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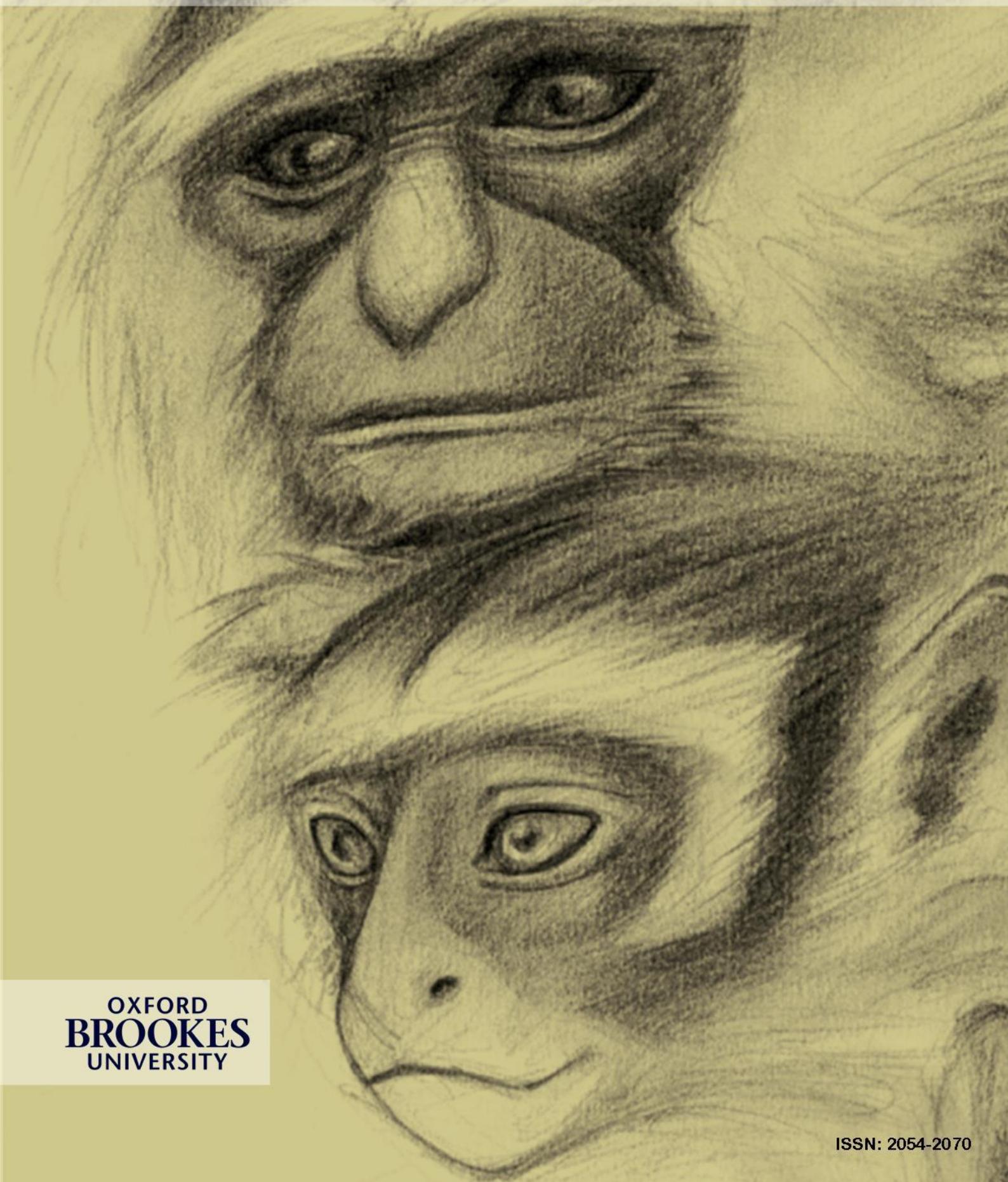

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Letter from the editors

Welcome to the Winter 2017 edition of Canopy, the in-house journal of the MSc in Primate Conservation at Oxford Brookes University.

The focus of this issue is ethnoprimatology. Ethnoprimatology is a multifaceted discipline broadly defined as the study of primates using social anthropology methods. It can be used as a framework for the exploration of the human-primate interface, human perceptions of wildlife and changing ecological attitudes and behaviours.

As we reach a critical point in what has been termed the Anthropocene, it is imperative that as global geophysical actors we work to conserve biodiversity. As human populations grow and areas cleared for agriculture increase, human-primate encounters will become more frequent. Increased contact can lead to conflict as humans and non-human primates compete over resources. As primatologists it is important that a cross-discipline approach to fieldwork is taken, as in many cases involving the local community is one of the best ways to have a lasting conservation impact.

This is a special edition focuses on ethnoprimatology and human-primate interactions, as it reflects the research interests of many in our cohort. The articles within were selected to investigate some of the numerous research questions that can be tackled with an ethnoprimatological approach. We hope you enjoy exploring them, and want to thank everyone who helped to make this issue a success, including organisations without whose support this research would not have been possible.

