues afterwards. To extend the goals of exchange and sharing even further we anticipate that the conference will lead to the production of an edited volume, allowing not only the participants but the public at large to get acquainted with the results of primate conservation research.

We have had quite a number of PhD students in recent years studying some of the least-known primates. This year Lilia Bernard and Karla Biebouw successfully defended their PhDs on the slender loris of Sri Lanka and the hairy-eared dwarf lemur of Madagascar, and currently we have Mphil/PhD students working in Colombia, Uganda, Guinea Bissau, Malaysia and Indonesia, amongst others. Looking further in the future I hope we can develop our MPhil and PhD programme in primate conservation even further, allowing more students to do in-depth studies of threatened primates and habitats. The last ten years has showed us that there is no shortage of projects in the field of primate conservation, and given the rate of habitat loss, and pressures we put on the last remaining populations of threatened primates, we can be assured there is no shortage of projects in the decades ahead of us. While many of you already actively contribute to finding solutions, I hope we will continue to be able to offer students the support and perhaps words of wisdom to continue to do so.

Finally I thank the editors of Canopy for their hard work and I hope you enjoy the fruits of their work.

On behalf of the MSc Primate Conservation Course Committee,
Vincent Nijman

"Only after the last tree has been cut down.
Only after the last river has been poisoned.
Only after the last fish has been caught.
Only then will you find that money cannot be eaten."

- Native Cree Prophecy

Interview with Madelaine Westwood of the Great Ape Film Initiative (GAFI)
www.gafi4apes.org

INTERVIEW BY CARRIE STENGEL – 19 MARCH 2009
EDITED BY FELICITY ORAM

1. *How do you think GAFI makes a unique contribution to primate conservation?*

GAFI provides an umbrella organisation for NGOs to access and use media for conservation purposes. GAFI has reached approximately 300 million people so far across Africa and SE Asia through its screening programmes since 2005. We also provide legal advice for NGOs in the field whose work is filmed by broadcasters to help them receive the acknowledgement and financial reward they deserve. The organization has also supported a number of MSc students in their research into the effectiveness of the media in conservation.

2. *How did GAFI come about?*

As a wildlife filmmaker I, along with many colleagues in the industry, are very aware that, although we work in one of the most powerful communication mediums, our films are not making enough of a difference – we are still losing habitats and species at an alarming rate. Many people thought that reaching broader audiences around the world might help conservation films be more effective, but no one had taken on the commitment. Since I was President of Filmmakers For Conservation and they were supportive, I decided to start.

I contacted Ian Redmond, the UNEP\UNESCO chief consultant for great apes, he suggested I start with great ape species and then use that as a template for others. So, the Great Apes Film Initiative was born. Granada and BBC agreed to supply films for the initiative, however I soon discovered that agreement is one thing and actual help is another! It took seven months of constant negotiating to get the appropriate licenses to screen the films!

In the meantime, I developed a distribution strategy. I decided I would target three key groups, a) Decision and law makers, including key national government officials as well as local village elders, b) National television audiences in range countries. Millions of people in Africa and SE Asia have not seen the wildlife films we take for granted as their television stations cannot afford to buy them, and c) Communities on the ground by partnering with local NGOs, schools, universities, wildlife management centres, remote villages, karaoke bars etc.

We set out to send copies of the GAFI library on DVD to anyone who could use them for outreach, education or even 'entertainment'. We decided we would follow up by issuing questionnaires constructed with local NGOs to measure changes in attitude, perception or willingness to participate in conservation schemes . We also hold discussions after screenings to elicit local solutions, which has proved to be extremely valuable.

Ian Redmond took the first films to west Africa and the Presidents of Cameroon and Congo signed the contract for free transmission on their television networks and the films were seen by millions of people within a week. Thus, in 2005 GAFI had begun.

3. *What major projects are you focusing on right now?*

With 15 countries and over 40 NGO partners in the field now, it is hard to single out just one project but a couple stand out. We are just completing roadshows in Sumatra funded by US Fish& Wildlife whereby the library travels through the country to offer alternative methods of engagement to palm oil workers when orangutans enter their plantations that does not result in the automatic death of the apes. We are using films specially made for this purpose by conservation filmmakers. In Uganda we have just started a new initiative to get pedal-powered-cinemas into remote regions so we do not have to rely on generators or even buildings to be able to screen films to thousands of people. We are currently raising funds to expand this project as it is in great demand by many of our NGO partners. We hope to raise enough funding to supply at least 8 countries with systems this year.

3. *What are GAFI's long term goals?*

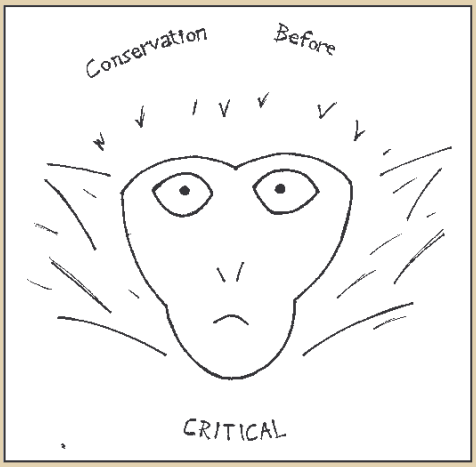
GAFI will continue to use media in every way it can to support the conservation and protection of great apes and their habitats in all range states. Specifically, GAFI will continue to provide educational films to support local initiatives like the palm oil plantation example above. We will also offer support to other organisations who wish to focus on other endangered species. We also intend to train local communities and NGO's by providing them with equipment, expertise and distribution networks so they will be able to make their own films in local languages.

Continued on Page 5

In addition, GAFI will continue to listen to suggestions for local solutions and seek to implement these wherever feasible in partnership with local communities.

4. *How can people contribute or become involved with GAFI?*

GAFI is completely run by volunteers, no-one is paid. We have vacancies for volunteers to help with data analysis, pedal-powered fund raising events web site (especially the education site where we want to provide education for school children in a number of languages). We have a GAFI Oxford team and a GAFI London team at present and new members are always welcome. However, anyone considering this should be clear about what they can offer to GAFI in the way of time, resources or skills.



