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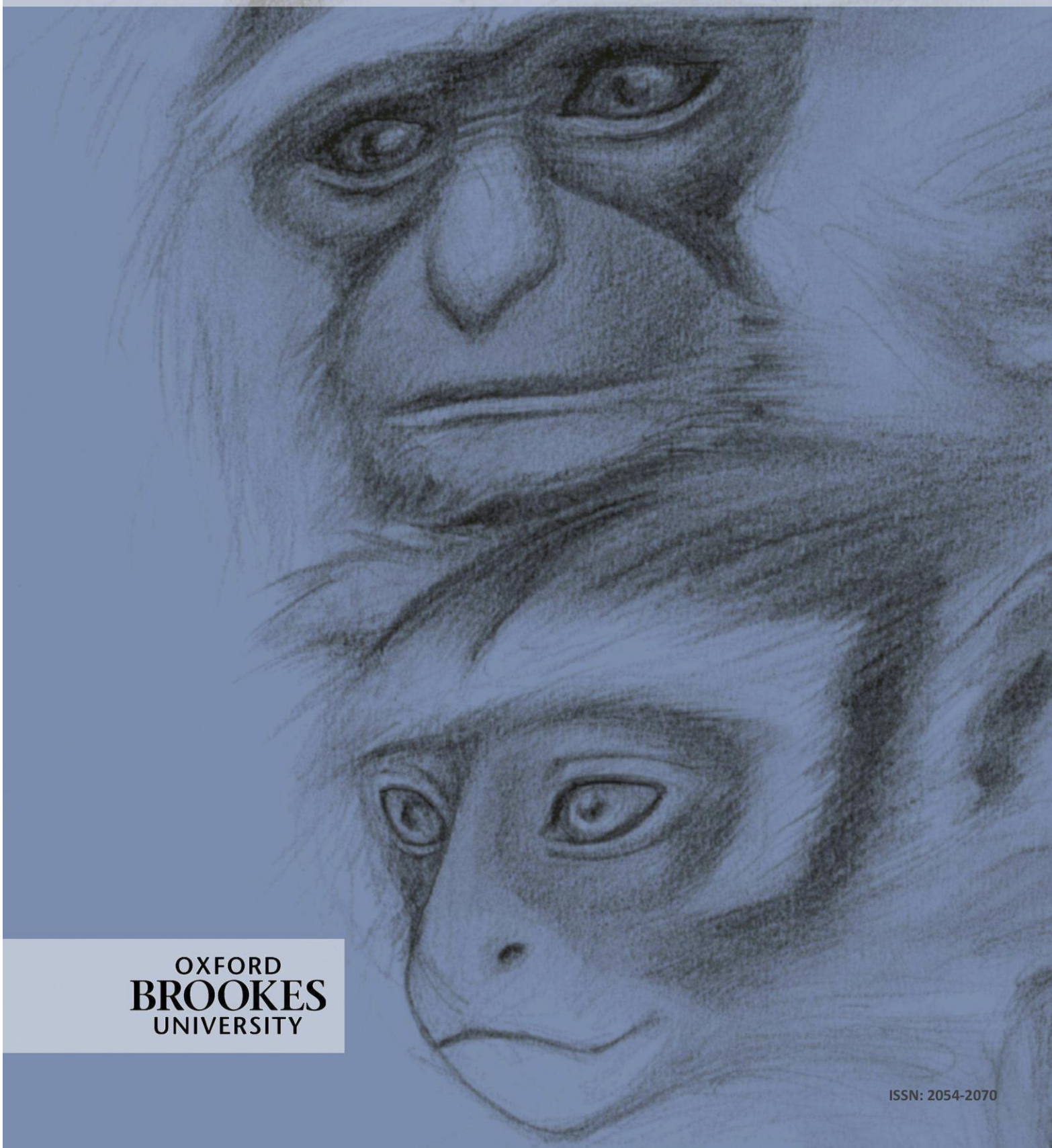

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Letter from the editors

We warmly welcome you to the winter 2012 edition of Canopy, the in-house journal produced by MSc students in Primate Conservation at Oxford Brookes University. We hope that this issue draws attention to the ecological diversity of primates, highlighting the importance of conservation on a global scale and the real world contributions individuals can make within this discipline.

The articles selected for this issue were written by previous MSc students and reflect the Primate Society of Great Britain's (PSGB) winter meeting theme of biogeography. This edition features research conducted in Indonesia, Africa, Asia and Central America, illustrating the implications of a number of pressures threatening primate populations.

We are proud to present a special feature interview with a valued member of the MSc team, Professor Simon Bearder. He is the founder and a former lecturer of this MSc program who will be awarded the prestigious Osman Hill Memorial Medal at this year's PSGB winter meeting.

We would also like to take the opportunity to congratulate course leader, Professor Anna Nekaris, for receiving further recognition of her charity, the Little Fireface Project. This project has been selected as the Primate Society of Great Britain's 2013 Conservation Cause. Further details regarding this will be presented on 5th December during the Winter Meeting in London.

Thank you to everyone who has dedicated their time and efforts in preparing this issue.

Kind Regards

The Editors (from left to right)

Martin Fahy
Carina Morris
Kristen Diederich
Daniel Bergin
Magdalena Svensson
Meaghan Fleischli

Letter from the Course Tutor

Welcome everyone to the new issue of Canopy. I'd also like to take this opportunity to, extend a very warm welcome from all the Course tutors to our new cohort of students, who we hope by now are feeling very much at home here in Oxford.

