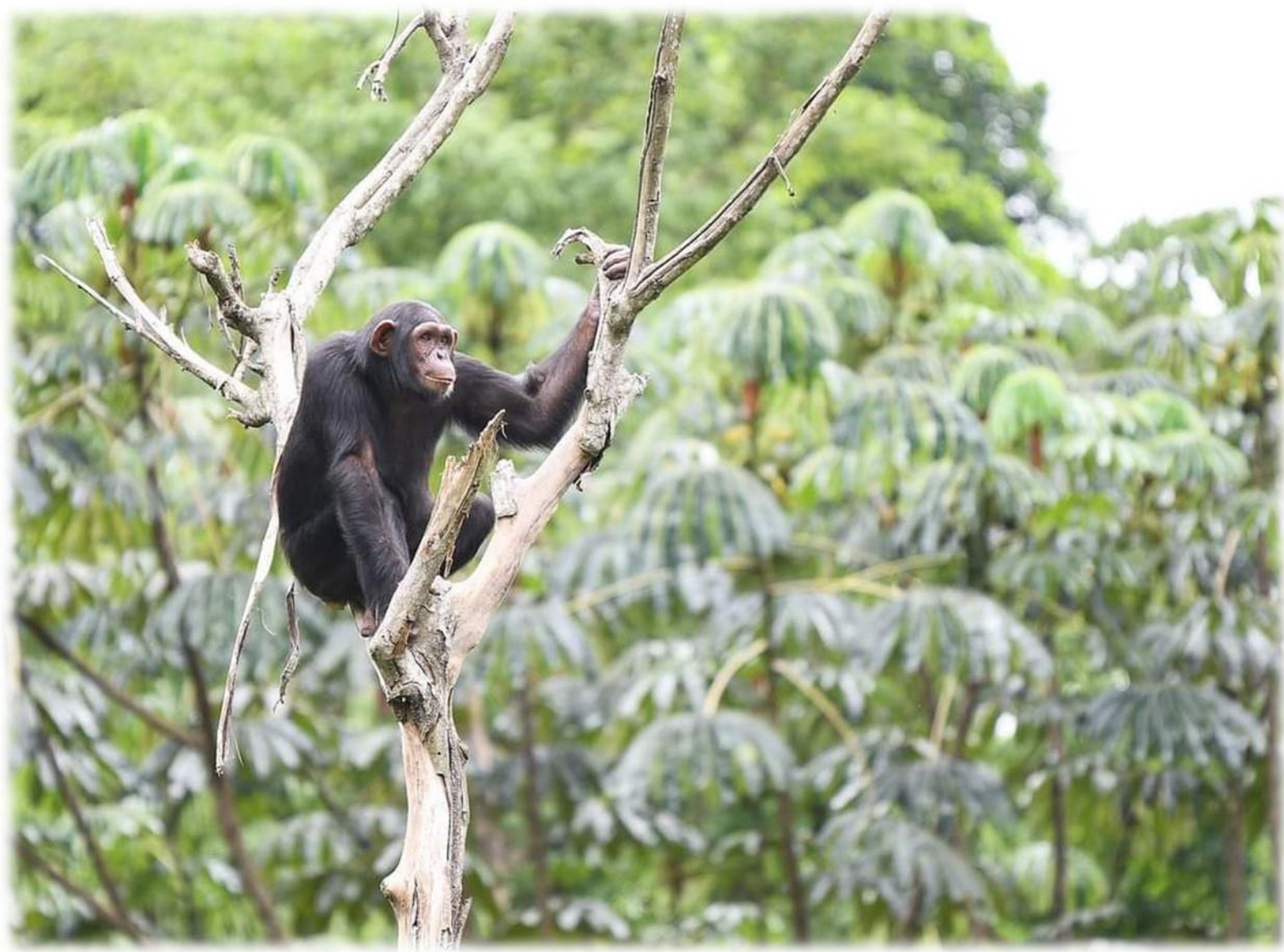


# Canopy

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**Front Cover**

Chimpanzee (*P. t. troglodytes*) at Sanaga-Yong Chimpanzee Rescue Center, Cameroon  
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## Letter from the Editors

Welcome to the Spring 2021 edition of Canopy. With a move to online teaching this term, and a third national lockdown, we wanted to use this edition as an opportunity to showcase some of the best examples of desk based projects our past students have completed, demonstrating the excellent work that can be done without leaving the country.

Whilst many of us were disappointed to realise that the Covid-19 global pandemic would prevent travel overseas for fieldwork, we have also been inspired by the many ways in which we can use online sources and previously collected data sets in our work. Alongside the lecturers, we have had to adapt to restrictions outside of our control and make the most of the things we can do rather than dwelling on opportunities missed. Examples include a multitude of online talks and conferences, zoom meetings with conservationists from all over the world and our virtual 'Monkey Mondays' which have enabled us to connect directly with alumni who often could not have travelled to the UK if the sessions had still been face to face. Some students have become involved in conservation closer to home, with participation in a mammal survey at a local nature reserve providing a chance to gain practical skills within Oxford and raise awareness of wildlife on our doorstep.

The pandemic has also enabled us to reconsider the extent to which short term trips to primate range countries can be justified and how the events of the last year may change the ways in which primatologists work in the future. With much discussion around decolonising primatology, we can't help but think that the pandemic has provided a moment to reflect on the status quo and consider if we can work more effectively with those living in primate range countries, reducing non-essential overseas travel going forwards. An interview with Dr Susan Cheyne and Professor Anna Nekaris highlights the ways in which the pandemic has shifted the way they work with considerations of what they might change in a post pandemic world.

We hope that next year will bring an increased sense of 'normality' for the next cohort, whatever that word may now mean. In the meantime, we hope that you enjoy reading this edition and that the work presented may inspire future students and conservationists to consider the innovative ways in which studies can be completed without necessarily leaving the country. We would like to end with a final thank you to the MSc course team for constantly adapting their teaching and often going above and beyond to arrange one to one meets with students, providing us with the essential tools needed to pursue a conservation career despite an ever changing and unpredictable global landscape. Happy reading conservationists!

The editors





## Letter from the Lecturer

The MSc in Primate Conservation is at its 20th anniversary which makes this course one of the more long-lived programmes in this field. I have been very happy to contribute over the last 13 years (since I have been working at Oxford Brookes University) to the evolution of the programme, along with the rapidly changing world and the emerging new urgencies in conservation. I can list here just three examples of these changes and new challenges that have grown over the years. First, several years ago the use of the internet to fuel the illegal primate trade and various other misrepresentations of primates was not among the urgencies of conservation. Today this is an increasingly serious risk that needs urgent management actions. Secondly, in the first decade of the programme most students enrolled to the course to work in the field to survey or observe non-human primates. Today there is a growing knowledge of the importance of working with the communities that live side by side with the non-human primates on aspects such as conservation education, resource management, and more in general what we define as ethnoprimateology. Thirdly, the increased availability of online data that are now accessible from many sources and the advancement of analytical techniques have boosted the impact of desk projects that were once considered a backup option while today are as important as field projects to help the cause. These new trends became even more evident last year when our students had to face the constraints of the Covid pandemic with the necessity of changing their projects last minute.

The students' projects presented in this issue of Canopy largely reflect the tendencies highlighted above. Tyler and Praill worked on online accessible data-set and/or data made available by NGOs, to estimate illegal wildlife trade in Colombia and to assess non-human primate roadkill data. All these projects are superb examples of multi-species analyses with the production of useful recommendations for conservation management. In contrast to this multi-species investigations, Watkins and Robert-Chapple present two studies that focus on single species data-sets collected in the field. The level of resolution reached by this research is remarkable. In all these papers a common denominator seems to emerge, that is, excellent research can be performed by applying new questions to previously collected field data. Not needing to organize presented students with the possibility of using analytical techniques that would be otherwise constrained by the tight timing that characterize the last phase of field-based projects. Also, in line with the trends mentioned earlier, Bayless and Foreman's projects illustrate the importance of exploring the media to assess non-human primate perception or the distribution of publications of individual species. With the pandemic raging across the world and people not able to travel and meet, medias and social medias in particular became even more important (and powerful) to drive people perception and attitude.