All the best,

The editors
Chloe Chesney, Keely Maynard, Will Westwood & Magdalena Svensson

Letter from the Course Leader

The MSc in Primate Conservation is at its 17th edition and this year is possibly one of the richest in structural changes since its beginning. For the first time the traditional formula of the programme has been modified to incorporate knowledge pathways that offer the students the opportunity to specialize on some of the current trends in primate conservation. The pathways, that include Lemurs and Nocturnal Primates; Human-Primate Interactions; and Apes in the Anthropocene, are also meant to match with the expertise developed by our staff over the past two decades. I was very happy to contribute to this change and to assist to this evolution of our MSc programme at Oxford Brookes University in line with the fast change of the multidimensional subject that is Primate Conservation. I have no doubt that this change will contribute to produce an even more significant world-wide impact of our students.

The students' projects presented in this issue of Canopy largely reflect the leading themes of two of the introduced pathways, that is ethnoprimatology and the need to understand the complex interactions between human and non-human primates. Themes ranging from local ecological knowledge (Miard), to primates interactions with the local community (Phelps and Ramon) or tourists (Forti), to ecotourism development (Frenkiel) and illegal pet trade (Kitson) have all as common denominator the need to understand the local perception of the primates and their role in the culture as well as in the economy of the human community in countries like Madagascar, Malaysia, Brunei, Indonesia, Turkey, Senegal, and the Gambia. This multi-disciplinary approach requires primate conservationists to have competences that span well beyond classic behavioural studies on single primate species but incorporate elements from Social Sciences, Psychology or even Business. It is only through a comprehensive understanding of the human dimension of conservation that conflicts may be minimized and long-term solutions hopefully identified. This is difficult not only in the field but also at our institutions where we tend to speak different languages in different disciplines. The failure of non-inclusive conservation projects imposes now this as a sine-qua-non condition for the future of the primates (including the human ones).

As for previous years, also the new cohort is formed by a very diverse group of motivated students who want to make a difference. Their projects are going to cover various aspects of primate conservation with an increase of ethnoprimatological studies in the attempt to helping our threatened cousins and the local communities living alongside them. Helping these students will be a challenging but extremely rewarding at many levels. Congratulations are due to the editors of this issue of Canopy for producing this in time for the Winter Meeting and the 50th anniversary of the Primate Society of Great Britain. The meeting this year will be a fantastic opportunity for our students to discuss their ideas and meet in person some of the main actors working in primate conservation and other fields of primatology. For many of them this will be the first occasion to show their work and/or to talk about project ideas with primatologists from outside Oxford. I wish all students of this year's cohort the best of luck to make their contribution significant for the primate species and the human community their work will be focussing on, and for their life.

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Reader in Biological Anthropology

Local ecological knowledge of two Sarawak tribes, the Iban and the Penan, about nocturnal animals and awareness about lorises in Brunei

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The island of Borneo is divided between three countries and is highly diverse in terms of biodiversity (Scriven *et al*., 2015). However to effectively manage wildlife conservation it is important that all the countries agree on policies and rules (Runting *et al*., 2015). For this project I focused on the state of Sarawak, Malaysia and the close sultanate of Brunei. Sarawak is the biggest state of Malaysia (with 124,450 km^2, Fig. 1) and is ethnically diverse (Malaysian Department of Statistics, 2013) with 40 sub-ethnic groups each with a distinct language and lifestyle (Statistics.gov.my). Some of these groups are also present on other parts of Borneo.

FIGURE 1 Map of South East Asia with the location of Malaysia and the state of Sarawak on Borneo and the sultanate of Brunei.

I looked at the local ecological knowledge (LEK) about animals in Sarawak with an emphasis on nocturnal animals and slow lorises (Silvertown, 2009), focusing mainly on the two most emblematic tribes in Sarawak, the Iban and the Penan. The Iban are mostly farmers and fishermen who also use the river for hunting (Cramb, 2012). Old religion with multiple omen species is still in practiced even if most of the population has now converted to Christianity (Jensen, 1974). The Penan are the last nomadic tribe in Sarawak and are mostly hunter-gatherer (Mohamed & Masron, 2014). However for this study I only visited settled Penan villages due to the difficulty of reaching nomadic ones still living in the forest. In the settled Penan villages the old traditions are still alive, such as hunting with blow pipes and poison darts (Brosius, 1991), and even some beliefs about animals even though most of them are now Christians.

Interviews with open-ended questions were asked, with pictures about different nocturnal animals (colugo, civet, leopard cat, pangolin, tarsier and slow loris) to assess the knowledge of the local people. An online survey following the same type of questioning was distributed to people in Sabah, Sarawak and Brunei to gather knowledge of people living in big cities. An emphasis was given to slow lorises and how different tribes have different knowledge about them. In total 136 interviews were conducted with 110 respondents in 6 villages and 26 online respondents. In general, the Penan tribe was the one with the most extensive knowledge about animals and their behaviours. This is due to their hunting traditions and intensive connection with the forest.

The second part of this study was made possible in Brunei with the help of a local NGO, 1stopbrunei Wildlife, to coordinate school presentations to raise awareness about

slow lorises in Brunei. I visited three schools and one university.

The children and students were really receptive and interested in learning about a species they don't know, but that lives close to them. Overall the participation was good and everyone was really interested in the talk and asked a lot of questions. However, their knowledge is really lacking about primates, with every one of them thinking they do make good pets and eat only fruits, like banana. They also think the problem with primates is because they eat people's crops. They do realise that the major problem is people hunting them and think it is important to protect them.

One class also made some drawings of lorises, including some with teeth, meaning they remembered the talk I gave.