The Editors have put together an excellent collection of articles in this new issue of Canopy, showcasing some of last year's student research projects, and on-going conservation research and activities by past students and collaborating organisations. Prior to writing this letter I had the opportunity to read each of the contributions – I now have a much better idea of what some of you were up to last year when you disappeared off to the field! On a more serious note though, these articles highlight some of the current threats to primate populations throughout much of their range. Habitat decline as a consequence of economic development and consequent land use change (Scott) is unfortunately a narrative that is increasingly prominent within the wider literature on deforestation. The competition pressures between livelihood strategies of the rural poor and their non-human primate neighbours, including implications for habitat degradation and resulting dietary stresses (Thurley), or reproductive isolation of primate populations (Nguyen) are also pressing concerns, as are the risks to primates of being caught up in the pet trade (Rattel) or as components of traditional medicines (Iseborn). However, it's not all negative. There are also 'positives' to be gleaned from these articles. For example, sites with adequate habitat protection continue to sustain populations of potentially vulnerable species (Bersacola); working with local people within conservation initiatives can help foster a sense of engagement and responsibility, encouraging pro-conservation attitudes (Miranda-Jiménez & Méndez-Carvajal). In a field where we often focus on what doesn't work, it's important not to lose sight of what can or might work.

This is my twelfth year of teaching on the MSc. A number of things have changed over the years – colleagues have come and gone, the content and mode of delivery of modules has changed, and of course each year we have to say farewell to students we have come to know quite well. I admit to feeling sad as I say goodbye to members of the 'old' cohort, perhaps for the last time, but there's the excitement of meeting the new group, the anticipation of what this year's class will be like. Amongst all the change that occurs each year there is something that has remained constant for me across each cohort I have taught – I still look forward to Wednesday mornings in Semester 1 teaching People-Primate Interactions, which are often the most interesting, rewarding and entertaining 3 hours in my working week!

Dr Kate Hill
Reader in Anthropology

Population density and habitat of red langurs (*Presbytis rubicunda*) in the Sungai Wain Protection Forest, East Kalimantan, Indonesian Borneo

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Borneo contains over 222 species of mammals, including eight endemic primates (Myers et al., 2000). This island is regarded as a conservation hotspot due to the increasingly large scale of deforestation (Myers *et al*., 2000; Meijaard & Nijman, 2003). Forest loss is mainly caused by logging, fires and habitat conversion (Jepson *et al*., 2002; Curran *et al*., 2004). The habitats affected by deforestation are mainly those situated at low altitudes and along coastal areas, where human population and industry are in rapid expansion (Hansen *et al*., 2009). Red langurs (*Presbytis rubicunda*) are an endemic primate of Borneo and are listed as 'Least Concern' on the International Union for Conservation of Nature (IUCN, 2011) Red List of Threatened Species. Their population trend is decreasing due to habitat loss and hunting (Nijman & Meijaard, 2008). There is a paucity of recent studies on red langurs throughout Borneo, and the effects of human disturbance and fires on this species remains poorly understood.

In collaboration with the ongoing research conducted by the Sabangau Red Langur Research Project (SRLRP), in partnership with the Orangutan Tropical Peatland Project (OuTrop) in Central Kalimantan, density and habitat of red langurs were studied in the Sungai Wain Protection Forest (SWPF), East Kalimantan. In 1998 the resulting fires of the El Niño Oscillation Events affected over half of the SWPF, now in the process of regenerating (Fredriksson & Nijman, 2004). The aim of this study was to assess the current population number of red langurs within the remaining intact part of the Sungai Wain Forest, examine habitat characteristics in both burned and unburned areas and identify potential threats for red langurs in the SWPF.

Red langur density was estimated using Distance sampling on line transects (Buckland *et al*., 2001; Thomas *et al*., 2010). Thirteen parallel transects were repeatedly walked at an average speed of 0.9 km/hour, with a total sampling effort of 207.12 km. Demographic data were also recorded. Sightings were entered in DISTANCE 6.0 (Thomas *et al*., 2010). Habitat was assessed using the plot sampling method described by Ganzhorn (2003). A total of 83 plots measuring 10 x 10 m were employed.

We successfully surveyed the pristine area and achieved a total of 69 observations of red langurs on transect. A total of 381 individuals were estimated living in the dipterocarp forest type within the remaining intact area. We identified all-male bands as well as groups formed by one adult male, one or more adult females, sub-adults, juveniles and infants. Group size varied from two to eight individuals. Habitat characteristics differed significantly between forests. Tree density, trunk size and canopy cover were found with larger values in the primary habitat. Total tree species diversity and richness were also different. The regenerating

forest was found to be dominated by pioneer species from the *Macaranga* genus, and the known red langur food trees were less evenly distributed there compared to the primary forest as a result.

Distance sampling is an efficient procedure for surveying red langurs. Our data are comparable with other studies conducted at different sites on Borneo (Blouch, 1997; Marshall 2004; Ehlers-Smith & Ehlers-Smith, in review). From our habitat assessment we suggest that 14 years after the forest fires, the primary forest still provides a more suitable habitat for red langurs, perhaps explaining the relatively high langur densities in this area. Although they are present in secondary and degraded habitats, red langurs appear to be negatively affected by human disturbance (Blouch, 1997). In disturbed forests langurs are more likely to become vulnerable to hunting for food or medicinal purposes (Blouch, 1997; Nijman, 2005; Nijman & Meijaard, 2008). At present, hunting in the primary forest of Sungai Wain does not occur. With the expanding human activities around the SWPF's perimeters and the increasing human encroachment into the regenerating forest, red langurs are likely to come into contact with people more often. In these more disturbed areas hunting may be or become a problem. In addition, illegal logging in the regenerating area and the increased industrial activities provide drier landscape conditions, increasing the likelihood of the reoccurrence of fires. Originally the SWPF was connected to several lowland habitats, which formed a large forest plateau (Wilson & Wilson, 1975). Logging activities were performed in the area since the 1970s (Wilson & Wilson, 1975). Following the subsequent El Niño fires in 1982-83 (Cleary & Genner, 2004) and those in 1998, at present the 40 km^2 core area of the SWPF is the last remaining lowland intact forest in the south of East Kalimantan (Fredriksson & Nijman, 2004). Any further forest fires could cause irreversible damage for the wildlife population in the area.