As for previous years, the current cohort is formed by a very diverse group of motivated students who want to make a difference despite the difficult times that we continue to experience. Their contribution to primate conservation will be as important as ever now that the consequences of the pandemic on primate conservation need to be assessed. Due to the halt or significant slowdown of many conservation programmes during the last year. Helping these students will be challenging but extremely rewarding on many levels. I wish all students of this year's cohort the best of luck to make their contribution significant for the human and non-human primates their work will be focussing on, and for their future.

**Giuseppe Donati**, Reader in Biological Anthropology



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# Utilizing media to assess the distribution of publications involving *Pan troglodytes* (chimpanzees)

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Cohort 2017-2018

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Flagship species are species that greatly attract public attention and thus cause increases in funding and support (Senzaki *et al.*, 2017). It is known that public support is necessary for successful conservation (Bennet *et al.*, 2017). This has led to a large amount of conservation organisations developing marketing campaigns around animal aesthetics (Smith *et al.*, 2010), causing the public to focus on these, not conservation (Smith *et al.*, 2012). Some argue that focusing on aesthetics allows conservation to be understood by an audience that lacks knowledge on it (Smith *et al.*, 2010, & Smith *et al.*, 2012). Others suggest the attention towards flagship species benefits the rest of the ecosystem and continuing to target animal aesthetics is a valid conservation strategy (Senzaki *et al.*, 2017). In comparison, others argue that flagship species draw attention away from other species in need (Caro & O'Doherty, 1999).

Non-human primates are particularly aesthetic to the general public due to their close genetic relationship with humans (Estrada *et al.*, 2017). But there tends to be an unequal distribution of attention towards certain species. The great apes are who are mostly considered 'iconic' in primate conservation (Estrada *et al.*, 2017). These species include chimpanzees and

bonobos (*Pan* spp.), orangutans (*Pongo* spp.), and gorillas (*Gorilla* spp.) (IUCN, 2018). Primatology research has shown an unequal distribution of attention to each of the primate species, with the great apes receiving more attention than most (Nekaris & Nijman, 2013). Among these, chimpanzees receive more attention than the others (Lukas & Ross, 2005). This heavy attention on chimpanzees can motivate the public to actively conserve them through volunteering or financial support (Smith & Sutton, 2008). Conservationists are increasingly aware that public attention levels on different species affects the general public's attitudes and behaviour, but very little information is available about its effect on conservation science.

This study aimed to investigate the distribution of conservation focus within the scientific community by; 1) assessing the number of publications on each of the great ape species; and 2) assessing the distribution of study setting, location, and subject for *Pan troglodytes*. It is hypothesized that there are more publications on *P. troglodytes* than on other great ape species. It is predicted that there is a lack of captive studies in *P. troglodytes* range countries but an increase in captive studies in non-range countries. Finally,

it is hypothesized that studies focusing on chimpanzees lack variance in study site and subject. Overall, these hypotheses suggest that public attention does have an effect on conservation focus within the scientific community.

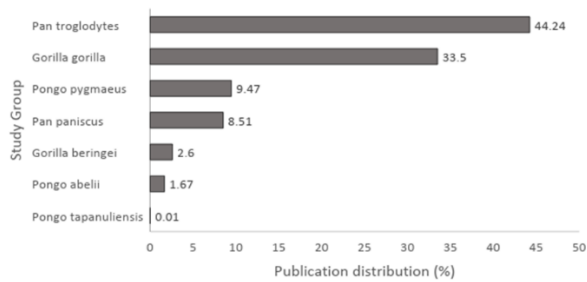
A media search was conducted on Web of Science for each great ape species (IUCN, 2018). The distribution of publications on each of these species was investigated to determine the presence of significant differences. There were no other restrictions on the overall search and the number of results for each search was recorded. Article results for *P. troglodytes* (chimpanzees) published between 2016 and 2017 were then further assessed to understand distribution of study setting, study location, and study subject. Articles were selected based on the following conditions: 1) reference to *P. troglodytes* or chimpanzees in title 2) no reference to other species in title 3) no review articles 5) must state study area/location and 4) must focus on live animals rather than specimens.

The following information was then gathered from each article: 1) title 2) publication date 3) study setting (captive vs. wild) 4) geographical location and 5) study subject. Study setting was assessed to determine any differences in studies conducted in captivity versus in the wild. Geographic location was assessed to determine the distribution of study sites. Study subject was assessed to determine the distribution of subjects among chimpanzee

publications. From the results, studies were placed into the following subject categories: 1) behaviour 2) case study 3) communication (cues, gestures, calls) 4) enrichment 5) feeding behaviour and diet 6) genetics 7) habitat and population distribution 8) health and disease 9) history and background 10) rehabilitation 11) reproduction and sexual behaviours 12) social 13) stress 14) task and 15) tool use.

Data analysis was conducted via SPSS. The initial media search of publications for each study group was assessed through descriptive statistics. These results were calculated into percentages for each study group and then placed into a graph for comparison. The chimpanzee publication data was then assessed using the following variables: study site, location, and subject. A binomial test was performed to assess the difference between setting (captive vs. wild) among chimpanzee publications. Locational and subject data was then assessed through a frequency test and displayed as a percentage. Finally, a bivariate correlation test was used to assess the correlation between each variable.

13,954 articles were identified during the initial search on publications for each study group. Descriptive statistics results indicated a larger number of publications focused on *P. troglodytes* in comparison to the other great ape species (Fig. 1).



**Figure 1.** *P. troglodytes* received a much higher number of publications than *P. paniscus* and the *Pongo* spp.

Results for publications on *G. gorilla* resulted in more publication results than the other study groups, indicating both groups are more heavily studied than the other great ape species. The criterion for publications on *P. troglodytes* revealed 168 articles valid for analysis. The binomial test revealed a similar proportion of publications conducted in captive vs. wild studies. The data indicated there was a slightly higher proportion of studies conducted in the wild rather than in captivity, but the difference was insignificant (Spearman rho:  $r=0.152$ ,  $N=168$ ,  $P<0.01$ ).

The frequency test results identified 48 different study locations and 68% of publications were conducted in the same 12 locations (Table 1). Of these locations, 36 are not identified in the graph due to the small frequency seen for each ( $<2.0\%$ ). The frequency test results for subject distribution revealed that 62.5% of the articles focused on the same five subjects: feeding behaviour and diet, social grouping, health and disease, behaviour and communication (Table 2). There is greater variation among the other 7 study

subjects, with rehabilitation receiving the least number of publications. This data suggests that publications on *P. troglodytes* place a large amount of focus on a small amount of study subjects.

**Table 1.** The top 12 locations displayed are distributed evenly between captive and wild settings, further suggesting an equal distribution between publications based in *situ* and *ex situ*

Location	Frequency	%
Kibale National Park	24	13.6
Budongo Forest	16	9.1
Primate Research Institute (Japan)	14	8
Gombe National Park	13	7.4
Yerkes National Primate Research Center	12	6.8
National Center for Chimpanzee Care	9	5.1
United States Center for Great Apes	6	3.4
Issa Valley (Tanzania)	6	3.4
Köhler Primate Research Center	5	2.8
Mount Assirik (Senegal)	5	2.8
Hoima (Uganda)	5	2.8
Gashaka (Nigeria)	5	2.8

Some have argued that great ape species receive more attention due to their close genetic relation with humans (Pussey *et al.*, 2007). Other studies have furthered this information by concluding the general public is more knowledgeable and relates more to chimpanzees rather than great ape species as a whole (Lukas & Ross, 2005). The study first hypothesised that this increased attention on chimpanzees causes a larger number of publications to focus on the species. Results



support this hypothesis, revealing more publications on chimpanzees than other great ape species between 2016 and 2017. This increase could potentially be attributed to increased public attention on chimpanzees and therefore demonstrates an effect on conservation focus within the scientific community.