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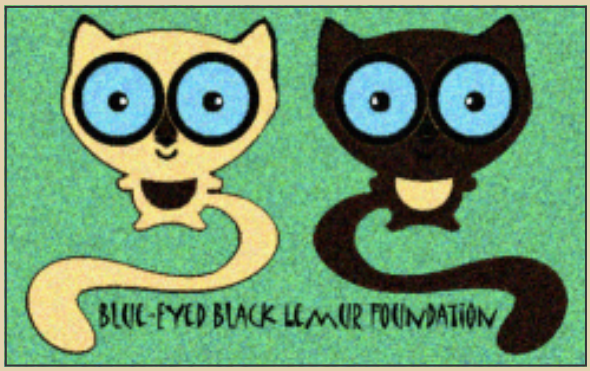

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MSc in Primate Conservation 2000-2010: A brief history

SIMON BEARDER

The MSc at Oxford Brookes originated as a development from two previous courses; the annual Conservation Summer School at the Durrell Zoo in Jersey, started by primatologists Professor Bob Martin and Alison Jolly, and a short course for zoo personnel called Animals in Captivity which I helped to run at Oxford Polytechnic with Dr Allister Smith. These courses brought together a number of teachers and zoo staff with a passion for animals, and students from a wide range of backgrounds committed to developing a career in conservation. This formula worked like a dream for short courses and we simply extended it by adding a number of postgraduate qualifications (PGCert, PGDip, MSc, PhD via full time, part time and distance learning).

Why conservation of primates and not just wildlife conservation in general? At Oxford Brookes we have been teaching undergraduate classes in primate comparative morphology, behaviour and ecology since 1976, and our research expertise in this area includes the Nocturnal Primate Research Group. We are also members of a rare kind of Anthropology Department in the UK, in which Social and Biological Anthropologists work closely together. Research included work on the interactions between humans and other primates, headed by Dr Kate Hill, and other primate field workers who needed to negotiate the cultural complexities of their field sites also benefited from these links. It therefore followed logically that we should combine our primatological and anthropological interests into an MSc course that required both. But perhaps the main advantage of giving conservation a primate focus is because it allows our students to learn a great deal from one another. They come with a wide variety of knowledge and experience, including students from primate range countries. The common interest in primates brings people together, but the huge array of subfields and areas of specialisation ensure that they do not need to compete.

The success of this formula was illustrated by the rapid increase in intake after our first year between 2000 and 2001. The numbers doubled from 17 to 34, and at this stage we brought in Dr Anna Nekaris to coordinate the course. Together with a team of permanent staff, specialist visiting lecturers and collaborating institutions such as the Oxford University Museum, Living Futures and the Cotswolds Wildlife Park, we have now reached a grand total of 308 students of 36 nationalities, with a maximum intake of 41 people in 2006. Such is the interest in conservation issues involving primates that we have been able to sustain a weekly seminar series, with some 20 visiting speakers each year. In 2005, professional help with fundraising by the University raised £155,000 to support three habitat-country studentships each year (bringing a rich vein of culturally-specific understanding) and to provide state-of-the-art equipment for student research projects (now totalling 211 projects in 42 countries). As a result, in 2007 we were one of twenty institutions to receive the Queen's Anniversary Prize for excellence in Further and Higher education.

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CLASS OF 2001

Influencing the rate of deforestation in the tropics may seem daunting, but training new generations of enthusiastic students for a life-long career in conservation is an effective way to help reverse the trend. Students are able to develop their individual interests and skills, culminating in their practical research dissertations, some of which are summarised in this twice-yearly journal, *Canopy*. Project work also leads to scientific publications and creates valuable links with non-governmental organisations, zoos, wildlife parks, sanctuaries, museums and other research institutions world-wide, building on a network of contacts within the conservation community and a firm foundation for effective action at many levels. Above all, progress is ensured by the dedication of students who are determined to do what they can to reverse the shocking decline in the world's natural resources. The qualifications they gain help them move on to conservation-related jobs, for example, in zoos, NGOs, sanctuaries, education establishments and genetics labs.

Our staffing has now increased to include Dr Vincent Nijman, who has established a research group on primate trade, Dr Nancy Priston, working with Kate Hill on human-wildlife interactions, Dr Corri Waitt, with extensive experience of research on captive management and welfare and Dr Peter Kirby, a social anthropologist with an interest in cultural differences in concepts of wildlife conservation and management. Added to this we have the support of a number of PhD students and honorary research associates/advisers, Dr Alison Jolly, Dr John Oates, Dr Debbie Curtis, Dr Giuseppe Donati, John Fellowes, Sian Waters and Andrew Perkin. We very much hope that you will be able to join us in Oxford to celebrate our Tenth Anniversary Conference on 23-24 April 2009 (see Letter from the Course Tutor). You will be very welcome.

Primates of Panama
by Halit Khoshen

Captive primate wellbeing: Changing traditions and educating keepers

HALIT KHOSHEN (HALIT.KHOSHEN@GMAIL.COM)

The primate species residing at the Summit Zoo in Panama include spider monkeys (*Ateles geoffroyi panamensis* and *Ateles fusciceps robustus*), capuchins (*Cebus capucinus*), tamarins (*Saguinus geoffroyi*), night monkeys (*Aotus zonalis*) and squirrel monkeys (*Saimiri oerstedii*). All residents are ex-pets whose "owners" grew tired and dropped them off at the zoo or were confiscated by the authorities. When I arrived in 2006 I encountered many traumatised individuals who experienced difficulties living with conspecifics or living in a cage without human contact even if it had previously been negative. The fact that the keepers were unfamiliar with species behaviours and their specific needs, did not help the situation.

The first stage in educating keepers included teaching positive contact with the primate residents. Animals are not objects, but living beings, with feelings, needs and unique personalities. Only with understanding and by treating each resident animal as an individual can one provide for what the animal requires and deserves. Based on this idea, we used the following approach:

1. ***No to fear, yes to understanding***. Mickey is a spider monkey who always comes running towards you with open arms and tries to hug and kiss you on the cheek. He lived in complete filth and had food thrown up on top of the filth because the keepers were afraid of going in, because they feared his gestures meant attack. But that is how spider monkeys greet each other in the wild. Observing and sometimes interacting with the primates teaches us so much about their behaviour, feelings and humour. The keepers were taught how to observe, listen and interpret the resident's actions in order to properly care for these traumatised residents.

2. ***Not by force, but by using our brain***. Some primate's aggressive behaviour made it impossible to go in and clean the enclosures. The keepers would respond negatively which would then cause the primates to become even more aggressive. Pancho, the alpha capuchin monkey, was so aggressive and uncooperative to shifting in order for his cage to be cleaned that it was never cleaned. Pancho was so belligerent that at least two visitors got bitten each week. To address this we began offering Pancho red grapes when he was behaving in a positive manner, moved him little by little towards the shifting cage, closed the door, and kept offering him red grapes if he behaved there while we were out cleaning the enclosure. With a bit of patience and positive reinforcement it only took a week or two to reverse this behavioural issue. It also reinforced the bonds between keeper and resident. Today Pancho moves into the shifting cage voluntarily, waits patiently, attempts to groom and play with the keepers and never bites any of the visitors.