Despite its small size, the primary forest in the SWPF carries a relatively high abundance of red langur, enhancing the importance of Sungai Wain as a conservation area for this species. Efforts should be increased in preventing the reoccurrence of fires. Future long-term studies should be conducted in both regenerating and pristine forests to increase our understanding of the home range and resource competition between sympatric species. Studies should also focus on identifying the potential threats for red langurs, such as conflict with humans and hunting. Regular surveys should also be conducted by trained local staff in order to monitor the population trend of red langurs in the SWPF.

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Colobine diets revisited: Examining the overarching patterns in colobine ecology

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Contrary to early opinion, an accumulation of ecological research on the Colobinae of Africa and Asia has revealed them to be broader than a group of simple arboreal leaf eaters (Chapman *et al*., 2002**;** Campbell *et al,.* 2010; Workman 2010). However this increased knowledge of the variation which can exist within Colobines brings with it new questions. Nutritional scientists and ecologists have long sought to determine relationships between the resources available in an animal's habitat and the resources actually consumed (Waterman & Kool 1994). It is expected that much of the variation in food use between taxa will be determined by their dietary restrictions and modulated further by resource availability (Campbell *et al*., 2010).

Dietary data was compiled from the available literature, specifically PhD theses and scientific papers, across the geographical distribution of the Asian colobines. Genera included in the dataset were *Trachypithecus, Presbytis, Semnopithecus* and *Nasalis.* Dietary data was combined with proxies of resource availability, climatic variables such as rainfall and seasonality and body mass data in an attempt to better understand the variables effecting feeding ecology. Selection ratios were calculated to examine the relationship between availability and consumption.

Overall, results highlighted the flexibility existing within the Asian colobines. While the Asian colobines were found to be predominantly folivorous (mean leaf consumption= 46%; fruit consumption= 24%), a large amount of variation was found, both within and between species. One way ANOVA revealed no significant differences between the four genera regarding fruit, flower or seed consumption. However when dietary components were examined at a species level, both fruit ($F=3.222$; $p=<0.05$) and seed consumption ($F=8.647$; $p=<0.001$) varied significantly between the 8 species included. Factors found to affect feeding behaviour were body mass, rainfall and temperature seasonality. Body mass was positively correlated with the proportion of leaves in the diet and the best predictor for degree of folivory and florivory. Rainfall was negatively correlated with folivory. Langurs existing in disturbed or human-modified environments exhibited markedly different feeding strategies to those in undisturbed forests and showed high reliance on one species, supplemented by a small number of other species. This was far less pronounced in groups in undisturbed areas.

Findings here support the expectation that colobines with higher body masses are more folivorous. This is largely based on the

assumption that with increased body size, the proportion of foliage in the diet increases (Elder, 2009). This relationship has been shown to be powerful and significant across primate taxa (Clutton-Brock & Harvey 1977). As mean annual rainfall increases, the proportion of leaves in colobine diets decreases. Additionally frugivory increased as folivory decreased. This same relationship has been noted for other primate species, such as gibbons (Elder, 2009). Coley and Barone (1996) noted that young leaves are rare during the late rainy season, and extended periods of cooler, rainy weather slow digestion of leaves in sloths. Previously, strong correlations have been found between rainfall and tree species diversity and density (Gentry 1988; Kay *et al*., 1997). Site specific variation in the composition and productivity of vegetation is strongly related to climatic parameters such as rainfall, soil type, and latitude (Pianka, 1994; Malone & Fuentes 2009). Therefore in habitats with heavier rainfall, resource availability may be higher, allowing these populations to exploit more fruit and reduce their reliance on leaves (Elder, 2009).

While comparisons of langur groups in different habitats revealed both variation and flexibility within species, a clear pattern was seen regarding the coping strategies employed at various levels of disturbance. Similar findings have also been noted in other colobine species, such as François langurs in a severely fragmented habitat feeding almost exclusively on four staple species, only occasionally supplementing their diet with other plant species (Li *et al*., 2009). By the very nature of their diet folivorous primates encounter a diverse range of plant secondary metabolites (Dearing *et al*., 2005). By diversifying leaf sources and consuming small quantities of individual plant species, colobines may prevent a build-up of individual toxins to lethal levels; this option may be reduced for groups relying heavily on one or two species (Dela, 2012). Additionally, reliance on one species leaves a population highly vulnerable to anthropogenic change. Human modified environments are unstable and open to further disturbance (Dela, 2007). Seasonal changes in food supply combined with dramatic and permanent changes in the spatial abundance of food sources can have severe repercussions on colobine survival (Bennett & Davies 1994).

Dietary data have been used to address a multitude of theoretical issues; studies often calculate the proportion of time spent eating different dietary foods (fruits, leaves etc.) to place species into dietary categories and contrast morphological or behavioural traits (Chapman *et al*., 2002). However, this approach does little to understand or emphasise the degree of flexibility which may exist within a species. Variation in the plant parts eaten by the colobine populations across Asia suggests that dietary variation is often large. The magnitude of this variation suggests that the characterisation of species' diet is both site- and time- dependent (Chapman *et al*., 2002). In

order to truly assess variation, a number of studies must be conducted on the studies. While some- such as the hanuman langur (*Semnopithecus entellus*)- are well studied, other colobine species are lacking even basic data- such as the white-fronted langur (*Presbytis frontata*). Until this is remedied, the feeding ecology of the Asian colobines cannot be properly assessed.