Further analysis of chimpanzee publications revealed there were slightly more studies done on wild than captive populations. The locational data indicates that the majority of chimpanzee studies within the past two years may be conducted in the same areas. This information accepts the statistical hypothesis by revealing a lack of captive studies on *P. troglodytes* in range countries but an increase in captive studies in non-range countries. There are 17 sanctuaries in Africa associated with the Pan African Sanctuary Alliance (PASA, 2018). About 12 of these house chimpanzees (Farmer, 2002), but only two were identified during locational frequency testing. All other captive settings were located in non-home range countries (IUCN, 2018). This information suggests that many researchers focused on studying captive chimpanzees do so at zoos or sanctuaries located outside Africa. It is also acknowledged that the western general public mostly have positive attitudes toward chimpanzees (Batt, 2009), but some humans that share land with chimpanzees have negative attitude toward the species (Hockings & Sousa, 2013). This is one potential cause of

reduced researchers in these areas. In addition, many facilities in the west receive large amounts of funding and public attention (Jamieson, 1985), which can attract researchers but also potentially skew the results and contribute to scientific bias. This study demonstrates that these variables do have an effect on conservation focus within the scientific community.

Analysis on study location reveals there was a significant amount of attention placed on certain wild areas (i.e., Kibale NP, Budongo Forest, Gombe NP, Issa Valley). It has been shown that studying chimpanzees for an extensive period of time can provide valuable information about their behaviours (Chapman & Wrangham, 1993). For example, Kibale NP has been studied since 1982 (Chapman & Wrangham, 1993). Even so, there were nine chimpanzee range countries that were not identified during locational frequency (IUCN, 2018), identifying a decrease in locational variance in published studies on wild chimpanzees. The subject frequency data suggests that many researchers focus on similar study subjects. Some may argue that researching the same topic on multiple occasions removes needed conservation focus from other Endangered species (Senzaki *et al.*, 2017). Even so, each study contributes insight into human evolution, welfare, etc.

**Table 2.** All publications were placed into one of the identified study subjects so there was no need to include an 'other' section.

Subject	Frequency	%
Feeding behaviour & diet	28	15.9
Social grouping & interactions	25	14.2
Health & disease	21	11.9
Behaviour	20	11.4
Communication	16	9.1
Genetics	15	8.5
Tool use	12	6.8
Tasks	9	5.1
Habitat & population density	8	4.5
Case study	6	3.4
Reproduction & sexual behaviours	5	2.8
Stress & cortisol levels	5	2.8
History & background	3	1.7
Enrichment & enclosure	2	1.1
Rehabilitation	1	0.6

The study was successful in identifying the subject, frequency, and setting of chimpanzee studies published between 2016 and 2017. All statistical hypotheses were accepted based on the results found. Suggestions for future studies include; 1) further investigation of the relationship between great ape species and publication quantities; 2) using other search engines to gather more potentially significant information on these differences; 3) focus on increasing study site variance regarding to captive chimpanzee populations; 4) consideration of studying chimpanzee populations within range countries to allow for increased result variance; and 5) focus on conducting media searches to understand and implement projects that are needed in chimpanzee conservation. Chimpanzees are an important species but conservationists need to

ensure that animal charisma and public attention does not affect the distribution of studies within the scientific community so research can better assist conservation.

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## The movement ecology of bamboo lemurs (*Haplemur meridionalis*) in Madagascar

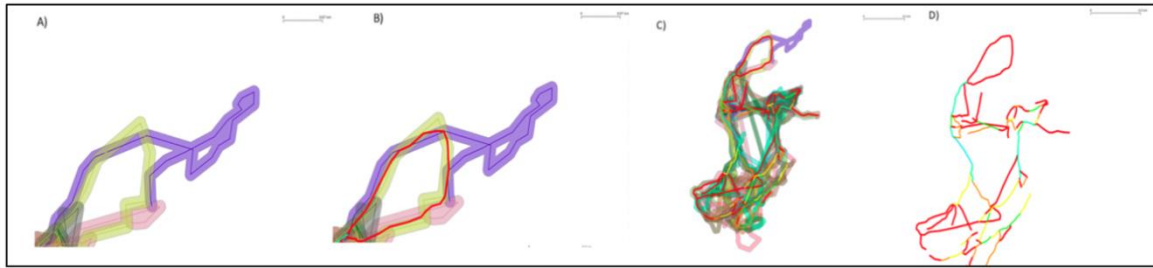
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Cohort 2019-2020

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I investigated whether three groups of bamboo lemurs in Mandena were using a route-based map by determining how often the routes were utilised. *Haplemur meridionalis* (Southern bamboo lemurs) are cathemeral, usually live in groups of 4 to 7 individuals (Eppeley *et al.*, 2011). They are folivorous specialists, with a high percentage of their diet focused on bamboo (Eppeley *et al.*, 2016a). However, the absence of primary feeding resources in Mandena, in the south-east of Madagascar, has resulted in a shift from arboreal to terrestrial feeding (Eppeley *et al.*, 2016b). An exclusively folivorous diet requires large quantities of leaves to gain sufficient

nutrition and energy (Glander, 1982). Since many plant species have evolved defence mechanisms, folivorous primates have evolved anatomic (i.e., specialised digestive tracts), behavioural (i.e., selecting higher quality food, Schulke *et al.*, 2006; Eppeley *et al.*, 2011) and physiological adaptations to reduce energy expenditure (Amato & Righini, 2015). During periods of low food availability, primates have been shown to increase the proportion of time spent feeding while decreasing the time allocated to travel. Conversely, during periods of high food availability, traveling increases (Schulke *et al.*, 2006; Eppeley *et al.*, 2011). Bamboo lemurs (*Haplemur* spp.) in Mandena



**Figure 1:** Example of forming route networks using interpath overlap of travel bouts: A) travel paths performed across different months; B) a travel path for the year was traced over the top of all repeatedly used travel segments in order to disregard backtracking; C) all monthly paths that overlapped among each other within a 10m buffer with route network overlaid on top; D) route segments used on multiple occasions

switch between a folivorous and frugivorous diet with seasonal changes in food availability (Eppley *et al.*, 2016b). As their social group and habitat remain unchanged while food preference switches, study of their movement ecology presents an opportunity to gain understanding of the link between diet, movement and cognition. The movement of wild animals is a fundamental component of an ecosystem so an ecological perspective can expose the navigation capacity of animals in relation to habitat degradation, enabling the development of better conservation strategies (Allen & Singh, 2016). An animal's ability to move through their landscape depends on their cognitive capacity: their ability to plan and execute goal directed paths in relation to the recognition of places through memories and landmarks (Etienne & Jeffery, 2004). Movement is also fundamental in assuring survival, being intrinsically linked with fitness, the dynamics of a population, gene flow, seed dispersal, predation and disease (Doherty & Driscoll, 2018). To navigate its environment

with ease, taking shortcuts or detours, an animal requires a cognitive map (Etienne & Jeffery, 2004).