It is important to gather local knowledge to assess threats and create effective conservation projects that includes the needs of the local populations (Alves, 2012). This project was a first aim towards this goal. It is also essential to raise awareness about local animals because more and more people are now leaving rural areas to live in bigger towns. Children and school activities are really beneficial for conservation and should be developed intensively.

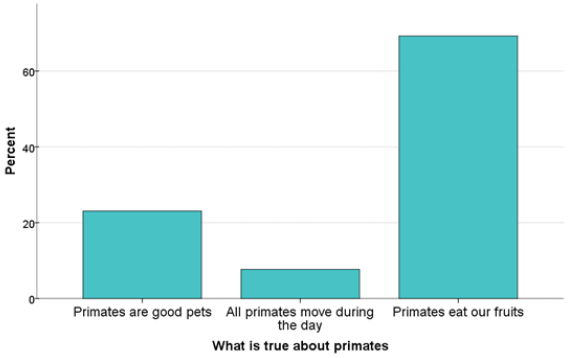

FIGURE 2 Knowledge of school children about primates.

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The illegal trade of slow lorises (*Nycticebus* spp.) in Marmaris, Turkey

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Interaction with wildlife is a highly desirable tourist attraction (Curtin, 2009). Across Asia there are longstanding and thriving traditions of the use of wildlife as tourist entertainment, including as photo props (Osterberg & Nekaris, 2015), however this is thought to be uncommon in Europe. Photo props are likely wild-caught animals used for souvenir tourist photographs, often on beaches, in bars and clubs. This study found evidence of the use of slow lorises, macaws, dolphins, turtles, sugar gliders, vervet monkeys, and rabbits as photo props in Marmaris, Turkey. The emerging trade of slow lorises as tourist photo props in Marmaris was found to have occurred since at least August 2012.

Slow lorises (*Nycticebus* spp.) are small, nocturnal, arboreal primates found in numerous habitats throughout Asia (Nekaris, *et al*., 2013; 2016). Slow lorises have large forward facing eyes, with almost humanistic appearances. Due to their appearance, social media stories often refer to them as being the "cutest" animals on the planet (Nekaris, 2014). Slow lorises are the only venomous primate (Nekaris *et al*., 2013), therefore individuals in the pet or photo prop trade have their teeth removed to prevent injury to humans (Right Tourism, 2012). Slow lorises are known to position themselves in a 'classic defence posture' (Fig. 1) when stressed, this posture allows for rapid head movements between the brachial glad to combine fluids with saliva in preparation to administer a venomous bite (Nekaris *et al*., 2013). People who keep slow lorises as pets are unable to provide the highly specialised conditions that they require, resulting in individuals perishing quickly in captivity (Nekaris & Jaffe, 2007).

There are currently nine recognised species of slow loris, all of which are listed as Endangered or Critically Endangered (IUCN, 2016). The most prevalent threat that slow lorises face is the pet and photo prop trade, although other threats include habitat loss, bush meat hunting, and use in traditional medicine (Starr *et al*., 2010; Kumar *et al*., 2014). Slow lorises, like many primates, are slow to reproduce and therefore are unable to re-establish their rapidly diminishing populations (Nekaris *et al*., 2013

In the last twenty years, slow lorises are one of the few primates that have been reassessed to be listed under APPENDIX I by CITES banning all trade (Nekaris, 2014; CITES, 2016). The Javan slow loris (*N. javanicus*) has also been listed in The World's 25 Most

Endangered Primates list since 2008 (Clark *et al*., 2014).

FIGURE 1 Slow lorises in the 'classic defense posture', where slow lorises raise their arms above their head, to enable combination of saliva with brachial gland fluids (Nekaris *et al.,* 2013)

Marmaris, Turkey was chosen as the study site due to evidence of slow lorises being used as photo props on social media site Instagram. Using observational methodology (Holmes, 2013), daily surveys were carried out during two trips to Marmaris, to obtain presence/absence data of wildlife photo prop individuals. Observational methods, also known as direct observations, are used when the objective of the study is to evaluate an ongoing situation, in this case, the photo prop trade. When wildlife photo props were observed, as much information was recorded as possible using descriptive notes, as well as photographs and videos where possible. The descriptive notes included information on the location, time, species and welfare condition. Welfare condition relates to the general physical condition of the individual as well as the anthropomorphic condition, such as wearing clothes, and being in physical contact with people. The general physical condition was categorised by body condition (skinny, healthy, overweight), if teeth had been removed, and condition of hair/fur amongst other indicators. All evidence collected was taken by appearing as a 'normal tourist', whilst not encouraging or promoting the illegal wildlife trade.

Three slow lorises were located in Malibu Beach Bar, and identified as one juvenile and one adult Bengal slow loris (*N. bengalensis*) and one adult pygmy slow loris (*N. pygmaeus*). The vendor referred to the slow lorises as lemurs, whilst the bar owner referred to them as sloths. No-one appeared to question these descriptions although when photo prop images from Malibu beach bar are posted on Instagram the terms slow loris, lemur, monkey and bush baby are frequently used to describe these slow lorises. For just 10 lira (approx. £2.50 - June 2016) a tourist could either have their photograph taken by the vendor and printed out to take away, or they could 'play' with the slow loris for various time periods (depending on how busy it was), enabling tourists to take photographs with their own devices. Although no slow lorises were observed during daylight hours, the bar contained bright lights and flash photography was frequently used, causing both stress and potential damage to the sensitive eyes of the slow loris.