3. ***Each primate is an individual***. The use of personal names is the first step towards a positive relationship between the keeper and the resident primate. A name gives the primate an individual personality in the eyes of the keeper and the public.

The next step for their rehabilitation was enrichment. Enrichment is the modification of the animal resident's or group of animals' environment in order to nurture their bodies and minds.

Close your eyes and imagine living in a jail cell, with no bed, chair, table, television, books, stereo, toys, drawing utensils or any other gadget day in and day out for the rest of your life. How would you feel? Alone or lonely? Stimulated or bored? Alive or dead?

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"Although other animals may be different from us, this does not make them less than us"

- Marc Bekoff in *Animal s Matter*

Enriching the life of primates in captivity is important both for the physical and the mental well being of the animals. It serves many functions:

- It elevates quality of life in captivity.
- It helps to eliminate stress, aggression, boredom and stereotypic behaviours.
- It serves in promoting species specific behaviours.
- It offers the general public a more pleasant visit.
- If performed correctly, it also serves as an education tool.
- It facilitates the work of keepers.

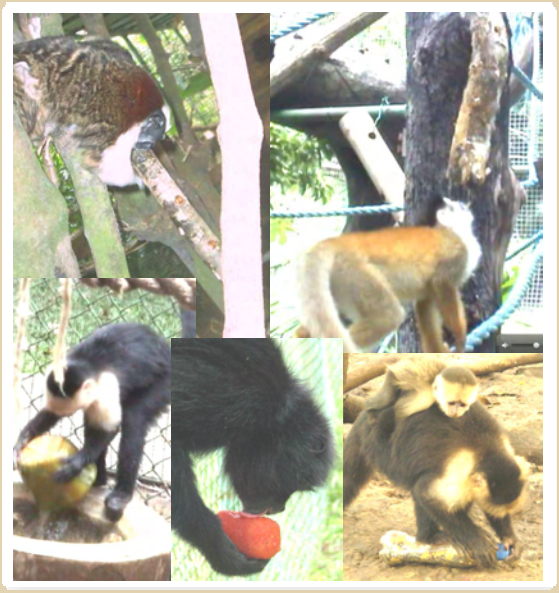
There are many components to enrichment. Training is a form of enrichment (as shown in the example above with shift training of Pancho) and so is environmental enrichment.

Training: Based on positive reinforcement, and helps create a common language between the resident animal and the keeper. Based on mutual understanding, it facilitates keepers' work and transforms experiences that could seem frightening to the animal into understandable, more easy to grasp moments.

Environmental enrichment: Performed both by furnishing the interiors in order to encourage species specific behaviours, and by changing pieces of furniture around in order to make the living quarters more interesting.

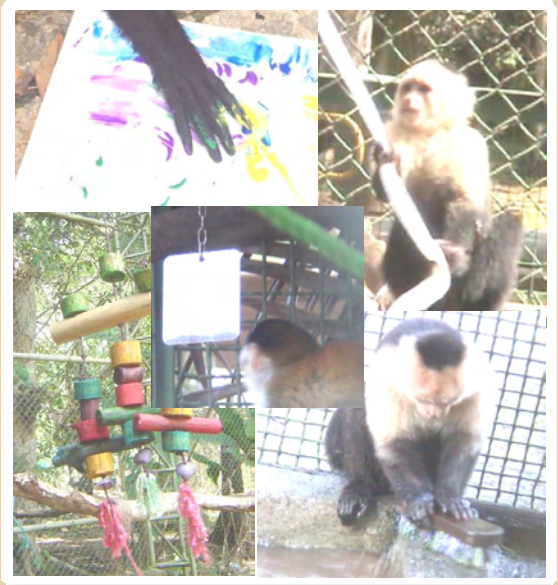
General enrichments performed throughout the day can be food related, attract and make use of the different senses of the primate, replicate behaviours performed in the wild, or just composed of general fun and enjoyment items in order to provide mental stimulation. Considering most of the primates are ex-pets the enrichment program also includes some non-natural items that may be familiar to them as well.

Food enrichment: Includes food presentation, placement and hiding of food, and novel food items.



Sensory enrichment: Includes the use of spices, perfumes, other animals' odours, food and plant items that motivate, stimulate and involve the different senses.

Toy enrichment: Includes all type of objects the animals can manipulate without getting hurt or hurting others such as toilet paper, barrels, swings, clothes, stuffed animals, puzzle toys, mirrors, hammocks, beach toys, balls.



Remember: When performing enrichment one has to remember that 1) each group of animals, each species, has different particular needs, and 2) each animal within a group has a different personality = different tastes = particular needs.

(Photos by: Daves Batista, Arun Idoe and Halit Khoshen)

The Bristol Conservation and Science Foundation 2nd Annual Symposium

TIM LEWIS-BALE (TIMLEWISBALE@GMAIL.COM)

This year the Bristol Conservation & Science Foundation invited primatologists from the field and captivity to discuss the successes and challenges of primate conservation. The aim of this talks was to take stock of what has been achieved to date, and discuss ways forward to insure the survival of primates in the future.

Selection of the talks:

Ian Redmond (Chief Consultant, GRASP) – Save the primates to save the world. Discussed the necessity for the "Copenhagen Climate Treaty" to recognize the value of primates' role in tropical forest maintenance, and consequent importance to climate stability.

John F Oates (Hunter College of CUNY) – The disappearing roloway monkey: why is conservation still failing in West African forests, and is there anything we can do to make things better? The roloway's decline is largely due to bushmeat trade. Such concerns were not being met by adequate responses from conservation establishments. Conservation needs to be executed on the ground, in habitat countries, not talked about in the lecture halls and meeting rooms of western countries.

Christoph Schwitzer (Bristol Conservation and Science Foundation) – The challenges of protecting a poorly known genus: Conservation of Lepilemurs in Madagascar. Recent genetic analyses have dramatically increased the number of known *Lepilemur* species, with 18 being described in the last 4 years. But little is known of population density, abundance or behavioural ecology hence red-listed as Data Deficient. With increasing fragmentation several species are thought to be in danger of extinction. Urgent studies are needed to avert this critical situation.

Anna Nekaris (Oxford Brookes University) – Can we use the media to conserve primates? Lessons from the "Top 25 Most Endangered Primates" biennial list. Over the years media attention on a few charismatic primate species has lead to a third of the 600+ taxa going unstudied in the wild. To ameliorate this bias, in 2000 specialists drawn from IUCN Primates Specialist Group, International Primatological Society and Conservation International began the biennial process of selecting 25 of the most endangered species.