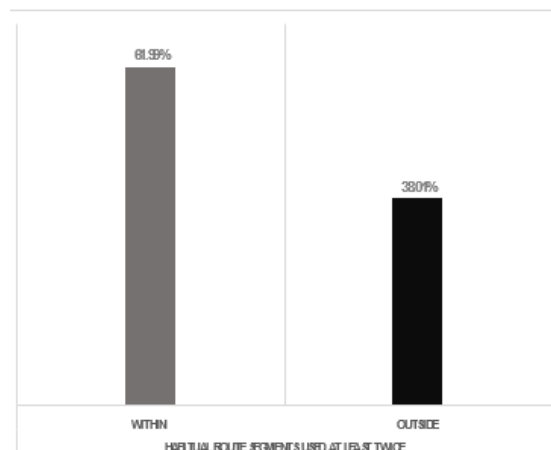
Cognitive maps can be route based or Euclidean. Route-based maps being egocentric orientation mechanisms having the individual at the centre of its surroundings (Haun *et al.*, 2011), locating objects by using itself as a reference point, constantly updating its current direction and distance from a reference point as it moves away from a single place (Etienne & Jeffery, 2004).

Re-using routes simplifies the decision-making process of moving (Poucet, 1993), reducing the need to acquire as many cognitive resources or store information about specific feeding trees. Conversely, Euclidean maps are an allocentric spatial system using other objects as reference points in conjunction with other features in the environment (Presotto & Izar, 2010) and consist of a series of angles and distances within an environment encoding the relationship between them (Normand & Boesch, 2009). They involve geometrically

locating landmarks and other environmental features and creating optimal travel routes or shortcuts to achieve high energy reward (Di Fiore & Suarez, 2007). Although the use of coordinate-based maps by humans has been widely debated in recent decades (Warren, 2019), there is evidence in the literature pointing to the potential existence of such navigational mechanisms in other animal taxa (Normand & Boesch, 2009). It has been demonstrated that when exposed to new landscapes younger and older animals use egocentric spatial memory, and when this develops and builds, gradually becoming more connected, the spatial strategy changes into a more exocentric or landscape-based representation (Fagan *et al.*, 2013). Studies linking brain size and navigation strategy, imply that primates utilising route-based maps have smaller brains; and larger brained primates use Euclidean maps (Normand & Boesch, 2009). Little is known, however, about lemur's cognitive ability. Most research focuses on *Microcebus murinus* (mouse lemurs), concluding that smaller brained solitary mammals can show a similar cognitive ability to a large-brained species such as ape. This suggests that spatial skills could evolve independently from sociality and brain size (Joly *et al.*, 2011) and indicates that research using lemurs as a model in understanding cognition could be an important next step.

Data was collected by Tim Eppley from January to December 2013, five days a month from

sunrise to sunset (Eppley *et al.*, 2016c). Using QGIS, I created layers of information about their movement, creating a route network for each group. Paths and travel segments of varying distances were created for each month (Fig. 1) and the distance travelled within and outside the route network calculated for each segment for each month.



**Figure 2.** Percentage of distance travelled within and outside the habitual route segment used at least twice

The accumulated distance travelled was calculated across different levels of overlap and for different travel distances in order to determine if bamboo lemurs are using a route-based map for navigation.

Route networks were created for all groups. A significant difference between distance travelled within and outside the route network was found (ANOVA  $F=19.305$ ,  $df=2$ ,  $p=0.01$ ). A route network was formed from segments used at least twice. The total length of this network was 567,767m with more travel occurring within the route network than

outside (Fig. 2) and 98.24% of all travel falling within a 50m buffer of the route network.

My findings suggest bamboo lemurs have gathered enough spatiotemporal knowledge to optimise a set of habitual routes throughout their home range, enabling them to visit key locations every few months. Literature on movement ecology has tended to link route networks with lower cognition and Euclidean maps with higher cognition. Past research on lemurs has not concluded whether allocentric or egocentric navigation is demonstrated. My results suggest that use of Euclidean maps is not the only way to optimise travel but that routes adapted by a small, highly social group can approach the travel efficiency achieved by species assumed to have higher levels of cognition.

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# The Global Primate Roadkill Database: Collection and analysis of global non-human primate roadkill data

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In the wake of the Anthropocene, it is becoming increasingly urgent that we understand the adverse impacts human activity can have on primate populations. Linear infrastructures, such as roads and railways, are proliferating globally, with predictions suggesting that 25 million kilometres of newly paved road will be built by 2050 (Dulac, 2013). As a result of denser road infrastructure and increasing human populations, the increased traffic volume has led to a rise in wildlife vehicular collisions (WVCs).

Eighty-five primate species, or approximately 17% of all primate species, are listed as threatened by roads and railroads according to the IUCN Threats Classification Scheme (IUCN, 2020). Research which examines the adverse effects of roads on primate populations is novel, and there are very few papers which focus on primate mortality due to WVCs. However, its analysis is important, as road construction can fragment a species' habitat. Habitat fragmentation by road often forces primates to move terrestrially across roads to reach other habitat patches to forage, disperse, and breed (McLennan & Asiimwe, 2016; Srbek-Araujo *et al.*, 2018; Al-Razi *et al.*, 2019). This is what makes them vulnerable to

vehicle collision. WVCs may be having considerable impact on primate populations that are struggling due to other anthropogenic pressures already, and the fatality of one individual within a threatened population could have dire consequence on its persistence.

The purpose of this study was to use a variety of methods to collect data on incidents of primate roadkill across the globe. Collecting this data can help conservationists better understand how roads are negatively impacting primate species. By quantifying the extent to which primates are impacted by vehicular collisions, areas can be identified where roadkill mitigation measures are required. Local authorities can then be contacted to implement these, so primate populations at risk of fatality can be protected. Data was collected on roadkill incidents from published literature, grey literature, databases, social media, and anecdotally. With it the Global Primate Roadkill Database (GPRD) was produced, and is available for future public research, aiding primate conservation efforts.

During data collection, conservationists were also asked to provide their opinions on the effects of WVCs on primates within their locality and globally. The majority of

conservationists that participated in this survey believed that roads pose a considerable threat to primates and that further research was needed in their local areas and in all primate range countries.

The GPRD managed to identify primate roadkill 'hotspots' where many incidents were reported. These hotspots indicate areas where there are ongoing environmental monitoring projects that collect roadkill data. In locations where primate roadkill is regularly monitored and reported, it is possible to use the data to successfully implement mitigation measures which can reduce the incidence of primate roadkill in the future. Warning signs, wildlife crossings and reduced speed limits have been shown to be successful roadkill mitigation measures which can protect primates in fragmented habitats by reducing the risk posed by road crossings.

Furthermore, the GPRD also identified species that are more likely to be reported as victims of vehicular collisions. Species that were reported more often within the database were often behaviourally flexible species able to exploit human-modified habitats. Their presence in human modified habitats due to their tolerance of human disturbance may make them more vulnerable to WVCs.

The GPRD found many primate range countries had no reported incidents of primate roadkill. This does not indicate that primate roadkill is not present in these countries, simply that reports of roadkill had not been found or that

there are no ongoing monitoring projects which are collecting roadkill data inclusive of primate fatalities. Gaps in data within the GPRD indicate areas which require further research.

Each time a primate makes a road crossing, there is a risk that it may be involved in a WVC. Continuing to collect, quantify and analyse primate roadkill data is essential to protecting primates that live in road-fragmented habitats. Mitigation strategies should be tailored to the species and location where vehicular collisions occur. Conservationists should commit to regularly monitoring and reporting primate roadkill within their area, as data collected could be used for conservation in the future. Local data could be presented as evidence to local organisations to encourage them to invest in environmental monitoring and roadkill mitigation projects. It is also important to make the public aware of the threat and share educational messages about the impact WVCs have on primates. Support from the public and governmental organisations is essential to ensure the success of conservation projects, and consequently the protection of primates. Mitigating primate roadkill is a success for conservationists, but also for other people and the environment, a principle which is named the One Welfare approach (Garcia-Pinillos *et al.*, 2016). By reducing roadkill using mitigation measures, WVCs which prove fatal for humans are reduced. Furthermore, other non-primate species which may provide

essential ecosystem services may be less at-risk also, which demonstrating the approach. Studies have suggested extensive data on wildlife road mortality can also better inform road safety and collision mitigation measures and so improve the safety of the road for wildlife and humans (McLennan & Asiimwe, 2016). This concept, along with the evidence that conservationists believe that more needs to be done to investigate and mitigate the impact of roads on primates, supports the recommendation that research into this topic should be continued.