When not being used to either entice tourists or being held by tourists, the slow lorises were

stored in unknown conditions behind a small DJ booth. All three slow lorises were observed being fed unsuitable foods, ranging from cherries, grapes and even a wedge of orange taken from a cocktail. Feeding only occurred when tourists had paid to 'play' with the slow lorises and was carried out by both the vendor and the tourists. Although none of the slow lorises appeared underweight, it was difficult to distinguish if they were in fact overweight. At no time were any of the slow lorises observed wearing any sort of clothing, although many images online show that this does frequently occur. The adult Bengal slow loris was observed on multiple occasions in the 'stress position' (Fig. 1), this occurred mostly whilst being held and stroked by the vendor.

Each slow loris appeared to have a role within the vendor's business. The adult Bengal slow loris spent the majority of the time with the vendor, attracting tourists, whilst the juvenile Bengal slow loris appeared to be used only when groups of tourists paid to 'play' with the slow lorises, and on quiet nights was not on show. Both of the Bengal slow lorises had had their teeth removed, to prevent them from inflicting their venomous bite. The pygmy slow loris was used mostly for photographs, taken by the vendor, or for tourists to play with. The pygmy slow loris was in poor condition, with little movement and general lethargic appearance, which is possibly why it was selected for photographs more than the other more active individuals.

This is the first study that quantifies the use of slow loris photo props outside their range countries, and highlights a significant threat to slow loris conservation. According to the CITES Trade Database, no non-human primate has ever been legally imported into Turkey, confirming that these individuals have been illegally imported. Efforts are needed to continue to raise awareness of the slow lorises' plight. Without a change in attitude from the public, the use of slow lorises as photo props is likely to continue, with the potential to spread further across the globe. In conclusion, the possible global spread of slow loris photo props would result in further detrimental effects on a species with already rapidly decreasing population numbers.

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Brief overview on edge effects and crop raiding study on the lemur community inhabiting Tsitongambarika Protected Area, Southeast Madagascar

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From May-July 2016 I conducted a study that involved two complementary parts, in the Ampasy region of Tsitongambarika Protected Area, Southeast Madagascar. The first part was to understand how the lemur species in the area respond to edge effects, and the second part to was understand which species (not just lemurs) crop raid and whether crop raiding is a problem to local farmers. Madagascar has suffered and continues to suffer extreme forest loss due to human expansion into rural areas for timber, slash and burn agriculture etc, (Gade, 1996; Agarwal *et al.,* 2005). The expansion of farmland into forests increases the area of edge habitat in the original forest (Fahrig, 2002), which alters the abiotic and biotic conditions of the forest (Harris, 1988; Murica, 1995) and lemur species respond to these changes in different ways (Lehman *et al*., 2006). There are three defined ways lemur populations can respond - higher densities in the forest interior (negative edge response), no change in densities throughout edge and interior (neutral edge response), and higher densities in the forest edge (positive edge response) (Ries *et al*., 2004).

Furthermore, species that display higher populations at the forest edge are also more likely to crop raid and incorporate crops into their diet.

There are seven lemur species present at the Ampasy study site; two cathemeral lemurs *Eulemur collaris* and *Hapalemur meridionalis*; five nocturnal lemurs *Daubentonia madagascariensis, Avahi meridionalis, Lepilemur fleuretae, Mcirocebus rufus* and *Cheirogaleus major*. However, the taxonomy identification of the last three nocturnal species mentioned is unclear in the area and needs clarifying (Nguyen *et al*., 2013). With current identification, all the Ampasy lemur species are classified as being threatened with extinction to some degree, except *D. madagascariensis* and *C. major*, which are data deficient.

To understand the response to edge effects data were collected on species distribution and abundance differences from the edge to the interior by transect work. To understand crop raiding I conducted relatively short questionnaires (with the help of a translator) with farmers in nine villages located at varying distances from the forest.

Results of the edge effects section demonstrated one cathemeral species displayed a negative edge response whereas the other cathemeral species displayed a positive edge response. Three of the nocturnal species displayed neutral edge responses – the remaining two nocturnal lemurs were not included in data analysis due to small sample sizes during transect work. Results of the crop raiding section highlighted that two lemur species crop raid in the area, however farmers reported nine other species including birds and rodents. The lemur species appear to be very specific on their choice of crop, with only two types of crop connected to lemur crop raiding activities. Furthermore, there appears to be some conflict due to crop raiding.

Unfortunately, due to the short time scale my study had limitations and I recommend further research to be carried out in the area to increase knowledge. To further understand edge effects, more research should be conducted on the diet of the species in the area. Moreover, it would be interesting to study the diet of the crop raiding lemurs and how it affects the behaviour/activity budgets. Finally, mitigation techniques should be trialled to reduce conflict and to help both the lemurs and the farmers.

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Utilising the Analytic Hierarchy Process (AHP) for ecotourism site selection in Java, Indonesia: An interdisciplinary approach to primate conservation

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In primate habitat countries around the world, ecotourism is used as a tool to gain essential funding for conservation and local development. Ecotourism is a form of nature-based tourism with a strong educational component, which emphasises benefits for the wildlife, environment, and host communities involved (Honey, 1999). When guiding criteria are not stressed during programme development, ecotourism can pose a threat to primate and habitat health and the stability of communities. It is therefore essential to utilise business management methodologies to inform ecotourism site selection.