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Demographic dynamics of isolated populations of brown collared lemur (*Eulemur collaris*) in littoral forest fragments of South-Eastern Madagascar

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The brown collared lemur (*Eulemur collaris*) is a medium sized lemur distributed from south-west of Tolagnaro to the Mananara river in Madagascar (Andrainarivo *et al.*, 2008), where it plays a fundamental ecological role as the principal seed disperser for a number of plant species (Bollen & Donati, 2006). Previous research has identified that *E. collaris* exhibit cathemeral activity patterns (active both daytime and night time) (Donati *et al*., 2002; 2009), with groups being formed of multiple males – multiple females and consuming mainly fruits all year round (Donati *et al*., 2007a). The species' status on the IUCN Red List of Threatened Species was assessed as Vulnerable, which means the species population has been reduced by more than 30% over the past 24 years (Andrainarivo *et al*., 2008). Habitat loss and hunting are the two main pressures on this species, especially on those populations living in the isolated fragments of the south-eastern littoral forest (Andrainarivo *et al*., 2008). It has been reported that habitat conditions may influence the birth rates of primates, as habitat determines the healthy condition of the animals and its population, thereby influencing fertility in many species (Dunbar, 1987). Habitat fragmentation and degradation also affect quality and quantity of food resources, as well as plant density, size, and distribution in the fragmented forest (Donati *et al*., 2011). It is estimated that lemur populations of about 40 adult individuals are unable to survive for more than 20 – 40 years in isolated forest fragments (Ganzhorn *et al*., 2003).

The distribution and population density of *E. collaris* in the fragmented littoral forest of Sainte Luce (STL) and Mandena (MDN) were assessed in 2000-2001 (Ganzhorn *et al*., 2007), but there is no information on the demographic dynamics of this species' populations. A recent report has been published on demographic dynamics for groups of *E.collaris* living in Mandena Conservation Zone, an isolated and degraded littoral forest west of Fort Dauphin, where the species was reintroduced in 2000 (Donati *et al*., 2007b). However, the distribution of this species in larger fragments of STL littoral forest still remains unknown.

Large frugivores are the most vulnerable to habitat fragmentation (Kannan & James,

1999; Herra *et al*., 2001; Schwitzer *et al*., 2011). The different forest fragments of STL showed variations in vegetation structure and characteristics. Occupied fragments showed greater density of large and high trees with vertical profiles showing all the characteristics of quasi-intact forest. Un-occupied forest structures indicated that these two fragments have been heavily impacted by humans, with a low number of trees having a diameter at breast height (DBH) larger than 10cm and very few individuals of plant species belonging to Ebenaceae, Sapotaceae and Lauraceae families, as these plants are preferred by the local people as a fuel source or building structure. One group of *E. collaris'* important food trees are those belonging to the genus Syzygium (Myrtaceae). These plants are known to be used by the local people to produce local rum, or *toaka gasy.* The local people cut down hard-wood trees for firewood and use leaves and tree barks for flavouring rum (Irwin, 2004; Lehman *et al*., 2006). Bark cutting increases tree mortality rate, thus reducing food availability and directly impacting *E. collaris* population density (Irwin *et al*., 2005).

Plants preferred by local people were heavily exploited at unoccupied fragments. Low numbers of large trees may reduce food availability, as large trees produce a greater amount of food sources than smaller ones (Chapman *et al*., 1992). *E. collaris* groups do not appear to disperse from occupied fragments to other available fragments, even if they can easily cross open habitats, due to the lack of food resource available, low number of large trees, and high level of human disturbance (Ganzhorn *et al*., 2007).

Population densities at both occupied fragments increased steadily over the years. *E. collaris* population density increased from 1998 – 2001 and is the result of an efficient and long conservation management in these two fragments, which has been promoted by QMM, researchers, and other conservation stake-holders during the last decade. These efforts resulted in a number of initiatives for the local communities (Donati, personal communication). With hunting no longer a factor, the population may increase steadily until it reaches the forest carrying capacity. Unfortunately, none of the remaining fragments of this forest are large enough to support a viable population of large lemur species (Ganzhorn *et al*., 2001). These small, isolated populations of *E. collaris* in the littoral forest are facing extinction, due to genetic, demographic, and environmental stochasticity. The discontinuous and heavily disturbed habitats in STL pose a barrier to gene flow, thus reducing the effective population size of *E. collaris*. Human disturbance causes reduction in fragment size and plant diversity; overcrowded population might lead to nutrition stress, while disease

and parasitism are more likely to have catastrophic effects in isolated populations (Randall & Sauther, 2006; Irwin, 2008; Schiwitzer *et al*., 2011).

E. collaris play an important role in the littoral forest of STL, they are the only frugivore in the forest that is able to swallow and disperse large seeds of up to 16.5 mm diameter (Ganzhorn *et al*., 1999; Spehn *et al*., 2000). Some species of plants that are dispersed exclusively by *E. collaris* are: *Canarium boivinii*, *Diospyros* sp., *Eugenium* sp, *Hyperacanthus mandenensis*, *Cinnamosma madagascariensis* var. *namoronensis* (Bollen *et al*., 2004). Local extinction of this species is likely to lead to the disappearance of those plant species that are dependent on *E. collaris* for seed dispersal. In fact, results from plot surveys showed that the five plant species named above are more abundant at occupied fragments showing a suitable canopy height and vegetation attributes for *E. collaris* population. Thus effort should be made to protect these remaining habitats (Rodriguez – Toledo *et al*., 2003); corridors between the three protected areas of STL should be carefully considered as they facilitate gene flow and allow *E. collaris* to move between fragments (Deppe *et al*., 2006). Protecting these small fragments is the only hope to restore the original connected forest and species composition by providing larger and more suitable habitats for *E. collaris* and other endemic species living in the same areas.

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Assessing the population of proboscis monkeys (*Nasalis larvatus*) and threats to their survival in Sungai Wain, East Kalimantan, Indonesia

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Balikpapan Bay in East Kalimantan is home to one of the largest remaining populations of proboscis monkeys (*Nasalis larvatus*) left in Indonesia (Meijaard & Nijman, 2000). Over the past 30 years, many populations have been studied in depth across all provinces on the island, but nothing has been published on proboscis monkeys occupying Balikpapan Bay. Preliminary surveys conducted in 2007 revealed that the estimated local population was around 400 individuals, but no further investigation by researchers has been made in the area since then. The rapidly declining population of proboscis monkeys has placed them on the IUCN Red List as Endangered (Meijaard & Nijman, 2000).