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## Assessing perceptions on the use of primates in social media posts

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Current research shows that viewing non-human primates in unnatural settings, or interacting with humans negatively impacts perception of their behaviour, conservation and pet suitability (Kitson & Nekaris, 2017; Mutalib *et al.*, 2017; Siriwat & Nijman, 2018). When combining this information, with the increasing evidence that social media and the viewing of detrimental imagery on social media leads to an increase in demand for the illegal trade of primates, the negative

conservation implications of living in a technological age become clear (Reuter & Schaefer, 2017; Mutalib, 2018; Lenzi *et al.*, 2019). This research aimed to begin filling the gaps in the current literature on primate conservation and the link between the illegal trade, inaccurate perceptions on primates and the use of social media.

This research was conducted through creation of an online survey, distributed over Facebook. Participants varied in their age groups,

education level, and profession. A total of 288 respondents engaged with the survey, with respondents categorised into two groups: Conservation professionals and Non-conservationists (general public). The survey consisted of both closed and open-ended questions, devised to determine if each group perceived different images of primates found online differently, due to disparities in conservation education. Participants were asked to “react” to images and provide appropriate captions and hashtags as if they were uploading them onto their own social media accounts. All images presented were taken from Instagram. Only images posted under a public privacy level were selected for inclusion in this study. Public privacy settings allow any Instagram user to view a post such as an image without following the original uploader. In photos where uploader identity could potentially be traced via features such as username, caption, face, tattoo, or logo, these elements were pixelated in compliance with Oxford Brookes University’s ethical review.

The main results of this research found considerable differences between the online behaviour of the two participant groups alongside differences in conservation understanding and potential for behavioural change. Variations were also found in the perspectives of different images of primates between the two groups.

This research adds an additional element to current literature and as a result highlights the

need for further regulation of human-primate interactions and social media use alongside the distribution of educational materials relevant to primate conservation and illegal trade. Successful education of the global population on the importance of responsible human-primate interactions and social media use requires a myriad of techniques which must directly target groups with varying levels of conservation understanding (Sherrow, 2009; Jacobson, 2010). Although there is a long way to go to achieve these goals, such efforts are paramount in controlling the illegal wildlife trade. It is essential that these efforts are implemented in conjunction with other longstanding methods, such as law enforcement and protection of wild areas to ensure the future survival of primates (Estrada *et al.*, 2017; Nijman *et al.*, 2017).

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## Attitudes and perceptions as threats to great apes in Deng Deng National Park, Cameroon

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All species of great apes are classified as Endangered or Critically Endangered (IUCN, 2019). It is predicted that by 2030, more than 90% of African great ape habitats will suffer moderate to high impact from human activities (Nelleman & Newton, 2002). Despite their protected status within Deng Deng National Park (DDNP) (Fig. 1), Cameroon, Western Lowland gorillas (*Gorilla gorilla gorilla*) and chimpanzees (*Pan troglodytes*) continue to face significant anthropogenic threats. With an estimated population of 23.4 million in 2018, and a poverty rate of 45% (BTI, 2018), the demand for land, forest and resources are on the rise in Cameroon. Understanding local perspectives and concerns regarding wildlife is essential for informing appropriate management strategies that reduce conflict and promote sustainable coexistence. Conservation is intrinsically a multidisciplinary field, dealing with the interface between environmental and human concerns and



**Figure 1.** Deng Deng National Park.

interests. Long-term human-wildlife sympatry therefore depends on the willingness and capacity of local people to coexist with wildlife.

During a three-week period in May 2019, interviews were conducted in DDNP to determine whether great ape conservation provides appreciable benefits to residents living in and around the park, or whether it has fostered negative attitudes among residents. I worked collaboratively with the African Conservation Foundation and the Environmental and Rural Development

Foundation. Informal interviews and questionnaires were administered to 78 individuals in eight different villages. The aims of the research were to recognise the positive and negative impacts that this PA, along with its conservation activities, is having on local community livelihoods. The goal of this being to improve the link between great ape conservation and poverty alleviation, both in policy and in practice.

Tense relations between park management and local communities exist in and around DDNP. Respondents were negative about many aspects of the park, especially the destruction of crops by great apes. Moreover, 88% of respondents said they are afraid of great apes as they are “aggressive”, “dangerous”, and “can kill”. Negative attitudes are often associated with a lack of public participation in the management of protected areas (Oonyu, 2009). Most respondents expressed the need for increased local involvement and participation in the management of the park, as well as compensation for the losses they have experienced resulting from its creation. Respondents had a good understanding of the laws and legislations regarding great ape conservation. Despite this, however, the majority said they only agree with the law because they have to. Reasons for not agreeing with the law included “I will not die because of conservation” and “we need meat to eat and so that we can send our children to school”.

However, although most communities in the park equate great ape conservation to a refusal to access forest resources and bushmeat, they are conscious of the further declines in wildlife populations in their area and fear the extinction of great apes in the near future. To emphasise this, 77% of respondents said that great apes should be protected, mainly for future generations to see. When asked what the park could do to improve, the most common response from interviewees was that the park needs to compensate them for the loss of their farms and resources. This was closely followed by the need for alternative income generating activities such as beekeeping. Respondents also expressed strong desires to be included in the management of the park, and for their children to work in the park.

It is thus essential that, for great ape conservation to succeed in DDNP, the attitudes and beliefs of local communities are considered. Suggestions for the improvement of the park include integrated conservation and development projects (ICDPs), animal husbandry, and beekeeping. ICDPs aim to compensate local people for restrictions on natural resource use and provide them with alternatives. Livestock rearing cattle, sheep, goats and poultry are all options that could decrease the harvest of ape bushmeat in DDNP by replacing it with domestic meat as a protein source and a compliment to income (van Vliet, 2011). Finally, beekeeping is a good income-



generating activity for resource-poor people and is completely environmentally friendly. However, all potential strategies come with their own difficulties, and must be considered carefully. For instance, the availability and prices of alternatives should be measured relatively to forest resources such as bushmeat. Otherwise, hunters will engage in activities such as beekeeping, but will keep their “business as usual” when it comes to bushmeat hunting (van Vliet, 2011). It is therefore essential that all potential alternatives and income-generating activities are thoroughly researched before they are developed.

The potential for great ape conservation projects in DDNP to empower and enrich the local communities is vast. However, to achieve the full impact of such potential, a good understanding of the effects that conservation activities are having on local peoples’ livelihoods is required. It is thus recommended that regular monitoring of community attitudes is carried out. Moreover, documenting, evaluating and monitoring interventions are critical steps towards any improvement. Importantly, eco-guards must continue to be trained and re-trained so that effective law enforcement is consistently carried out in the park. Finally, community education would be hugely beneficial, and this should be implemented in DDNP as soon as possible.

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# Preliminary study of improving rehabilitation assessments for successful reintroduction of ex-pet gibbons using personality assessments

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The study of animal personality has been rapidly growing within scientific research for a number of decades (Réale *et al.*, 2010). Only a handful of studies have directly discussed the link between personality and the role it plays in conservation fields such as reintroduction. Personality influences a range of factors which are necessary for an individual's survival in the wild, representing the influence which personality has on an individual's reintroduction success. Here, we discuss the potential affect that long-term captivity and inappropriate rearing has upon *Hylobates lar* personality dimensions and will discuss the impacts individual personality may have on gibbon reintroduction. The aim is to aid integration of personality further into reintroduction programmes of primates.