In this paper, we test the applicability of the Analytic Hierarchy Process (AHP) to selecting a partner site for an ecotourism programme at the Little Fireface Project (LFP) in Java, Indonesia. The AHP method was developed in the 1980s as a multicriteria approach to group decision-making in the context of business management (Saaty, 1980). It has been applied to tourism development as a method of site and activity selection (Lahdelma *et al*., 2000; Ok *et al,* 2011). The AHP method allows planners to select the criteria most relevant to their projects, making it an ideal method for ecotourism development, which necessitates both environmental and social standards (Fig. 1). Between May and July of 2017, we visited four wildlife conservation sites with the aim of determining the most suitable partner site for ecotourism development with LFP (Fig. 1).

The LFP is a long-term field site which works towards the conservation of the Critically

Endangered Javan slow loris (*Nycticebus javanicus*). The field station and study site are located in the village of Cipaganti, Cisurupan, Garut Regency, West Java, Indonesia (7°16'44.30 "S, 107°46'7.80 "E, 1200 m asl). Cipaganti is a largely Islamic community situated on the face of Gunung Puntang, one of the many peaks within the mountain range containing Gunung Papandayan, an active volcano (Nekaris *et al.,* 2017). Although the immediate area surrounding the village is unprotected, it supports an unusually high density of Javan slow lorises. In Java, the slow loris is commonly captured for sale in the illegal pet trade (Nekaris *et al*., 2010). The LFP hosts a number of ongoing projects to protect Javan slow lorises and their habitat, while also working towards the education and empowerment of their host community in Cipaganti. Funding for these projects is an issue, as Javan slow lorises are a less charismatic species compared to their large-bodied primate counterparts. Although the site maintains a volunteer tourism programme, LFP has never hosted short-stay international tourists as part of an ecotourism package. An ecotourism programme could provide the funding needed to carry out current projects, increase pay for local staff, and conduct projects that are being developed.

We will refer to the four sites assessed as potential partners as Sites A, B, C, and D. All sites were either wildlife rehabilitation centres or wildlife viewing sites.

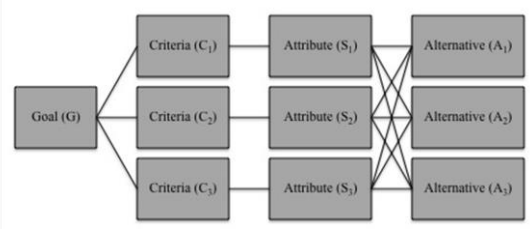

FIGURE 1 AHP hierarchy model

We obtained information regarding our criteria for each site through the use of participant observations and semi-structured interviews. Our pre-defined criteria (C) included a) preservation of landscape and wildlife, b) livelihoods of individuals in adjacent populations and economic benefit to the country as a whole, c) safety and education of tourists, and d) logistics pertaining to an ecotourism partnership with LFP. Each criterion was informed by a set of attributes (Table 1). We gave all sites scores of High, Medium, or Low desirability for each attribute, where desirability refers to the social, environmental, or logistic suitability for an ecotourism partnership with LFP.

We used an AHP online calculator to complete a series of pair-wise comparisons between criteria (BPMSG, 2017). The online calculator then listed differential weights for each criterion, with a) preservation of landscape and wildlife and b) livelihoods of individuals in adjacent populations and economic benefit to the country as a whole being weighted more heavily than c) safety and education of

TABLE 1 Attributes informing criteria assessments for ecotourism partnership selection

Preservation of landscape and wildlife	**Livelyhoods of individuals and economic benefit to the country**
1. Mitigation of disease transmission	1. Mitigation of crop-foraging
2. Mitigation of poaching/theft	2. Impact on local attitudes
3. Mitigation of disturbance to natural activity	3. Provision of sustainable income
4. Mitigation of negative impacts to environment	
5. Use of natural resources	
Safety and education of tourists	**Logistics**
1. Mitigation of risk to safety	1. Distance from LFP
2. Availability of infrastructure/resources	2. Accessibility
3. Impact on attitudes/behaviour	3. Cost
	4. Presence/absence of wild primates

TABLE 2 AHP anlysis of sites for ecotourism partnership selection in % (criteria ranking provided in italics)

	Site A	**Site B**	**Site C**	**Site D**
Preservation of landscape and wildlife (*33.3%*)	9.99	9.99	3.33	9.99
Livelihoods and economic benefits (*33.3%*)	13.7	3.77	2.14	13.7
Safety and education of tourists (*16.7%*)	9.08	2.04	4.52	1.06
Logistics (*16.7%*)	4.38	1.96	0.92	9.43
Total	**37.2**	**17.8**	**10.9**	**34.2**

tourists and d) logistics. We then completed the same process to compare each site's desirability within each criterion. Table 2 shows the comparative weighting of each secondary site for each criterion. Site A (37.2%) was ranked the highest, followed by Site D (34.2%), Site B (17.8%), and finally Site C (10.9%). The rankings reflect each site's relative suitability to our goal.

