

Bristol Conservation and Science Foundation

How can we save

PRIMATES

from extinction?



2nd Annual Symposium – 29th October 2009



INTRODUCTION

The Bristol Conservation and Science Foundation was launched in 2008 as a new operating unit of the Bristol, Clifton & West of England Zoological Society Ltd that is charged with running the Society's wildlife conservation and research programmes at Bristol Zoo Gardens and in the field.

The amount of land around the world that is protected for wildlife, as national parks or wildlife reserves, is very small. In most parts of the world, the 'wild' is no longer an unspoilt wilderness. Many species are threatened and becoming rare due to human activities.

The roles of good Zoos are to provide visitors with amazing experiences for learning about wildlife and biodiversity, to apply our specialist skills to investigate threats to biodiversity, and to support communities in tackling specific pressures that give rise to conservation need.

The Bristol Conservation and Science Foundation, staffed by international conservationists, scientists and enablers of conservation, undertakes original research to provide the critical insights that help fulfil our conservation goals.

How can we save primates from extinction?

29th October 2009

10:00 *Arrival and coffee*

Symposium session 1 – Status quo of primate conservation

- 10:30** **Jo Gipps** Welcome and scene setting
- 10:40** **Simon Stuart** Global Diversity conservation priorities: a view from the primates
- 11:20** **Ian Redmond** Save the primates to save the world
- 11:40** **John Oates** The disappearing rolaway monkey. Why is conservation still failing in West African forests, and is there anything we can do to make things better?
- 12:00** **Christoph Schwitzer** The challenges of protecting a poorly-known genus: Conservation of *Lepilemurs* in Madagascar
- 12:20** **Harriet Nimmo** Wanted – Red list primate images

12:30 *Lunch*

Symposium session 2 – Success stories and challenges

- 13:30** **Kathy MacKinnon** Development Assistance and Primate Conservation: A World Bank Contribution
- 13:50** **Anthony Rylands** Ten years of the world's 25 most endangered primates
- 14:10** **Jean-Marc Lernoald** Three cases of successful contributions of zoos to *in-situ* primate conservation
- 14:40** **Zena Tooze** PASA Sanctuaries: From primate welfare to proactive conservation
- 15:00** **Mike Bruford** DNA, taxonomy and systematic of primates: applications to conservation

15:20 *Tea*

Symposium session 3 – What can we do better?

- 15:50** **Alison Cronin** The Dao Tien Endangered Primate Species Centre
- 16:20** **Anna Nekaris** Can we use the media to conserve primates? Lessons learnt from the "Top 25 Most Endangered Primates"
- 16:40** **Lesley Dickie** The contribution of zoos to primate conservation: the reality and the opportunity
- 17:00** **Neil Maddison** The Value of Great Apes – a community led initiative
- 17:20** **Bryan Carroll** Summing Up
Neil Maddison
Christoph Schwitzer

Bristol Conservation and Science Foundation Team

Dr Jo Gipps - Director



Dr Jo Gipps joined Bristol Zoo Gardens as Director in September 2001. He previously worked at London Zoo for 12 years, eight of those as Director. Jo is a member of the Council of the World Association of Zoos and Aquariums (WAZA) and he chairs its Conservation Committee; in this capacity, he was responsible for producing “Building a Future for Wildlife”, the World Zoo and Aquarium Conservation Strategy, in 2005.

He chairs the Bristol Natural History Consortium, a charity which is responsible for the annual Bristol Festival of Nature and the ‘Communicate’ conference. He also sits on the Board of Destination Bristol and is a member of the steering groups of Science City Bristol and the Bristol Green Capital Momentum Group.

Dr Bryan Carroll - Deputy Director



Dr Bryan Carroll joined Bristol Zoo in August 1995, having come from the Jersey Wildlife Preservation Trust (now Durrell Wildlife Conservation Trust) where he was Curator of Mammals at Jersey Zoo. This background in an establishment that pioneered the idea of the zoo as a conservation organisation has enabled the development of Bristol Zoo’s conservation and scientific programmes.