Other talks from:

Simon Stuart – IUCN Species Survival Commission
Kathy MacKinnon – World Bank
Anthony B Rylands – IUCN Primate Specialist Group
Jean-Marc Lernould – CEPA (Conservation des Especes et des Populations Animales)
Zena Tooze – PASA Pan African Sanctuary Aliiance
Mike Bruford – Cardiff School of Biosciences
Alison Cronin – Director of Monkey World
Leslie Dickie – European Association of Zoos and Aquaria
Neil Maddison – Bristol Conservation and Science Foundation

Thank you to Bristol Zoo for hosting such an informative and well run event.

"The greatness of a nation and its moral progress can be judged by the way its animals are treated"
- Mahatma Gandhi

"A society is defined not only by what it creates, but by what it refuses to destroy"
- John Sawhill, former president/CEO of The Nature Conservancy

"If you want one year of prosperity, plant corn. If you want ten years of prosperity, plant trees. If you want one hundred years of prosperity, educate people"
- Chinese proverb

Thank You to All of Our Guest Speakers

ERIC NEILSON (EWNEILSON@GMAIL.COM)

Enrolment in the Oxford Brookes MSc in Primate Conservation has provided students with a comprehensive curriculum aimed at addressing all aspects of primatology and conservation. In addition to lectures and discussion, our cohort has attended a primate conservation symposium hosted by Bristol Zoo Gardens, travelled to the Netherlands to visit the world renounced Apenheul Primate Park and every Monday night, visiting speakers divulge the processes of cutting edge research and conservation initiatives in the field.

Starting with a bang in week 1, Dr. Susan Cheyne opened our eyes to Southern Borneo and the research and conservation projects at Sabangau, Central Kalimantan. Illegal logging and fires that can burn continuously in the meters deep peat increasingly threaten biodiversity in this incredible peat swamp. Dr. Cheyne concluded by encouraging all fledgling researchers in the room to consider contributing to projects ranging from vegetation regeneration, sleeping tree choice and GIS mapping in Sabangau.

In week 3, Helen Buckland espoused the importance of consumer choice and citizen activism in determining conservation outcomes. As director of UK Coordinator of the Sumatran Orangutan Society, she lobbies for the implementation of sustainable, orangutan-safe palm oil by large goods producers in the UK. Palm oil plantations threaten orang-utans throughout Indonesia and western consumption drives their establishment. Raising awareness oceans away from orangutan habitat is essential for protecting it.

Without leaving Sumatra, week 4 featured a rather different topic than the one before it. Through a discussion of his PhD research on Sumatran elephants, Ente Rood suggested methods for establishing species home ranges and densities. Habitat correlates allowed him to create elephant presence prediction models consequently informing conservation action for this threatened species.

Moving to Equatorial Africa, week 6 featured Alliette Jamart, the founder of HELP Congo discussing the history of the program. Decades of chimpanzee rehabilitation and reintroduction initiatives have allowed HELP to accumulate invaluable data and helpful insight for aspiring primatologists.

Every conservation program must be aware of its own eco footprint. And so, in week 7, the Oxford Brookes sustainability manager, Harriet Waters spoke to our cohort. Oxford Brookes has been ranked the 3rd greenest university in England but Harriet was keen to mention that much work has yet to be done. Discussion ranged from reducing car use at Brookes to upgrading toilets and taps to low flow technology. Given the challenges of Brookes' current student bussing system, the conversation predictably migrated to criticism of public transit.

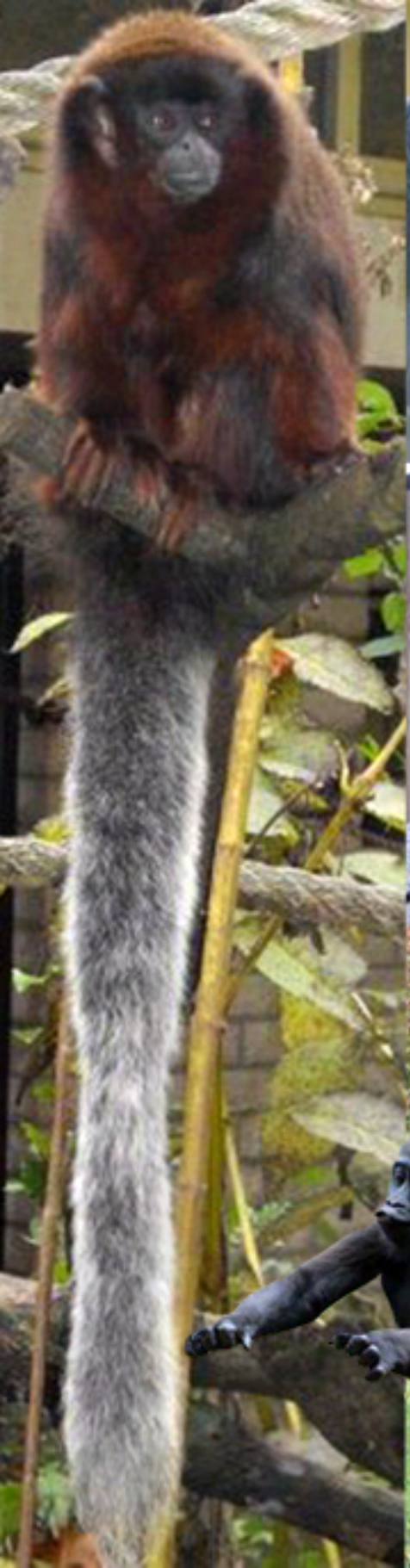
And finally, in week 8 an alumnus from last year Jermaine Clark described his work with Neotropical Primate Conservation last summer in Peru. From hiking thousands of vertical meters to social protests flaring up between his camp and his study site, JC certainly characterized the potential adventures of primate fieldwork. In conclusion, he encouraged current students to consider Peru for their own projects as his study area is understudied.

By complimenting the material and themes of our MSc and in the additional information provided in our Monday night seminars, we are inspired and challenged to achieve real world conservation outcomes. And of course, the discussion that invariably follows and blooms at the Britannia Pub leaves us all wondering where will we go from here. From the current Primate Conservation cohort, thank you to all visiting speakers and Monday night coordinators. The course wouldn't be the same without you.

Sincerely,

The 2009-2010 Cohort

"Contrary to general belief, humans imitate apes more than the reverse" - Frans de Waal







Apenheul




A comparative feeding ecology of two cercopithecine species: *Cercopithecus mona* and *Cercocebus torquatus torquatus*

DANIEL S. DREW

A study investigating the feeding ecology of two Cercopithecine species, the mona monkey (*Cercopithecus mona)* and the red-capped mangabey (*Cercocebus torquatus torquatus)* was undertaken in Rhoko Forest, Cross River State, Nigeria. The project was based at the field research centre of the conservation nongovernmental organisation and charity CERCOPAN (Centre for Education, Research & Conservation of Primates and Nature) in the Iko Esai Community Forest.