Site A received high scores in each criterion. The site developed many initiatives to improve the livelihoods of individuals living in the area and maintained an extensive protocol to protect the welfare of their wildlife and its habitat. They also had many resources already available for tourists, including educational materials and infrastructure. All of our social and environmental criteria were a factor in every site's developed protocols and regulations; however, these were less developed at some sites. Alternate sites may have received low scores if they employed mainly foreign staff, used unsustainable construction materials, did not monitor for human-wildlife contact, or posed risks to visitors' safety, for example. Some sites also presented logistical challenges such as the

distance from LFP, poor accessibility, and high costs.

In this analysis we showcase an interdisciplinary approach to decision-making in primate conservation. Ecotourism is being utilised to address a lack of funding at many conservation sites. If developed criteria for ecotourism are not considered in planning processes, it is likely that programmes will not meet the standard set by ecotourism research (Honey, 1999; Diamantis, 2004; Russon & Wallis, 2014). Along with informing programme development at LFP, this analysis represents a holistic method of weighing ecotourism's positive contributions against its negative impacts. Its flexibility allows the method to be utilised at sites around the world, where criteria and attributes can be defined according to context.

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Reflections on undertaking cross-disciplinary fieldwork on human-primate interactions in West Africa

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Most non-human primate populations (hereafter primates) are threatened by different degrees of human disturbance (McKinney, 2015). In this context, cross-disciplinary research, which combines social and natural science methods, offers a unique perspective to examine human – primate interactions in shared spaces and enables a broader knowledge that a single approach would not provide (Fuentes & Hockings, 2010; Setchell *et al*., 2016). However, there are still numerous difficulties in conducting interdisciplinary research in conservation (Bennett *et al*., 2017). Considering the potential hurdles and that wildlife conservation should not hamper human wellbeing (IUCN *et al.,* 1991), primatologists should reflect on some practical and ethical issues when conducting fieldwork (McLennan & Hill, 2013).

In this article I discuss the difficulties experienced as a student while adopting a cross-disciplinary approach to examine the use of a wild resource by sympatric chimpanzees and local people in south-eastern Senegal, West Africa.

With fewer than 400 individuals, Senegal represents the most northwesterly point in the range of Western chimpanzees (*Pan troglodytes verus*), listed as Critically Endangered (Humle *et al*., 2016). In this country chimpanzees and humans compete over access to wild resources, including *Saba senegalensis* (hereafter Saba) (Carter *et al.,* 2003). The fruit of this liana is one of the main food sources for chimpanzees (Pruetz, 2006) and is also very important to humans, who harvest it for their own consumption but mostly for sale (Knutsen, 2003).

My research took place in two villages within the Dindefelo Community Nature Reserve (RNCD), southeastern Senegal, from April to July 2017. This reserve was established in 2010 by the Rural Community of Dindefelo with the technical assistance of the Jane Goodall Institute Spain (JGIS). It was created with the aim of contributing to the conservation of wildlife and natural resources as well as promoting the socio-economic development of the local people, who are mainly of the Fulbe ethnic group (Pacheco *et al.,* 2012).

I studied the importance, spatiotemporal use and extraction of Saba by humans and chimpanzees through a combination of social and natural science data collection methods. I

conducted semi-structured interviews, free-listing exercises and participant observation to collect quantitative and qualitative information on human use of Saba. Additionally, I monitored fruit trails weekly to obtain data on the amount of extraction of Saba by people and primates. Although this case-study was research-based, it was designed to provide useful data to inform conservation strategies. Prior to the start of the fieldwork, I obtained permission from the JGIS to research at the RNCD -who were already authorised by the Senegal Forestry Department-, and ethics approval from the University Research Ethics Committee.

Interaction with local people occurred on a daily basis, not only because of the methods employed, but also because I lived with people in their homes. I had previously worked as a local volunteer in the area with the JGIS, so I already had a basic knowledge of Pular, the local language, and was familiar with some of the local residents, which very likely helped me be accepted by the community. Once in the pertinent village, I presented myself as a student who wanted to conduct research in collaboration with the JGIS.

This article is presented as a case study to reflect on the following topics:

1. Combining social and natural science methods

Adopting a cross-disciplinary approach is challenging because it requires a command of natural and social sciences methods. As a biologist, in the beginning I was unfamiliar with the vocabulary, methodology and style employed in social sciences. I was also unsure about using qualitative methods (e.g. participant observation), since I found it difficult to interpret and validate the results. Only by reading and discussing with my supervisors did I understand that only qualitative data can reflect the complexity of the diverse factors that influence people's attitudes and behaviours (Setchell *et al.,* 2016).

I found it particularly hard to conduct cross-disciplinary research in the field, especially because of time constraints. I spent between 7 and 10 hours per day monitoring fruit trails, and had planned to carry out at least two interviews once I was back from the forest. These long working days were exhausting (it did not help that temperatures were higher than 35 degrees), and made it difficult to find time to enter data or deeply ponder the development of the project. Indeed, thinking across disciplinary boundaries was notably challenging. With such a tight schedule, any unexpected event (e.g. inclement weather, indisposition) forced me to rearrange the programme and reduce my resting time. The cross-disciplinary approach also required a greater investment to pay salaries and train

staff because I needed not only field assistants but also translators.

2. Working with and amid local people

In West Africa, it is socially very important to attend the rituals of the community. On several occasions I had to suddenly cancel or postpone interviews due to ceremonies. In addition, the schedule had to be adapted to the Ramadan period. For example, field assistants took a break to pray in the forest and interviews had to be conducted before people were ready to break the fast.