Long periods of time housed in captivity poses a risk to evolutionary change in behaviour and personality traits (Merrick & Koprowski, 2017). Personality traits are altered in captive environments compromising variation (McPhee, 2003) and impacting vital survival skills, such as anti-predator response, foraging and exploratory behaviours. The longer generations are housed in captive settings, the less likely predator-responses, such as

retreating to a safe area, will be heightened (Grueber *et al.*, 2017). Also, certain personalities are more selectively preferred in captive states than others, therefore promoting stress and welfare issues (Mason, 2010). Maintaining behavioural heterogeneity in captive populations should be considered if individuals are to be successful in reintroduction programmes (Merreck & Koprowski, 2017).

Personality has been linked to the fitness of an individual (Merrick & Koprowski, 2017). By highlighting the importance of understanding personality as an influence on survival, personality can be implemented to reintroduction programmes. The following sections highlight a few survival components which are influenced by personality and underline the argument for why understanding personality is essential to consider when planning rehabilitation and reintroduction.

Personality traits play a key role in reproductive success which contributes to the success of a species in the wild (Martin-Wintle *et al.*, 2017). Personality traits are correlated with a number of reproductive factors including mate choice, mate preference and

offspring personality (Groothuis & Carere, 2005; Merrick & Koprowski, 2017). Specific combinations of traits between individuals contribute to compatibility and mate choice, for example, excitable male giant pandas paired with low-excitable female giant pandas were successful in breeding (Martin-Wintle *et al.*, 2017). Furthermore, studies have shown animals rated higher in boldness displayed higher reproductive success and this success was higher in bold males than in bold females. Understanding personality traits which contribute to reproductive success could contribute to identifying the compatibility of candidates, particularly for pair bonded gibbons.

Key personality traits associated with high levels of movement or dispersal include boldness, exploration, aggressiveness, and sociality (Cote *et al.*, 2010) and have been shown to be repeatable and consistent over time and context (Blumstein *et al.*, 2009; Kurvers *et al.*, 2009). In order to travel between habitats, individuals need to express moderately bold and explorative traits. Similarly, when entering novel environments, individuals should show high aggressive traits in order to compete for territory and resources or express sociable traits in order to settle in a high-density population (Sih & Bell, 2008). When reintroducing a species back into a setting where dispersal can be practiced, traits which encourage individuals to disperse wide

should be assessed in order to allow for success (Bremner-Harrison *et al.*, 2004).

The way in which an animal responds to and uses novel environments is heavily influenced by personality and can affect the way individuals use this environment. Personality traits have been shown to influence foraging techniques and exploration of high-risk habitats such as areas of high predation density (Wilson & McLaughlin, 2007; Fraser *et al.*, 2001). For example, studies have shown that foraging routines are influenced by personality as more active and bold individuals have a greater exploratory routine and will range further within a habitat in search for food (Wilson & McLoughlin, 2007). Understanding the influence personality traits has upon foraging techniques and responses to habitat structures could play a key role in reintroduction programmes as factors such as risk taking can be predicted to ensure release animals are successful (Bremner-Harrison *et al.*, 2004).

Personality assessments should be encouraged in projects that hope to release gibbons, as behavioural observations are currently used today. Communication between practitioners and researchers are needed in these cases to cross transfer skills and knowledge to fully integrate personality into the reintroduction scene. A gibbon personality structural framework and further research on released individuals is needed to distinguish which traits are the most beneficial

for the release of gibbons. This is of course individual to each gibbon; however, flexible protocols should be considered to improve how individuals fare. For example, some individuals are more flexible in certain environments than others (McPhee, 2003). Therefore, personality assessments can decipher whether a gibbon is in need of further rehabilitation than another. Also, research showing certain traits do not bode well in captive environments should be considered and protocols should be used to ensure that individual animals are not under any stress (Merrick & Koprowski, 2017).

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# The impact of the end of the conflict in Colombia: Deforestation and the illegal wildlife trade

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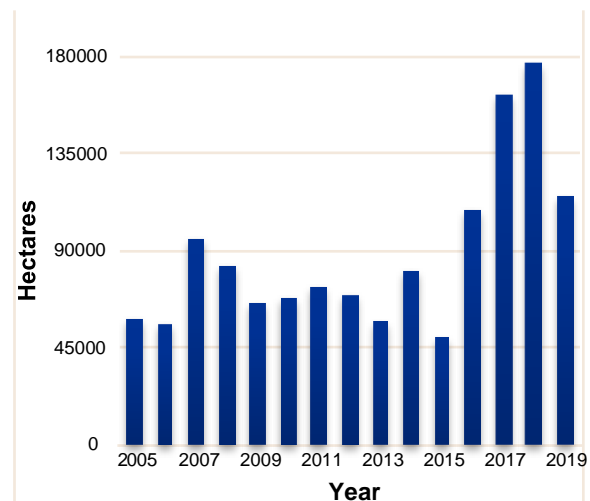
The illegal wildlife trade (IWT) is estimated to be valued between \$5 billion to \$21 billion annually which makes it one of the world's most lucrative illegal businesses. It is thought to be one of the largest risks to biodiversity, causing large decrease to wild populations figures and even extinction (Gray *et al.*, 2018). Colombia is estimated to house 10% of the world's biodiversity despite its area being less than 1% of Earth's terrain (Myers *et al.*, 2000). Colombia has also undergone one of the longest running civil conflicts in the world which started in the 1960's and ended in 2016, with a peace treaty between the Colombian government and the guerrilla group FARC (the Revolutionary Armed Forces of Colombia).

The aim of this study was to establish whether there has been an increase in animals confiscations since the 2016 peace agreement and to identify any relationship between the IWT and deforestation. During February 2020, I made a freedom of information act request (under Law 1712 of 2014) to CORMACARENA regarding wildlife trafficking and seizure data.

All animals were included in this study if they were reported as confiscations, rescues or voluntarily surrenders. Animals were split into subcategories of mammals, birds, reptiles and

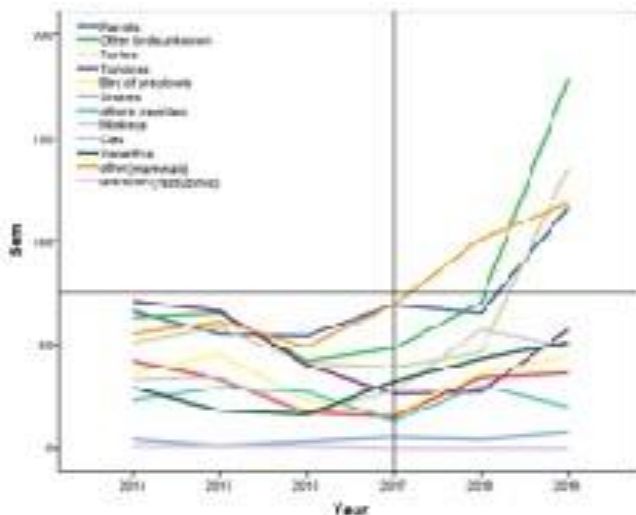
Testudines. Primary deforestation rates were used as calculated by Global Forest Watch.

Deforestation in Colombia has increased since the peace agreement, with the loss of primary forest being higher in the last three years than any years since 2005.



**Figure 1.** Graph showing the number of hectares of primary forest lost each year in Colombia between 2005-2019 (Global Forest Watch, 2020)

There has been a general increase in the number of confiscations in CORMACARENA since 2017.