The aims of the project were:

- To gain experience of observing and recording dietary behaviours of Cercopithecine primates.
- To contribute useful information to the conservation community regarding the little studied subject species.
- To compliment and aid the ongoing research projects at CERCOPAN, Cross river State, Nigeria.
- To explore ways in which the provisioned subjects (*C. mona* and *C. t. torquatus* groups) exploit additional resources for supplementary nutrition.
- To explore differences in food resource exploitation or foraging strategies between the two subject species, and between demographic groups within the species groups.

- If differences were found between the age and sex groups, to asses if these differences represent a response to specific and distinct nutritional pressures that the subgroup would be subject to.
- To investigate whether the diets of *C. mona* and *C. t. torquatus* conform with predictions based on the Jarman/Bell model of the relationship between body size and metabolism, and thus diet.

Methods:

Over 90 hours of behavioural observation were conducted spread between the two subject species using 10 minute focal animal samples. Data were collected on the general and feeding behaviours to gain insight into the dietary composition and quality of the two species.

882 wild food samples were collected from the local forest and presented to the monkeys as wild food tests, to compare each species dietary limits, variability and preferences. Data recorded included, food type (fruit, flower, bud, seed, bark, etc.) vegetation type (shrub, tree, climber etc.), species name (if known).

Provisioned food preference tests were also conducted on the *C. mona* and *C. t. torquatus* groups.

Results:

There was a significant difference between both the overall diets of the subject species (based on the total time each species spent feeding on each food type within the enclosures) and well as significant difference between the two species propensity for eating wild food samples: Mangabeys ate a wider range of food types, and had a lower overall quality diet than the mona monkeys. *C. t. torquatus* diet consisted of 53.6% of structural plant parts (*C. mona*=6.8%), 34.9% reproductive parts of plants (*C. mona*=31.1%) and 3.9% animal matter (*C. mona*=61.9%).

These results conform to the predictions afforded but the Jarman/Bell model of body size and metabolism, which put simply states: energetic requirements of animals are a positive function of body size in that the metabolic rate of animals increases with body size, but at a decreasing rate. Although large animals have greater overall energetic requirements, less energy is actually required per unit of body mass. Therefore, large animals can survive on a lot of low quality food whereas small bodied animals can subsist of high energy but sparsely distributed foods such as insects.

"It used to be that scientists studied nature as a way of looking into the mind of God. Now it isn't like that. Most science these days is being financed by corporations or political interests seeking specific results"

- William Fender

Analyses of stereotypic behaviour, behaviour switching rates and behavioural persistence: A comparative study using ex-pet and zoo-born mother-reared capuchins

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To date there has been little scientific research looking at the welfare implications of hand-rearing primates and keeping them as pets. The purpose of this project was to investigate the behavioural impact of being reared as a pet and the potential harmful implications this can have on the neurological development and welfare of these individuals. This project examined stereotypic behaviour and its relationship to behaviour switching rates and behavioural persistence in capuchins (*Cebus apella, C. olivaceous* and *C. olivaceous* hybrids).

Study animals comprised of two groups; a group of ex-pet capuchins (*C. apella, C. olivaceous and C. olivaceous* hybrids) at the Monkey Sanctuary Trust in Cornwall, UK and a control group of zoo-born mother-reared capuchins (*C. apella*) at a UK zoo. A total of 80 hours of behavioural observations were recorded and stereotypic behaviour recorded via continuous focal sampling.

Stereotypic behaviour can be an indicator of poor or compromised welfare. In humans, it is associated with schizophrenia and autism, and has been linked to damage within the basal ganglia system (a part of the limbic system associated with motor control, learning, cognition and emotion) (Amaral and Lavenex, 2006; Haber, 2003). Cross-species studies have demonstrated a relationship between inappropriate repetitive responses within an extinction learning paradigm and levels of stereotypic behaviour, which is suspected to stem from basal ganglia impairment (Vickery and Mason, 2003; Vickery and Mason, 2005; Garner et al., 2003). This paradigm was used in our study to assess behavioural persistence in three ex-pet and three zoo-born mother-reared individuals by using an operant conditioning task. Capuchins were trained to open a door in response to a conditioned stimulus (CS) to obtain a food reward. Once the conditioned response (CR) was learned, extinction trials would take place where the CR to the CS would yield no food reward. Behavioural persistence was measured by the following: (1) number of trials to learn the CR, (2) number of trials to extinguish the CR, (3) number of responses within 10 second window, (4) number of responses outside 10 second window and (5) total number of door lifts made (CR).

Results found ex-pet capuchins to show significantly higher levels of stereotypic behaviour in comparison to the mother-reared group. The time taken to both learn and extinguish behaviours during the extinction-learning paradigm were also found to take significantly more time in the ex-pet group. These results demonstrate that increased stereotypy and behavioural preservation in this group of ex-pet capuchins to be the possible result of basal ganglia dysfunction which in turn may be due to increased and prolonged levels of stress. Further analysis of ex-pet and control groups of primates are required in order to find out if these behavioural abnormalities and functions can be directly linked to pet primates. These results have important welfare implications for primates being kept as pets as this may cause irreversible physiological damage and long-term behavioural disorders.

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"It was strangely like war. They attacked the forest as if it were an enemy to be pushed back from the beachheads, driven into the hills, broken into patches, and wiped out. Many operators thought they were not only making lumber but liberating the land from the trees..." - Murray Morgan, from the book *The last Wilderness*

Reducing regurgitation and reingestion in captive western lowland gorillas (*G. g. gorilla)*

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Regurgitation and reingestion (R/R) is an abnormal behaviour that may be commonly seen in some captive western lowland gorillas (*Gorilla gorilla gorilla),* and has been linked to differences in the diets of captive and wild populations. Regurgitation is defined as voluntary retrograde movement of stomach or esophageal contents into the mouth, floor, or hand and reingestion is defined as the subsequent consumption of the regurgitant (Lukas, 1999). Regurgitation differs from vomiting in that the latter is a reflex behaviour elicited by autonomic activity preceded by hyper salivation, contraction of abdominal muscles, and nausea (Gould and Bres, 1986; Lukas, 1999). Regurgitated matter produced during R/R has recently been found to be more acidic than the original food consumed (Hill, 2009). This indicates that R/R may be an injurious behaviour with a potentially negative effect on the physical health of gorillas (Hill, 2009). The psychological implications of R/R remain to be assessed.