Despite introducing the aims of my project to each household and being apparently accepted, some people did not understand the purposes and speculated about what I intended to do regarding Saba. Some villagers thought that I went there to buy Saba fruits. On one occasion, while my assistant and I were counting fruits in the forest, a group of women arrived and asked me to write their name down in the supposed list of Saba sellers. Contrary to this, other people believed that I intended to forbid the Saba harvest. For instance, one week we found that somebody had removed the identification number of some lianas, which were marked with a biodegradable spray on trunks closely located to the lianas (Fig. 1). Monitoring lianas might have been regarded as a way of controlling people's activities. Other villagers went further and stated that I wanted to know how many sacks each family collected to economically compensate them after banning the harvest.

FIGURE 1 Liana number removed by cutting the tree's bark.

Once, while conducting a free-listing exercise to know what were the most important wild plants to local people, a man refused to continue. When I asked the translator why the respondent wanted to stop, he answered that he was suspicious about why a toubab ('white person') needed to know so many things about the plants of their forests. This reflects a perception of power imbalance between the rural villagers and I, the foreign researcher (McLennan & Hill, 2013).

However, I generally felt welcome and I had to take into account my social position. Although I am young and a woman, my status was high because I am educated, Western and a visitor.

Therefore, I had to make it clear that people were free to choose whether to take part in the study or not. My status, along with my

relationship with the JGIS, might have impacted the quality of data. For example, a resident affirmed that she never gathered Saba fruits within the reserve, but we could later see her collecting there. Hence, residents might sometimes give what they considered 'right' rather than 'real' answers.

For some villagers it was difficult to understand my position of objectivity. For instance, a counsellor from one of the villages asked me for help to sell Saba fruits at a fair price because harvesters were generally forced to accept the low prices proposed by itinerant merchants and sometimes were not fully paid. This raises an interesting point, since I could not address this issue directly and I had to act as an impartial observer without altering the current sale system. In this case, I told him that I would inform the JGIS about the situation, so they could decide what action could be implemented. Only by being present and working locally, I unintentionally played a role as a 'social actor' (McLennan & Hill, 2013). This could not only affect people's statements and actions, but could also have an impact on the process of collecting data and the accuracy of the data collected.

3. Working with local field assistants and translators

In primatology fieldwork, it is common to employ local people as assistants, since they have a deep knowledge of the forests and wildlife, and as translators, because they speak the local language. They can also provide information about local activities to researchers and disseminate research projects (McLennan & Hill, 2013). In the present study, a total of four men were hired: one field assistant and one translator in each of the two villages, as practiced by the JGIS. Two of them had previously worked for the JGIS and they were all essential for the positive development of the project. Nevertheless, the involvement of the new workers in the project affected their relationship with their community. As noted by McLennan and Hill (2013), their status might have increased because they were working with a foreign researcher, commonly considered as 'wealthy', and gained expertise in the use of novel equipment. In a particular case, the employment of a field assistant caused jealousy among some villagers, who thought he was not the right person to work with me. He also had to deal with rumours and deny false information about the research aims. I realised that, when hiring, factors such as the current and/or past status of the candidate within the community should be considered, as a bad reputation can be detrimental for the positive development of the project.

There are other drawbacks of having local residents as field assistants. Since they are involved within the community where they are working, they might be reluctant to pass sensitive information that may compromise other villagers or themselves. In addition, they sometimes omitted certain aspects that

could be particularly relevant for the research because they considered them as common and widely known.

This article does not intend to offer solutions but highlight certain problems that I experienced during my research and share the lessons I learned from this:

●To be flexible with unexpected circumstances and realistic with the amount of work that can be assumed;

● To hold more public meetings to avoid being misunderstood or viewed as an imposition, and to ensure that the permission to conduct research is obtained locally;

● To be transparent in the selection process of local personnel and sensitive with the local culture and values;

● To consider and minimise the potential impacts that a researcher can have on the residents and social dynamics, which can, in turn, affect the data collection.

I hope this study will enable future students to anticipate similar situations in the field, which could benefit their research goals, wildlife and local people.

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Time budgets, social behaviour and human impacts among green vervet monkeys and western red colobus at Bijilo Forest Ecotourism Park, The Gambia

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This paper discusses the difference in time-budgets in response to human interactions between green vervet monekys (*Chlorocebus sabaeus*) and western red colobus (*Piliocolobus badius temminckii*) at Bijilo Forest Ecotourism Park, The Gambia. The site is a National Park covering 51.3 hectares of coastal forest. The area is totally surrounded by touristic infrastructures, such as hotels, restaurants, travel agencies, houses, etc. Wildlife tourism is a growing phenomenon in different parts of the World (i.e. Nekaris & Wijeyerathe, 2009; Russon & Wallis, 2014; Borges de Lima & Green, 2017). A core problem is that touristic destinations of protected lands are not always inserted in a wider conservation plan (Whittaker, 2006). However, tourism can be an efficient strategy to increase people's awareness towards wildlife conservation (Ballantyne *et al.,* 2007). On the other hand, touristic presence increases primates' anxiety levels as expressed in an increase of aggressive behaviour among various species (McCarthy *et al.,* 2009; Maréchal et al. 2016). An additional effect is a change of ranging patterns, with primates avoiding more visited trails (Cunha, 2010), or changing feeding times (Klailova *et al*., 2010). I hypothesize that species-specific social structure will influence time budget and attitudes toward Park's visitors.