Fig 1. Proboscis Monkey *Nasalis larvatus* ©K Scott 2012

Proboscis monkeys tend to prefer coastal habitats, such as mangrove forests. These areas are also the current epicentre for human expansion and other anthropogenic activities, which have resulted in primate habitat degradation and deforestation. This study offers conservationists baseline data in order to gauge the current health and long-term viability of this population and enable the direction of future research. Based on population and habitat viability modeling the proboscis monkey population in Balikpapan Bay is predicted to go extinct within the next fifteen years (Stark *et al*., 2012) and therefore it is of paramount importance that more investigation is conducted in this area.

Most recent threats to the proboscis monkey population are the construction of bridges and road systems that traverse through the mangroves (MP3E1, 2011). This could completely isolate the mangrove forest from Hutan Lindung Sungai Wain (HLSW), a 100km^2 protected forest nearby (S. Lhota pers.comm), and permanently split the northern and southern populations. The formation of sub-populations could threaten the genetic diversity of the area and potentially lead to local extinction (e.g. Meijaard & Nijman, 2000b).

The aims of this study were to census the Balikpapan Bay proboscis monkey population and to determine if groups exhibit a healthy

demographic, while examining the sex-ratios between groups of proboscis monkeys between the northern and southern regions of the bay. Anthropogenic threats were identified and the impact on the animals' abundance in Balikpapan Bay was assessed in order to gauge the current health and long-term viability of the population. Satellite imagery was analysed using Google Earth Pro and Map Source in order to determine how proboscis numbers related to land use in and around the bay. The results of this study and subsequent reports will be available for distribution to relevant agencies and the public via future publication.

The results indicate that a minimum of 341 individuals inhabit Balikpapan Bay. There were 53 one- male (harem) groups, 6 all-male groups, 2 lone males, and one lone female observed. All rivers, apart from Sungai Kiri and Sungai Bugis, had at least one proboscis monkey group residing near it. Population density was determined 0.33 groups/km^2 and 2 individuals/km^2. Since 2007, a 30% decrease was found in proboscis monkeys inhabiting the northern subpopulation and 25% increase in the southern subpopulation.

The survey of satellite images shows that approximately 50% of the rivers around Balikpapan Bay still have some degree of mangrove cover. However, it is difficult to discern between palm oil plantations, natural forest, and mangrove from the pictures since much of the satellite imagery on Google Earth Pro is out-of-date. Spearman's rank was used to determine if there was any relationship between the amount of proboscis monkey groups per river and distance to the nearest industry or settlement (r_s=0.1973 N= 15 p= 0.47). The data show that there is a slight positive correlation.

Protection of Balikpapan Bay is important for the flora and fauna that currently inhabit it as well as the residing human populations. Mangroves provide local people with essential resources including food fibres, timber, chemicals and medicines (Duke *et al*., 2007). It also acts as protection from tsunamis and storm surges (Osti *et al*., 2009). While HLSW may act as a potential hold for some groups of proboscis monkeys, no groups were seen on the days surveying in Sungai Bugis. This may suggest that many of the proboscis monkey groups in Balikpapan Bay live in unprotected areas. Upon further concern, proboscis monkeys are awarded no protection against human encroachment and increasing habitat destruction (S. Lhota pers.comm).

This study highlights the loss of mangrove habitat in Balikpapan Bay and HLSW. Based on the observed trend, researchers predict that proboscis monkey numbers will plummet even further in the next five years (Stark *et al*., 2012). The remaining populations have been severely fragmented, with one population (Sungai Somber) already in complete isolation.

Although the results obtained from this research are preliminary, they clearly show that immediate action is necessary to conserve these primates and avoid the local extinction recorded by Meijaard & Nijman (2000) for Pulau Kaget in South Kalimantan. As already noted by Jeffrey some 30 years ago "The need for more intensive studies of proboscis seems urgent, in the light of the increasingly gloomy reports on the chances of its survival" (Jeffrey, 1982: 339). Hope for proboscis monkeys in Balikpapan Bay depends on effective resource management and land-use planning options (Walters *et al*., 2008) wherever possible.

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Interview with Professor Simon Bearder

Dr. Simon Bearder will be receiving the Osman Hill Memorial Award at the PSGB winter conference this year for his contributions to primatology. We had the opportunity to sit down with Dr. Bearder to discuss this award, as well as the work he has been doing since retiring from Oxford Brookes University in 2010.

What have you been doing since you retired?
Since I've retired, I've had a lot of free time. It's like being a teenager again…no responsibilities. What I'm doing is going back to what I was doing initially, which is a lot of field work. That's what I always wanted to do and I never imagined I would be able to do that in my normal work. When I first started, I went off to Africa to study animals, and that's what I'm still doing now…and I have much more time to do it.

What parts of Africa have been working in over the last few years?
In the last couple of years I've been to Malawi, Tanzania, The Gambia, Uganda, and South Africa. My main aim is to see as many different animals as possible. I concentrate primarily on nocturnal mammals, specifically the galagos (bushbabies). They're one of the most common primates in Africa; they are very widespread. We also see a lot of other animals and have recently become interested in the hyrax because of their loud, distinctive calls. And all this time, we keep discovering new species. Very few people know what's out there; they don't go out at night.

Will we be seeing papers being published on these newly discovered species?
Yes. I now have more time to focus on writing. We are developing several websites that are coming online about the work [see below]. We've just had some very exciting results from genetics. We're now beginning to understand how closely related these species are and we're finding that they have very deep roots. Some of the bushbabies that are around today have been separated for 30 million years. What that means is that within the bushbabies, you have species that are as distantly related as Old World monkeys are to New World monkeys. So very different animals, yet they look identical.