Typical Regurgitation and Reingestion Behaviour in Adult 18 Year-Old Female Captive Gorilla

Captive gorillas generally receive excess dietary sugar in the form of fruit, while not receiving sufficient fibre (Remis and Dierenfeld, 2004). Increases in the amount of fibre and browse and decreases of fruit in the captive diet have been previously associated with subsequent reductions of R/R. However, the isolated effects of these components have never been assessed. Thus, the present study assessed the independent and combined effects of browse and fruit on R/R by specifically manipulating these dietary factors.

The study was conducted on a stably-housed gorilla group at Port Lympne Wild Animal Park, UK. Behavioural observations of R/R were carried out across the following phases: Phase 1: baseline data with regular diet; Phase 2: regular diet plus browse supplementation; Phase 3: regular diet with all fruit excluded; Phase 4: regular diet plus browse supplementation and fruit excluded; Phase 5: return to baseline with regular diet. Each study phase lasted seven days with a three-day transition period between each. Continuous focal sampling techniques were employed.

Significant decreases in hourly rate of regurgitation events and percentage of time spent reingesting regurgitated food were associated with provision of extra browse, subsequent removal of fruit, and the final combined effects of added browse and no fruit. The most significant results were observed during the final phase when simultaneous changes were made by increasing browse and removing all fruit.

This study provides systematic, empirical evidence for the relationship between nutritive intake and behaviour. This study sheds light onto dietary care in captive great apes and how this contributes to psychological and physical welfare. Not only are the display of species-specific behaviours in captivity important for the welfare of captive gorillas, but they can facilitate unique experiences with wildlife for zoo visitors. Elicitation of positive emotions with nature and the environment have been shown to promote conservation action in the public. Hence, prevalence of R/R in the captive environment has the propensity to threaten more than gorilla health as well as conservation of wild conspecifics.

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"In the end, we will conserve only what we love, we will love only what we understand, and we will understand only what we are taught."

- Baba Dioum, *Senegalese conservationist*

Samkos Wildlife Sanctuary, Cardamom Mountains, southwest Cambodia as a priority area for primate conservation

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At the dramatic rate non-human primates are declining in Southeast Asia (Mittermeier et al., 2007), updates on primate populations is essential to determine their conservation status. Cambodia has a previous history of violent conflicts that prevented scientists from exploring its biodiversity for several years (Long and Swan, 2000). Information on Cambodia's wildlife and especially on primates is therefore currently limited, with their distribution and status still unclear. Nine species of primates are confirmed to occur in Cambodia (Baker et al., 2002; Long and Swan, 2000), of which eight are in danger of extinction (IUCN, 2008).

I carried out a 5-week survey on foot focusing on diurnal primates in Samkos Wildlife Sanctuary (Samkos WS), Cardamom Mountains, southwest Cambodia (Figure 1) between April and May 2009. The last survey in the area dates back to 2000 (Long and Swan, 2000). An update on the occurrence and distribution of primate species of the Cardamom Mountains was necessary in order to provide new data regarding their national and global status. Six primate species are reported to occur in the Cardamom Mountains (the Northern slow loris, *Nycticebus bengalensis*; the stump-tailed macaque, *Macaca arctoides*; the Northern pig-tailed macaque, *M. leonina*; the long-tailed macaque, *M. fascicularis*; the Indochinese silvered langur, *Trachypithecus germaini*; and the pileated gibbon, *Hylobates pileatus*) (Baker et al., 2002; Long and Swan, 2000; Momberg and Weiler, 1999; Daltry and Momberg, 2000).

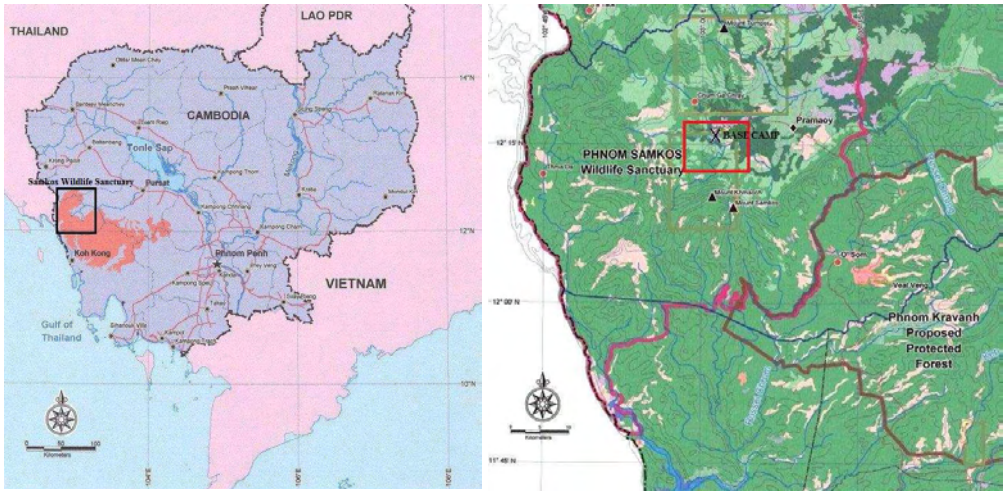

Figure 1: Cambodia and location of Samkos Wildlife Sanctuary with zoom on the area showing our base camp. © FFI Cambodia Program.

My survey provides the first confirming presence of four diurnal primates in the Cardamom Mountains with visual identification evidence (see Figure 2). From the data collected, I present an encounter rate (Sutherland, 2000) for each species (Table 1). Only the stump-tailed macaque was not encountered during the survey, despite its distribution thought to reach the Cardamom Mountains (Rowe, 1996; Baker et al., 2002). This could be explained by its very low density, by the fact that we did not cover sufficient area, although this species is known to inhabit forest types that we surveyed, or by its absence in Samkos WS, or in the whole Cardamom Mountains. Indeed, none of the previous biodiversity surveys conducted in the area confirmed the presence of this species.

Although rare and endangered species are protected by law from hunting and trade in Cambodia (Walston and Ashwell, 2005), primates and other wildlife continue to face various threats from illegal activities. In the Cardamom Mountains and throughout the country, hunting, illegal trade and logging accelerated after the war (Momberg et al., 1999), and these illegal activities persist in Samkos WS. During the field study chainsaws were heard twice at a few kilometres from our camp, and at the present date illegal logging is increasing in the region (Eastoe, pers. comm.). Hunting of wildlife for food, pets or medicine is another serious threat for wildlife in the region (Thy, pers. comm.). Before the field work, we witnessed an infant Indochinese silvered langur in Pramoy village that was for sale as a pet.