Behavioural observations covered a period between March and May 2017, totalizing >441 hours of observation: respectively >271 hours of green vervet monkeys and >170 hours of western red colobus. I conducted the behavioural data collection using time scan sampling for the troops and continuous focal sampling for the individuals (Altman, 1974; Setchell & Curtis, 2011). The two species have been observed both inside the Park and in the surrounding touristic structures, both in the morning and in the afternoon. Successively, data obtained with the two sampling methods have been aggregated (Pollett *et al*., 2015). To compare the two species time budget I used a common ethogram composed of 11 categories of behaviour: Aggression, Human Inducted Feeding, Natural Feeding, Forage, Affective Relations, Play, Interactions With Humans, Other Interactions, Moving, Resting and

Others. I also classified the behaviours in "Individual oriented" (when the individuals did not interact with others); Social Oriented (when the individuals interacted with other conspecifics); and Human Oriented (when individuals interacted directly or indirectly with humans). To obtain the incidence of each behavioural category on the total time budget I calculated the percentages of time. In sequence, I compare the two species time budget using correlations (r). To test for discrepancies between individuals and groups time allocation I used the mean square deviation index (σ2).

Behavioural macro-categories highlight that both species dedicate most of the time budget to Resting, Feeding (Human inducted feeding + Natural feeding) + Foraging, and Moving. Resting occupies >30% of time, Feeding + Foraging occupies 27/30%, and Moving 14/16% (Table 2). Although the two species present a similar tendency, they also use specific strategies. Green vervet monkeys present higher proportions of Human Inducted Feeding and Foraging, while western red colobus of Natural Feeding.

Correlation coefficient between the two behavioural series is r = 0,93 (n=13; p=0,08). Values indicate a strong trend of correlation between *Cs* and *Pb* behavioural series.

Data collected report the same social oriented, individual oriented, and human oriented time use tendency for both green vervet monkeys and western red colobus: social oriented respectively 16,84% and 12,64%; individual oriented respectively 72% and 80,5%; human oriented respectively 11,15% and 6,85%.

My data supports the hypothesis of different behavioural patterns between green vervet monkeys and western red colobus, and their direct association with social structures. Results indicate that:

1) Both spend most of their time budget in Feeding+Foraging, Resting and Moving, with western red colobus presenting a higher percentage in all of these behaviours;

2) Green vervet moneys spend more time than western red colobus performing social behaviour;

General time budget observations confirm results of other studies conducted with vervet monkeys and red colobus (Struhsaker, 1967; Seyfarth, 1980; Marsh, 1981; Cheney & Seyfarth, 1984; Struhsaker, 2010; van de Waal *et al*., 2012; Fonkwo *et al.,* 2015).

The results indicate that the human pressure produced by Park's visitors affect more vervet monkeys time budget than red colobus monkeys. Higher values of feeding from humans (i.e. nuts) in the former species indicate they are more used to eating directly from Park's visitors, while the latter species prefers natural sources (i.e. leaves). This difference confirms the classification as

"opportunistic" of the vervet monkeys and as "folivorous" of the red colobus.

TABLE 1 Percentages of incidence of behavioural macro-categories for green vervet monkeys and western red colobus. When compared, the higher percentages are displayed above in bold.

Behaviour	Green vervet monkeys	Western red colobus
Aggression	**2,59**	1,08
Human inducted feeding	**4,56**	1,74
Natural feeding	10,23	**20,22**
Forage	**11,04**	7,31
Affective relations	**6,31**	3,20
Play	1,83	**4,04**
Interactions with humans	**5,89**	4,66
Other interactions	**2,93**	2,41
Moving	14,79	**16,05**
Resting	30,98	**31,09**
Scratching	0,46	**0,64**
Vocalise	**2,11**	1,08
Out of Sight	6,21	**6,41**

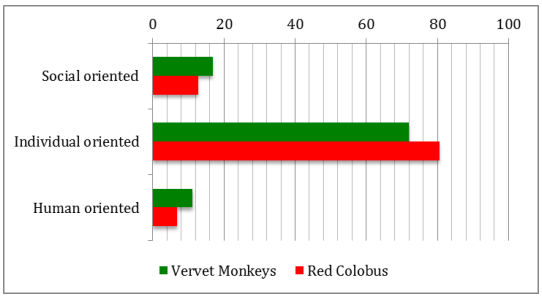

FIGURE 1 Percentages of time used by vervet monkeys and red colobus in social oriented, individual oriented, and human oriented behaviours.

Different feeding habits also influence social relations. Higher levels of aggression among green vervet monekys than western red colobus, can be related with the competition for accessing humans' food. At the same time, this higher level of aggression can also be associated with higher values of grooming, indicating a dynamic and stratified social structure in green vervet monkeys. On the contrary, low levels of aggression and grooming among western red colobus indicate a social structure characterized by rare competition, probably due to the abundance of food.

Since this research has been completed in a short lapse of time, more long-term studies are necessary to obtain:

1) A better comprehension of the interrelations between social and human factors influencing time budgets.

2) An evaluation of human caused impacts on green vervet monkeys and western red colobus social structures.

3) A long term evaluation of modified social attitudes produced by reciprocal influences.

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