So that's a whole redrawing of the genetic tree?
Yes, it is a whole new rewriting, so the impact on primatology should be much greater, but most primatologists don't really know much about the nocturnal ones. The main line of evidence that has brought us here is the different calls of the different species, which are very distinct. We've increased the number [of species] from 6 to 24, with four more waiting in the wings.

How do you feel about receiving the Osman Hill Memorial Award?
I'm absolutely delighted. Osman Hill was a great force in comparative anatomy; he was my hero. His books show incredible detail. For example, the structure of the hands, the fingernails, the reproductive anatomy, all sorts of details we've had to compare to name the species we've been finding. So it's really nice to be honoured with his medal.

What else have you been doing apart from research?
I've been keeping very fit because part of doing field work is going to very remote places, working at night and living in tents, so you have to be healthy to do it. I've recently taken up rock climbing and do a lot of walking. In the summer I did the Tour de Mount Blanc in the Alps. I go to the gym, I swim 2-3 times a week. I had a hip replacement a few years ago, but the more you use it, the easier it becomes, so I don't have a problem with that anymore.

What would you say your legacy in primatology would be?
Definitely setting up the MSc in Primate Conservation. I was at Oxford Brookes for 32 years. I learned a lot in that time. It was so nice to have committed students who really wanted to do primate conservation. We've got really good people on the course and we won the Queen's Award. Teaching has always been my main priority.

What advice do you have for current MSc students?
In a sense, you need to train yourself to face reality, because reality is shocking. We're living way beyond the sustainable means of the planet and we see that because we're going to these places and seeing it with our own eyes. [Students need to] face up to reality and still have the strength and enthusiasm to carry on the work, even though it seems very difficult. We should probably be as vocal as possible, because we're the people who know what's happening to the natural environment and understand the consequences, which I think is difficult for people who are not specialists. So we all have a responsibility as conservations to speak up where we feel we can have an influence. We should be bold, go for it.

What do you think the future holds for primate conservation?
It's very hard to be optimistic. The rich countries are essentially stripping the world of its resources and if you're poor, you have very little influence over that. If you're an animal or a plant, there's very little that can be done. In so many cases, the laws are in place to protect wildlife, but the enforcement is non-existent, so wildlife assets are being stripped as rapidly as we can imagine. We're looking at an accelerated rate of loss of biodiversity, which is truly, truly shocking to those who understand why it is important. That's why it is hard to be optimistic, but if we're realistic we can point out why we cannot go on living this way, especially the rich. It cannot last, we're going to have to change at some point, so the sooner we think about what that means, the sooner we take action.

Websites related to Simon's research:

www.galagoides.se	[project regarding the molecular phylogeny of dwarf galagos]
www.wildsolutions.nl	
www.galagos.org	[will be an interactive site that will allow users to identify galagos based on photos and audio recordings of their calls]

Low Encounter Rates & High Hunting Pressure Highlight the Threatened Status of Cambodia's Slow Lorises (*Nycticebus pygmaeus & N. bengalensis*) and the Importance of Forest Protection

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Night surveys are still sparse in Southeast Asia and therefore there are only limited data available on the distribution, densities and ecology of nocturnal animals (Nekaris, 2004; Streicher, 2010). Surveys are often concentrated in protected areas such as sanctuaries and national parks where there is a certain degree of law enforcement and monitoring (Yustian *et al*., 2008; Swapna *et al*., 2010; Starr *et al*., 2011). Due to a variety of reasons such as limited access, difficult terrain and political instabilities many remote areas of Southeast Asia remain unsurveyed. In Cambodia, Pol Pot's regime during 1970's, frequent conflicts with neighbouring countries and a considerable number of undetonated land mines in the forests until recently prevented extensive studies. Preliminary surveys of flora and fauna conducted in the country draw attention to the rich biodiversity of the region and raise concern regarding fast disappearing habitats and high, unsustainable exploitation of wildlife (Platt *et al*., 2004; Grismer *et al*., 2008).

This study was conducted in Veun Sai Forests (VSF) of north eastern Cambodia (Fig.1) and aimed at verifying sympatric coexistence and estimating densities of two slow loris species: *N. bengalensis* and *N. pygmaeus* (Fig.2) in the area as well as evaluating hunting pressure, economic importance and differences in hunting habits, knowledge and attitudes towards lorises by Kavet and Lao ethnic groups inhabiting VSF.

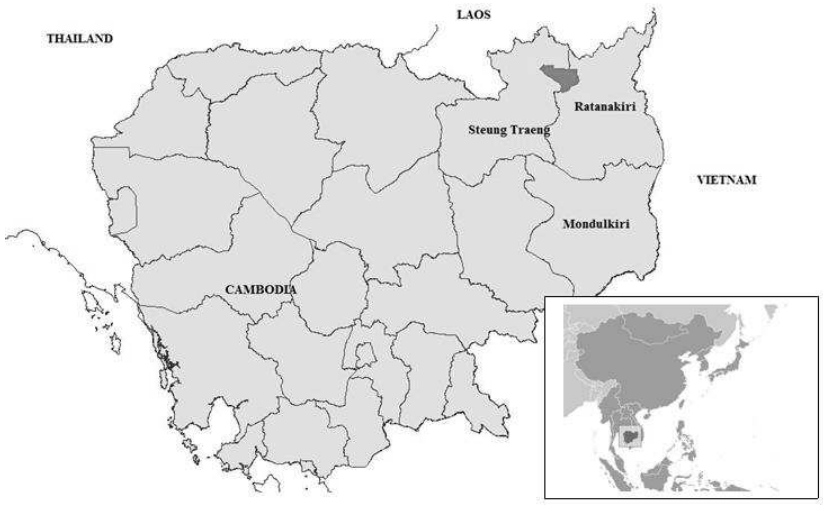

Fig. 1 Location of Veun Sai Forests in the administrative context.