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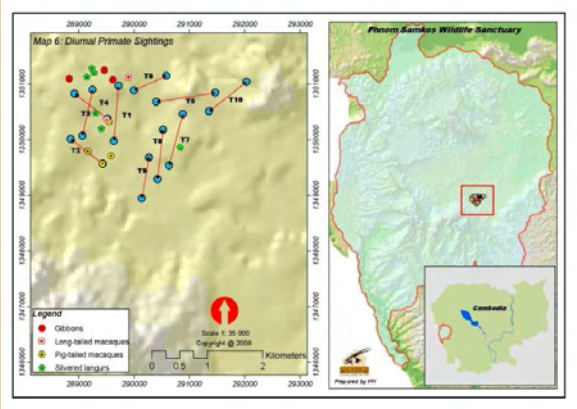

Figure 2: Primates sighted in the study area in Samkos WS in May 2009 including sightings during census time and opportunistic sightings. The start and end of each of the ten transects are represented with a blue circle. Each primate species are represented with a different symbol (see legend). The map was prepared by FFI Cambodia Program.

Cambodia represents a country of priority for primate conservation. It holds the largest populations of both the Endangered pileated gibbon (*H. pileatus*) and the Endangered black-shanked douc langur (*P. nigripes*), and possibly the yellow-cheeked gibbon (*N. gabriellae*) and the Indochinese silvered langur (*T. germaini*). Research in the country is still at its beginning and should continue and be encouraged nationally and internationally, notably with the continuing involvement of internationally renowned NGOs (e.g. FFI, WWF, CI, WCS, WA, TRAFFIC) and the collaboration of the government (MoE, MAFF etc.). Next steps for primate conservation in Cambodia should include (i) a national distribution map compiling all primate records to date, (ii) an assessment of primate species density in their habitat range, (iii) research on the ecology of the different species, (iv) an environmental education program throughout the country, (v) a law enforcement on and control of illegal activities. Our study provides new insights into the status and distribution of primates in Cambodia and suggest the high importance of Samkos WS and therefore of the Cardamom Mountains for primate conservation.

(Table 1) Primate species	Total number of sightings	Average group size from observation (o) or literature (l)	Group per hour	Individual per hour
Indochinese silvered langur (*Trachypithecus germaini*)	5	12.50 (o)	0.08	1.04
pileated gibbon (*Hylobates pileatus*)	4	5.00 (o)	0.07	0.33
pig-tailed macaque (*Macaca leonina*)	3	27.50 (l)	0.05	1.38
long-tailed macaque (*Macaca fascicularis*)	1	12.50 (o)	0.02	0.21
stump-tailed macaque (*Macaca arctoides*)	0	-	0	0

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Play behaviour and activity budgets of non-adult, wild southern-Bornean gibbons (*Hylobates albibarbis*), in the National Laboratory for Peat-Swamp Forest, Indonesia

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The study of non-adult gibbons' social behaviour is a new and understudied area of research, we have limited understanding of the dynamics of inter and intra-group social behaviours. The relatively small group size, gaps between births and speed of gibbons poses difficulties for observers.

Bekoff (1972; 2001) says that play is imperative to juveniles' development of acceptable behaviour and boundaries and that the absence of play can affect the development of social behaviours. The role of social interactions is of importance to rehabilitation centres and zoos as well as understanding affiliative behaviour in the wild.

Gibbons, like all primates, face external threats from humans, including the destruction of their habitat. Peat-swamp forests are subjected to logging, concessionary and illegal, like other forests across the world. Logging has transformed the Sabangau forest into degraded secondary forest; this will not only affect the heights of available trees in which the gibbons can travel, but also alter feeding and normal behavioural patterns, as the trees are smaller than in pristine forest. The pet trade also has a large impact on gibbon populations and possibly on their behaviour as well. The illegal pet trade in Indonesia is a problem that affects a large range of animals. Nijman (2005) shows that although the impact of direct trade on the gibbon population of Borneo is relatively small, the indirect consequences are extensive. For every gibbon that ends up as part of the pet trade at least one more was probably killed, as the mothers of infants are shot. The effects of this practice are large and far-reaching. The obvious consequences are that the infant will end up as a pet, or at best in a rescue centre, and the mother is killed. However, the removal of two members of a familial group is likely to have a huge impact on the remaining family members.

We aimed at quantifying the social and play behaviour displayed by non-adult, wild southern-Bornean gibbons (*Hylobates albibarbis*); testing differences in age, sex, social partner choice and between group differences. We constructed activity budgets and compared these with adult activity budgets from groups in the same research area.

The gibbons studied were members of three groups of habituated gibbons at the Natural Laboratory Research Area (LAHG), in the Sabangau Forest; consisting of two infants, two juveniles and four sub -adults.

We found marked difference in play behaviour between age groups, with infants exhibiting higher levels of play behaviour than either juveniles or sub-adults; levels of play were higher than expected and markedly higher than that of adults. Differences between groups were small.

The aims of this research were to gain insights regarding the behaviour of a severely understudied species and age group, non-adult *H. albibarbis*. The study sample is small and the period of research short; but even in this time, interesting findings regarding age differences were found. The study also showed that it is possible to conduct detailed behavioural research on non-adult gibbons. This study is an exploratory look into the complicated behavioural intricacies of non-adult gibbons where there are still many opportunities for future research. The fact that play behaviour occurs at high levels in gibbons is a huge step forward in understanding these small apes. It is also important that their cognitive abilities are acknowledged. In the past, gibbons have been thought to demonstrate low amounts of social and play behaviour compared to other apes. This is possibly not true if non-adults members are the focus. Play and exploration is often used as a research tool indicative of cognitive ability (Cheyne, 2009c). This area of study would benefit from further research, as it seems likely that if lower amounts of play are witnessed in gibbons when compared to other primates, it could be due to their arboreal nature and family dynamics, rather than lower cognitive ability. This study highlights the importance of more research into these understudied apes and takes a small step towards the recognition these small apes deserve.

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Preliminary survey, behaviour and ecology of the Bengal slow loris (*Nycticebus bengalensis*) in Samkos Wildlife Sanctuary, Cambodia

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The Bengal northern or ashy slow loris (*Nycticebus bengalensis)* is a little studied primate endemic to Bangladesh, Bhutan, Cambodia, China, India, Laos PDR, Myanmar, Thailand and Vietnam. Classified as Vulnerable based on habitat loss, data from wild populations are scarce. The species is popular in traditional medicine and as pets. Although Cambodia has joined CITES, the regional trade is still booming. Hardly any *N. Bengalensis* can be found in Cambodian markets and seem to have been replaced by the pygmy loris (*N. pygmaeus*), suggesting demand has exceeded supply. The species' behaviour has never been studied in the wild in Cambodia, and only recently has a survey been conducted by Starr to begin mapping their distribution within the country. Their continued use in the medicinal trade means that there is a desperate need to conduct surveys of their distribution, density, behaviour and ecology to develop effective conservation measures.