**Figure 2.** Graph showing the total number of animals in the following subgroups (1) parrots, (2) birds of prey/owls (2) other birds, (4) monkeys, (5) felids, (6) Xenarthra, (7) other mammals, (8) snakes, (9) other reptiles, (10) tortoises, (11) turtles and (12) other (unknown) confiscated for the 3 years preceding and 3 years after the ratification of the peace agreement by CORMACARENA.

In order to assess whether over time there is statistical difference in the total amount of animals confiscated before and after the peace agreement, I created a multiple linear regression model. The regression model used deforestation in Colombia, and three years before and after the peace agreement as predictors of the total amount of confiscated animals each month for each species group.

The model explains 9.9% of the variability in total animals confiscated ( $R^2=0.099$ ). This model is statistically significant  $F(2,71)=3.78$ ,  $p=0.028$ . It demonstrates that 33 more animals were being confiscated each month after the peace agreement “CORMACARENA\*After Peace” ( $B=33.262$ ,  $p=0.008$ ) together with the total number of animals confiscated being

linked to the deforestation rates in Colombia ( $B=0.000$ ,  $p=0.023$ ).

One of the most important events in Colombia in modern history was the ratification of the peace agreement in November 2016 by the Colombian government and FARC. After decades of civil war, it granted hope of increased institutional and political stability.

The relationship between peace time development and the environment is complex. Peace brings with it added pressures that are generally curtailed during conflict such as hunting, agriculture, logging and mining (Lindell *et al.*, 2010). Colombia currently faces major land transformation together with challenges such as the growing of illicit crops, increasing agriculture (especially cattle farming) and expansion of the palm oil industry, which add to the complexities of land management strategies and enforcement of environmental programmes (Alvarez, 2001).

The impact and effects of the conflict on the forests of Colombia are yet to be completely established. Alvarez (2003), found 20% of the forests in Colombia were located in municipalities that were affected by the conflict. Two of the main guerrilla groups had environmental policies as part of their political rhetoric and several conservation strategies were implemented during the conflict.

It has now been nearly 4 years since the peace agreement and there are concerning signs relating to deforestation. It has been



demonstrated that deforestation has increased since the peace agreement (Global Forest Watch, 2020) with areas once controlled by FARC experiencing greater deforestation (Prem *et al.*, 2018). Even protected areas have not been immune to increased deforestation (Clerici *et al.*, 2020) with six times more fires in protected high biodiversity hot spots than before 2016 (Armenteras *et al.*, 2019).

Increasing fragmentation of forests and deforestation, together with its associated development of infrastructure, led to once remote areas of forest becoming accessible (Laurence *et al.*, 2014; Benítez-López *et al.*, 2017). Consequently, anthropogenic pressures such as hunting increase (Barlow *et al.*, 2016).

However, whether deforestation can directly be linked to an increase in the IWT is hard to prove as there are so many other factors at play. Although, this study may show a link with confiscations increasing with higher deforestation rates. Deforestation in Colombia is caused by many different factors. Many studies have focused on the effects of either the IWT or deforestation and have not studied both factors together. Symes *et al.*, (2018) found that when both of the two anthropogenic threats are combined, the decline in species is much higher than if one factor is taken into account. The loss of these forests and the associated pressures of deforestation may have irreparable

consequences for the flora and fauna of Colombia.

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## Covid-19 and the many ways it affects apes in the wild

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Habituation of apes is defined by Woodford *et al.* (2002) as the practice of gradually familiarising apes to the presence of humans. The habituation of apes for tourism and research purposes has become an increasingly common practice. Criticisms of habituation often cite the risk of anthroponotic illnesses transferred from humans to fragile populations of wild apes (Woodford *et al.*, 2002). During the current Covid-19 pandemic this has become a hot topic of discussion amongst scientists. Covid-19 (Corona virus) is a highly infectious respiratory disease in humans and recent research suggests that all African/Asian monkey's and all ape species are potentially susceptible to Sars-Cov-2 (Melin *et al.*, 2020). An outbreak of Covid-19 amongst wild ape populations could possibly decimate vulnerable populations (Melin *et al.*, 2020). In light of this, the majority of field sites and destinations for ape tourism closed in order to comply with international restrictions and protect vulnerable species (Kimborough, 2020 as cited in Lappan *et al.*, 2020), however, this has potentially exposed habituated apes to numerous threats beyond that of Covid-19. Field sites are now beginning to open up, enforcing stricter rules for those working alongside apes, face masks must be worn, and the previously accepted rule of a 7 metre distance between humans and apes has now been increased to 10 metres (Van Hamme *et al.*, 2021).

The primary threats facing all primate species are poaching, the illegal wildlife trade, habitat loss and fragmentation (Wich & Marshall, 2016). These anthropogenic pressures remain a threat to wild ape populations, and are currently possibly getting worse as there are fewer researchers and tourists to act as 'surveillance' (Trivedy, 2020). The absence of researchers and tourists, alongside the increased economic and social pressures presented by the pandemic has seen a growth in illegal activities, including hunting for the illegal wildlife trade (Lee, 2020; Reynolds, 2020). Evidence of this is clear at the Budongo Conservation Field Site, Uganda, where the average number of snares found per day increased from seven at the start of 2020, to 12.6 during the pandemic (Reynolds, 2020). These snares are used to poach chimpanzees (*Pan troglodytes*) for the illegal bushmeat trade. Furthermore, restrictions put in place due to Covid-19 have limited the physical ability of enforcement agencies to work against illegal activities. For example, in Sabah, Malaysia, park rangers were unable to patrol an area unless clear evidence of poaching was presented, due to local corona virus restrictions (Lee, 2020). These measures reduce the potential impact that deterrents such as regular patrols can have on mitigating anthropogenic pressures on wild primate populations.

Low-income areas adjacent to ape habitats often rely on both researchers and tourists for regular income (Trivedy, 2020). Covid-19 restrictions have significantly reduced the income of local communities surrounding ape habitats, the removal of this stability has forced some people to seek alternative sources of income (Trivedy, 2020). This might explain why there has been an increase in illegal activities in the forests at the Budongo Conservation Field Site with increased observations of activities such as charcoal burning (Reynolds, 2020). Whilst some activities do not present a direct threat to apes, there is now an increased number of local people entering wild ape habitats, which increases the potential risk of Covid-19 transmission to apes (Reynolds, 2020).

Habituated apes are more vulnerable to anthropogenic threats due to their familiarity, and acceptance of the presence of humans (Gruen *et al.*, 2013), increasing the potential for contact between humans and apes. It is our responsibility as conservationists to respond to the threat of Covid-19, and it is our responsibility to protect apes that are more vulnerable to threats because we have habituated them. In non-pandemic times, the increased vulnerability of habituated apes is countered by regulations and

the protective presence of researchers and tourists, but the Covid-19 pandemic has significantly reduced this presence.

We support the return of a limited number of researchers to the field, following strict biosecurity guidelines to mitigate the risk of Covid-19. We encourage all staff at research sites to be tested regularly for Covid-19 and where possible receive vaccinations against the virus. Also, the IUCN Best Practice Guidelines Regarding Ape Health and the Limitation of Zoonosis should continue to be adhered too (Van-Hamme *et al.*, 2021), with appropriate modifications for Covid-19. We encourage the continuation and strict enforcement of biosecurity measures such as foot dips and the use of appropriate personal protective equipment (PPE), such as masks and gloves that should be worn when entering the field (Gilardi *et al.*, 2015; Van Hamme *et al.*, 2021). All direct follows of apes should be suspended, in order to limit the risk of Covid-19 transmission (Cheyne *et al.*, 2020). Furthermore, the progression of the pandemic in human communities surrounding research sites should be monitored closely, and immediate preventative measures should be taken if case numbers rise in local areas. Researchers should continue to monitor the health of ape populations to ensure that they remain healthy and unimpacted by the virus (Reynolds, 2020).