(a) **(b)**

Fig. 2 Differences in appearance of slow lorises, showing **(a)** a smaller orange-brown *N. pygmaeus* with frosting and **(b)** much larger *N. bengalensis* with almost entirely grey pelage. Photos by **(a)** K.A.I. Nekaris and **(b)** N. Das

Slow lorises are elusive and cryptic nocturnal primates, traits which make them difficult to study. Two species of lorises are found in Cambodia. According to IUCN, Bengal slow loris (*Nycticebus bengalensis*) and pygmy loris (*N. pygmaeus*) sympatrically inhabit the northeast of the country. However, no confirmed sightings of *N. pygmaeus* west of the Mekong River and no reported sightings of *N. bengalensis* east of the Mekong River suggest that either this body of water provides a natural barrier or that the species have been expatriated from the large areas. Both species face considerable anthropogenic threats in form of habitat loss and unsustainable off-take for traditional medicine.

Seven transects ranging from 1.1km to 1.6km were freshly cut through the forest with the minimum distance of 500m from each other and allowed to rest for at least 30 hours prior to a survey to minimize disturbance and allow the redistribution of animals in the absence of observers (Peres, 1999). Transects were walked at least twice, with the exception of two transects which, due to time and manpower constrains, were only walked once. Surveys started between 19.00 and 20.00 hrs and finished between 22.45 and 03.30hrs. Transects were walked slowly (500 - 1000 m/h) and quietly, maintaining approximately 10m distance between the team members (Starr *et al*., 2011) and scanning all levels of vegetation. Stops were made every 100m for 5 to 10 minutes to minimize disturbance and to increase the likelihood of detection (Peres, 1999). Although the use of red light filters is preferred when searching and observing nocturnal primates (Nekaris, 2003), in this study animals were located using locally purchased head torches with white light as the head lamps with red filter emitted insufficient light to penetrate the

vegetation and to allow successful detections and observations. Ethnological aspects were examined through structured interviews with open-ended questions involving representatives of Kavet and Lao ethnic groups.

A total of 17.2 km were walked during the night surveys. No Bengal slow lorises were detected during this study. The encounter rate for pygmy lorises was 0.29 animals km-1 (SD±0.35) and the mean density was 14.6 animal km-2.

Sixty two interviews were conducted in five local villages. Participants of both ethnic groups were equally represented. Interviewees included 42 hunters and 20 non-hunting users of traditional medicine. Interviews revealed a high hunting pressure in the area, with Kavet people relying significantly more on lorises for both economic and medicinal purposes. Lorises are commonly used as ingredients in traditional medicine in treatment of broad spectrum of diseases such as wounds, stomach ache, gynaecological complains, headaches, fever and leprosy to name just a few. Loris-based medicine is believed to be better than pharmaceutical preparations because they are perceived as natural and providing cure rather than alleviating symptoms. During the night surveys no *N. bengalensis* were detected, and therefore their sympatric coexistence with *N. pygmaeus* in the area could not be confirmed. This indicates that despite presence of the suitable habitat east of the Meakong River, this body of water creates a natural barrier. The densities of *N. pygmaeus* in VSF were found to be lower than in previous study in the area but comparable with densities from other sites. According to local population numbers of lorises in the area are rapidly declining. Lorises are amongst most desired species for hunters as they present high medicinal and economic value.

The study concluded that conservation measures and management of loris populations in VSF should take a multifaceted approach and concentrate on helping local population to establish sustainable livelihoods, educate about environment and about alternatives to animal-based traditional medicines. All conservation agreements between local population and NGO's should be closely monitored with adequate law enforcement.

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International Animal Rescue in Indonesia

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Our primate rescue centre in Ciapus, near Bogor in West-Java was built in 2006 with the objective of protecting species that were not often considered by other conservation organisations. Some of the animals that arrive in the centre were confiscated from pet owners or dealers; others were surrendered by their owners. At IAR we rescue and rehabilitate macaques and slow lorises that have been caught from the wild and sold at markets to become pets or abused as tourist attractions. This includes "Topeng Monyet", in which long-tail macaques (*Macaca fascicularis*) are dressed in clothing, often with a doll's head mask, and cruelly trained to perform human activities like riding bicycles for the sake of "entertainment". Macaques, as with almost all primate species are highly social and live in large groups in the wild. Kept isolated on their own with inadequate diet and under poor living conditions they suffer physically and mentally and most animals arrive at our centre highly traumatized. Unfortunately, under the current law, macaques do not have any legal protection in Indonesia. Law enforcement efforts to protect the Indonesian wildlife are in general poor which results in high numbers of openly traded slow lorises.

Facing the enormous demand of rehabilitation capacity, the Slow Loris Awareness Campaign has been implemented in 2011 to tackle the root of this problem. The main aim of the awareness campaign is to achieve that people recognize slow lorises that they are highly threatened species, and that they are illegal to catch, keep or sell, hopefully resulting in a decrease in the

demand and supply of this animals. Collaborations with multiple stakeholders and other local and international NGOs including Oxford Brookes University's Little Fireface Project, Wildlife Conservation Society, TRAFFIC, Lembaga Advokasi Satwa, and The Agency for Natural Resources Conservation help build support for our actions and pressure for greater law enforcement.

Education is a vital part of our work and we try to achieve a deeper understanding about these animals and their threats by giving presentations about animal welfare and biodiversity conservation at schools and universities. Also, by conducting surveys on trade status, awareness and attitudes we hope to identify the main threats and monitor changes to people's awareness and behaviour, and disseminate this information both nationally and internationally. By increasing the number of local people actively involved in our awareness events, we can foster positive attitudes towards biodiversity to minimize human-induced impacts on the environment.