Photo courtesy of Charlotte Packman

From April to July 2009, I calculated encounter rates of *N. bengalensis* along ten transects in Samkos Wildlife Sanctuary in the Cardamom Mountains, Cambodia, and collected preliminary data on their behaviour and ecology. Encounter rates were between 0 and 0.45 loris/km with an average density for the area surveyed of 18.75(SE8.48)/km^2. Local people reported a decline in loris numbers, and noted that in order to find lorises, they had to walk further into the forest than they did five and ten years previously. Lorises were ranked as highly important in Khmer traditional medicine, supposedly curing more than 100 ailments. However, the Bengal slow loris is not thought to be as potent as the pygmy slow loris which can fetch up to $50 in markets compared with just $5 for the Bengal slow loris.

Preliminary behaviour was compiled from 39 hours of opportunistic observations of Bengal slow lorises. 41% of behaviours were spent resting, 36% moving, 7% sleeping, 6 % feeding and 4% grooming. They were observed eating leaves, arthropods and tree bark but not exudates. Moon and weather affect their behaviour with lorises becoming most active in wet conditions and under the new moon. Animals occurred at low abundance, and numbers are probably still declining.

Bengal slow loris abundance is relatively low and in some areas it seems to be extirpated. Continued research into the distribution, behaviour and ecology of this species is vital to their conservation. Samkos Wildlife Sanctuary is one of the only areas in Cambodia where Bengal slow lorises have been found to date. Effective management and policing of this protected area is imperative to the survival of this species.

"Primates stand at a turning point in the course of evolution. Primates are to the biologist what viruses are to the biochemist. They can be analysed and partly understood according to the rules of a simpler discipline, but they also present another level of complexity: viruses are living chemicals, and primates are animals who love and hate and think"

- Alison Jolly

The cause of the population decline in a group of translocated collared lemurs, *Eulemur collaris*, in the Mandena littoral forests of southeastern Madagascar.

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With a diverse range of habitats (Irwin *et al.*, 2005), degradation, fragmentation and isolation are important processes threatening the biodiversity of Madagascar (Ramanamanjato and Ganzhorn, 2001; Schad *et al.,* 2004).

Listed as Vulnerable (VU) by the IUCN Red List, collared lemurs, *Eulemur collaris,* are an important flagship species for the threatened littoral forests of southeastern Madagascar. Fragmentation of Malagasy forests are increasing, with the remaining patches of non-degraded forest becoming more isolated and less accessible for the arboreal lemur species (Ganzhorn *et al.,* 2001).

Adult Male *Eulemur collaris*

Translocation, the movement of wild animals from one part of their range to another in an attempt to re-establish a viable population in the wild, has the potential to act as a management tool for the conservation of biodiversity (Soorae and Baker, 2002). One of the most important components of animal translocation is the long term monitoring of relocated populations, yet most post-translocation monitoring has usually lasted less than a year (Griffith *et al.,* 1989; Soorae and Baker, 2002).

The presence of charcoal makers in one fragment of the littoral forest in the Mandena region resulted in the destruction of this fragment. It was determined that the group of collared lemurs currently living in the fragment would not be able to survive the continuing destruction of this fragment and were translocated into a partially degraded, but protected conservation zone within the Mandena region (Donati *et al.,* 2007).

Twenty-eight collared lemurs were translocated in 2000 and 2001. There was an initial increase in the population, but after 2004, the population began to decrease (Donati *et al.,* 2007).

Predation pressure is one main factor noted to influence population density, population structure and composition as well as home range size (Starin, 1978; van Schaik and van Hooff, 1983). Lemurs form a large portion of the diet of the fossa (*Cryptoprocta ferox*), the largest carnivore in Madagascar, and an important predator of *Eulemur* species (Wright *et al.,* 1997; Goodman, 2003; Hawkins and Racey, 2008). Therefore, one hypothesis for the cause of the population decline was predation by *C. ferox*. As food abundance can limit the presence and densities of primate populations (van Schaik *et al.*, 2005), food scarcity was the second hypothesis.

It was predicted that if the decline in the population was related to predation, the continual presence of *C. ferox* in the forest would be observed. A large group size and greater percentage of males to females present in the population would also be expected. If the group size appears to be small, the diet less frugivorous, home range size large and/or the coat condition appears poor, it would be predicted that the cause of the population decline is related to food scarcity.

The study was conducted in the M15/M16 fragments of the Mandena conservation zone, 12 km north of Fort Dauphin in southeastern Madagascar.

Data collected by local assistants were examined from 2005 until 2009. While the examination of dead lemur bodies was not possible, capture records of *C. ferox* were maintained as an indicator of predation pressure. Traps were set from July 2004 to June 2006. For a brief period between March and June 2008 traps were reset when employees of the QIT Madagascar Minerals (QMM) mine reported footprints that resembled fossa prints.

In addition, data collection was carried out over a three month period from May to July 2009. Three groups were studied, consisting of nine individuals in total. Instantaneous focal sampling, with a five minute interval was used to obtain the activity budget and feeding data. Each day consisted of 12 consecutive hours of data collection. Two focal individuals were studied each day, one from 6am to 12pm and the other from 12pm to 6pm. The activity, food type eaten, and tree species were noted. The diameter at breast height (DBH) and the GPS location of all feeding trees were obtained to provide analysis of fruit abundance and home range.

It was determined that predation pressure from *C. ferox* was reduced, yet the population continued to decline. Group size was also observed to remain small over the five year period, with the maximum number of individuals in a group being six.

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A reduction in the sex ratio and a change to a greater percentage of females was also observed. The diet remained mainly frugivorous, although the home range size was large. The coats of all individuals appeared to be in good condition. While the hypothesis of the population decline due solely to predation pressure by the fossa was not supported, the food scarcity hypothesis could not be conclusively confirmed, with only some of the predictions met.

Male and female *C. ferox* captured by QMM mining employees.

It is evident that the population is not declining at the same rate as it did between 2004 and 2007 and may in fact be beginning to stabilize, indicating that the carrying capacity of the forest may be low, and thus limiting the population size. This study does show the value in long term monitoring of translocated populations as the initial population decline appeared the result of predation but data taken since has indicated some value for the food scarcity hypothesis.

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"We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect"

- Aldo Leopold in *A Sand County Almanac*

"Those who wish to pet and baby wild animals "love" them. But those who respect their natures and wish to let them live normal lives, love them more"

- Edwin Way Teale in *Circle of the Seasons*, 1953