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## Interview: How has the Covid-19 pandemic changed the ways in which primatologists work?

Amy Woolloff & Amanda Fairey  
Cohort 2020-2021

Covid-19 has greatly changed the way we live and work and this year the Primate Conservation course here at Oxford Brookes University has been conducted as much on zoom as in person. Many field trips have been cancelled and no overseas field work is planned for this summer. Assignments have had to be adapted to account for restrictions, with many of us conducting primate observations from the safety of our homes via webcams rather than in person.

Despite this, we have adjusted to this 'new normal'. Students have been able to attend numerous online talks with conservationists and educators from all over the world and to engage with people they may otherwise never have been able to meet in person. Some have found opportunities to gain field skills within Oxford and engage in conservation closer to home by conducting a mammal survey at a local nature reserve. Air travel has been greatly reduced and we have been forced to consider the innovative ways in which we can use data from online sources as we pursue desk based final projects.

With these changes in mind, we wanted to see how the Covid-19 pandemic has impacted the ways in which our lecturers conduct research, collaborate and run NGOs from afar. We spoke to Dr Susan Cheyne, co-director of the Borneo Nature Foundation and gibbon specialist with field work focused within Indonesian Borneo and Professor Anna Nekaris, Director of the Little Fireface Project and specialist in loris conservation and ecology with research focused within Java, Indonesia.

Whilst it is evident that the pandemic has forced Dr Cheyne and Professor Nekaris to adapt and reflect on their working practices with certain positive changes emerging, it was clear that we need to consider the potential impact the pandemic may have on building relationships and working partnerships going forward.

We discuss the ways in which technology has allowed them to reach new audiences and the opportunity less foreign travel has provided for them to adapt the ways in which they work with colleagues and students within the primate range countries, alongside the potential limits of zoom and what a post pandemic primatology world might look like.



*Professor Anna Nekaris*



*Dr Susan Cheyne*

### 1. Have you had to cancel any field trips? If so, which ones and what was the impact of that?

**Anna-** I had to cancel all my field trips, conferences and meetings with funders. My main field work is in Java, Indonesia, where my long-term study is entering its 10th year. Luckily, my team is largely Indonesian, and my single foreign member of staff was able to get her visa extended.

**Susan-** I have missed a few meetings in Vietnam and I should have also gone to Indonesia, where we are working with several rescue centres and NGOs to look at the impact of the illegal wildlife trade. It's fairly effectively been moved online but I think for funders sometimes it's absolutely critical to take them to the centre and show them the reality on the ground, which is something we have not been able to do.

**2. How are you doing your work otherwise? Is it entirely postponed or have you been able to do it in some capacity?**

**Anna-** Not being able to go to the field led to me developing an improved and much more efficient way to share data and files online and also led to more online meetings. In the past, I had an extreme dislike for these; I refused to accept their use and would not have an online meeting with anyone, for any reason. It was a major mental shift for me to be able to adjust to having them. With this new tool, we have made many advances in the project more quickly than we did before, or in a different way.

**Susan-** For the vast majority of work, we are able to collaborate online. I'm also privileged to have a team of around 74 Indonesian staff who know exactly what they are doing. Our education team have created a studio in our office with a green screen and they're producing online material and creating education packs that are being sent out to all the kids.

When it comes to building relationships though, that's something that is absolutely missing online. There's no getting away from the fact that at the end of the day when you've wound down from the conference and you're sharing a meal and a beer, you make connections. You talk about where you come from, family and personal things. That's what really builds relationships and creates if not collaborations even friendships, which are so important.

**3. Have you still be able to carry out data collection in the field?**

**Anna-** My wonderful team of coordinators, research assistants, volunteers and trackers have been in the field almost every day. Because it is an outdoor activity and the groups are usually 2 socially distanced people, we only had to stop for a very brief period of 10 days.

**Susan-** We've had an exceptionally long term data set for our three main species: the gibbons, orangutans and red langurs. In April 2020 we stopped all primate follows as we don't know enough about zoonotic transmission rates from humans to primates yet and it's not a risk we can take. We have yet to restart them but are discussing how we can potentially use Covid-19 testing for colleagues going into the field. I am concerned about the loss of habituation as a result of not being able to conduct this work.

**4. Is there anything you will be changing about the way you and your NGO works to adapt to what has happened?**

**Anna-** I think we have a responsibility to not travel for short term trips. Unless I plan to undertake some major research myself, or there is a meeting that must be attended in person, I would envision myself going to the field less frequently. My administrative and management roles are already arduous and do not necessarily need to be done face to face. The funds and the time used for travel can be invested into conservation work instead.

Equally I don't plan on accepting foreign volunteers for a while as I feel that young people have become too accustomed to essentially selfish short trips. These short trips also lead to a lack of personal growth as they often leave a place the moment things are difficult or they feel sad or homesick.

I have found that the Covid situation has been really empowering for Indonesian students, who might have felt shy around staff and volunteers from other countries. My Indonesian students have been truly dedicated, staying for longer periods and producing some top quality research and dissertations. I am so proud of them!

**Susan-** We will not come out of lockdown and completely change the way we do things but we have definitely gained a renewed appreciation of our existing staffs' vast skill and ability. For example, we

have got some exceptional educators who can do brilliant stuff to the camera which really engages students.

We have also managed to invest in some new equipment that has helped us to build an online presence. This has enabled us to produce online events and as a result allowed us to engage with a lot more people. The ability to reach out to people online is something we must embrace and carry forward but it's not going to take away from the importance of our live events.

**5. When Covid related regulations end, is there anything you will change regardless? For example would you travel as much in the future?**

**Anna-** I definitely would travel much less.

**Susan-** Certainly for field work I have to be physically present however for some of the workshops and other projects that I am involved in I don't believe travel is as necessary anymore.

Whilst travelling to provide your knowledge and expertise at a workshop or a conference is not necessarily so important, I think we need a bigger and better understanding of the implications of the loss of social contact.

**6. Do you have any trips planned? Where will you go first?**

**Anna-** I think it is too risky to travel now and I also think it feels quite "western" that we have the vaccine and so we start travelling again. I would rather see the world be more stable before I go anywhere other than the UK. I will just do my best to support my Indonesian team.

**Susan-** Nowhere just yet. We normally offer a field course to study primate behaviour but we are having to offer that as an online course which obviously won't be the same. My permits have been approved to travel to Indonesia but they are not currently sending paperwork because at the moment they are not allowing foreigners in.

**7. From a personal point of view, how has the lack of travel and hands-on field work affected you and your job satisfaction?**

**Anna-** To be honest, I was travelling too much and I was completely exhausted. I had no idea how tired I was and how much I needed a break. It also helped me to let go of some management roles of my projects and to trust my team more. I think my team found this empowering and enabled them to be more independent. Everyone seems to be happier!

**Susan-** From a physical and mental health perspective my happy place is in the forest in the jungles of Indonesia. Being up to my waist in water, crawling through the mud is where I feel most alive! Obviously with WhatsApp, zoom and all the other social media platforms I am able to engage with my team in Indonesia and my colleagues in the UK and abroad. We have regular meetings but it's not the same as being in the field. When I get up in the morning I come down to my office and it's me alone in my own four walls. I speak to people online and do lectures but it's not engaging in the same way.

**8. Susan, how have the rescue centres coped without their international volunteer programmes?**

It is a mixed bag, but I would say the vast majority have suffered. This is due not only to the loss of foreign volunteers but also the lack of local volunteers. The local lockdowns have meant that local people haven't been able to travel within their country to be able to volunteer at the rescue centres so the centres that are dependent on volunteer help have struggled.





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