In spite of IAR's determination to focus on the underdogs of the conservation world, it seemed inevitable to extend our field of activity. West Kalimantan is one of the most heavily deforested areas of Borneo, where forests are cleared in large tracts for logging and conversion to oil palm plantations. In the beginning of 2009, IAR took over a centre from a local NGO with the intention of functioning as a transit facility for orangutans before the animals would be passed on to other rescue centres. However, due to the high numbers of rescued orangutans the capacities of these centres were full and as a result animals remained in this facility without appropriate long-term accommodation. Improvements to the living conditions were sought by building better and bigger enclosures, but in order to provide enhanced housing situations and to be able to prepare the animals for future reintroduction to the wild, building work began at the end of 2011 for a new rehabilitation centre in Ketapang, West Kalimantan.

We hope that by continued support from multiple stakeholders, and with a strong awareness campaign aiming to raise the profile and understanding of the species, we can ensure the long-term survival of the primates of Indonesia and a more sustainable coexistence with the environment.

For more information, please see: **www.internationalanimalrescue.org**

Conservation of Chiriquí's Squirrel monkey (*Saimiri oerstedii oerstedii*), in Chiriqui Province, western Panama

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The squirrel monkey (*Saimiri oerstedii*), inhabits the forests of eastern Costa Rica and western Panama (Rodríguez-Vargas, 1999; Wi1son, 2002). In Panama, the subspecies *S. oerstedii oerstedii* is only found in the western region, specifically in the province of Chiriquí. This regional endemism contributes to the subspecies' vulnerable conservation status (IUCN, 2010; Miranda & Méndez-Carvajal, 2011). Threats to the Chiriquí's squirrel monkey include the subspecies' restricted distribution, the pet trade and habitat loss due to agriculture and tourism (Boinski *et al.,* 1998; Burghart, 2005).

Previous studies have recorded *S. oerstedii oerstedii* at the communities of San Carlos (Vargas, 2004), at sites near Diyala (Seiter, 2005) and 15 other sites in western Chiriquí (Rodríguez-Vargas, 1999). However, considering the extent of agricultural activities, and the high deforestation, it is necessary to evaluate the actual distribution of this subspecies. Currently, the Fundación Pro-Conservación de los Primates Panameños (FCPP) is visiting the sites mentioned in the previous studies and evaluating their presence, composition and distribution. FCPP and the Universidad Autónoma de Chiriquí (UNACHI) are also developing a thesis that examines the role of Chiriquí's squirrel monkeys as seed dispersers and pollinators, activities that are considered important in the dynamics of the ecosystem (Zunino *et al*., 2007). The disappearance or disruption of this plant-animal relationship could result in the local extinction of plant species and have consequences for the Chiriqui's squirrel monkey (Marsh, 2003).

Fig. 1 Chiriqui's squirell monkey – *Saimiri oerstedii oerstedii*

Since 2010 we have been conducting monthly population surveys on the actual distribution of the Chiriqui's squirrel monkey using presence/absence surveys and transect lines; while at the same time incorporating environmental education to elementary schools near monkey habitats. Four of the areas reported by Rodríguez-Vargas (1999) have been

surveyed for the presence of *S. oerstedii oerstedii.* No squirrel monkeys were observed in Boqueron or Gariche River. However in the township of Puerto Pedregal the community has informed us of monkeys present in the mangrove areas. In Limon, Baru District we have observed one in captivity.

The group in Limon town group, with 25 individuals, is the most observed group. We have obtained data on group composition, group structure and feeding preference and have compared these observations with results obtained by Wong (1990), Vargas (2005) and Burghart (2005). Based on these preliminary observations, as well as a survey of local people, we have been able to prepare our first conservation plan for the subspecies.

As part of the FCPP's activities that we have been developing in Panama, the project called "Proyecto de Conservación del Mono tití Chiricano" has posted a video on youtube.com (http://www.youtube.com/watch?v=SPTe00ymEv8), giving an introduction to our activities in the area of Limones. Teachers from Primer Ciclo de Punta Burica school describe the Corpachi natural trail, which they have created as an excellent conservation initiative, using their native forest as a reserve. They combine agricultural teaching with appreciation of local flora and fauna, with a focus on the conservation of the Chiriqui's squirrel monkey.

Fig. 2 Elvia Miranda-Jiménez with students in Panama

The FCPP is a non-profit organization, and a non-governmental organization that began with a similar project in 2001, as an effort to conserve two critically endangered primates in Azuero Peninsula, southwestern Panama. After gaining official recognition by the Panamanian government in March 2010, we have expanded our primate demography projects and conservation activities to different parts of the country, especially remote and devastated areas, both inside and outside of natural reserves. The support of Oxford Brookes University and its habitat country scholarship programme has been crucial to the promotion of primatology in Panama.

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University Events

Seminar Series

The seminar series is a weekly event which events guest speakers to present their research. We are currently in the process of recruiting speakers for our spring semester. If you are interested in attending or presenting please do not hesitate to get in contact with us. Contact details are provided within the contents pages

24 Sept	**Alejandra Duarte** (Escuela Nacional de Antropologia e Historia))
1 Oct	**Dr Vincent Nijman** (Oxford Brookes University)
8 Oct	**Johanna Rode** (The Little Fireface Project)
15 Oct	**Dr Todd Rae** (Universtiy of Roehampton)
22 Oct	**Panut Hadisiswoyo** (Sumatran Orangutan Society)
29 Oct	**Dr Adam Britt** (University of Liverpool)
5 Nov	**Joy Iliff** (MASC: Monkeys Acting in Schools for Conservation)
12 Nov	**Dr Bonaventura Majolo** (University of Lincoln)
19 Nov	**Dr Kim Hockings** (New University of Lisbon/Oxford Brookes University)
26 Nov	**Dr David Chivers** (University of Cambridge)
3 Dec	**Dr Christoph Schwitzer** (Bristol Zoo)

2012-2013 Cohort of the MSc Primate Conservation

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