Bryan is a member of the Council of the European Association of Zoos and Aquaria (EAZA) as well as being a member of the EAZA EEP Committee (which oversees all European co-operatively managed species programmes) and the EAZA Conservation Committee. Bryan is also a member of the World Conservation Union’s Primate Specialist Group, Bat Specialist Group and the Conservation Breeding Specialist Group.

Dr Christoph Schwitzer - Head of Research



A biologist by training, Dr Christoph Schwitzer received his PhD in Zoology from the University of Cologne, Germany, for his work on the nutritional ecology of lemurs, which he conducted in several European zoos. He worked as part of the primatological research group at Cologne Zoo for several years and also coordinated the European Endangered Species Programme for Ruffed lemurs. In 2003 he took on a position as Programme Coordinator for the European Association for the Study and Conservation of Lemurs (AEECL) in northwest Madagascar, where he directed a field research and conservation programme that has recently led to the creation of a new national park. Since August 2006, Christoph has been Head of Research at Bristol Zoo Gardens, and was appointed Executive Secretary of AEECL in May 2007.

Neil Maddison - Head of Conservation Programmes



Neil Maddison gained his first degree in Zoology at the University of Bristol and went on to work for several conservation charities before joining the Bristol, Clifton and West of England Zoological Society in 1997, initially as Development Manager. His experience in field conservation has led him to focus on working with communities to develop sustainable solutions to wildlife conservation, looking for practical ways to support disadvantaged people in their development. This often leads to an examination of the 'business case' for conservation, and finding new sources of revenue for local communities. Neil obtained his MBA from the University of the West of England, with a specialisation in pro-poor ecotourism. He is a Trustee of the Cameroon Wildlife Aid Fund, an NGO working to address the commercial bushmeat trade in Africa and was previously a Trustee of the Hawk and Owl Trust. He is also currently a member of the Conservation Specialist Breeding Group and the Association of MBAs.

Global Diversity conservation priorities: A view from the primates

Simon Stuart

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There are currently 415 primate species on the IUCN Red List of Threatened Species. Two of the species are already Extinct, leaving 413 extant species. Threat levels among primates are extraordinarily high, with 201 species in the threatened categories of the IUCN Red List of Threatened Species (Critically Endangered, Endangered and Vulnerable). This means that at least 48% of species are globally threatened. When it is considered that 56 species (13%) are Data Deficient, the true percentage of threatened primates is almost certainly over 50%, conceivably as high as 60%.

Of the 201 threatened species, 75 (37%) occur in Asia, 30 (15%) occur in Sub-Saharan Africa, 37 (18%) occur in Madagascar, and 58 (29%) occur in the Americas. In Asia, an extraordinary 78% of primate species are globally threatened compared with 36% in Africa, 39% in Madagascar, and 41% for the Americas. There are 37 primate species in the most threatened IUCN category, Critically Endangered, of which 13 are in Asia, 12 in the Americas and six each in Sub-Saharan Africa and Madagascar. In Asia, 13% of primates are Critically endangered, compared with 9% in the Americas, 7% in Sub-Saharan Africa and 6% in Madagascar.

Madagascar has 42 Data Deficient species, which is 75% of all the world's Data Deficient species, due largely to recent extensive taxonomic changes. From a global perspective, the conservation situation for primates is much worse in Asia than anywhere else, and this must drive conservation priorities. Looked at from a national level, 12 countries have ten or more threatened primate species: Brazil (40); Indonesia (37); Madagascar (37); China (19); Vietnam (19); Colombia (15); Laos (15); Malaysia (15); India (13); Nigeria (11); Thailand (11); and Nigeria (10). For Critically Endangered species, the top countries are: Brazil (7); Vietnam (7); Madagascar (6); China (5); Indonesia (5); and Colombia (4).

Two overriding threats are driving primates towards extinction: habitat loss (affecting 194 (97%) threatened species), and hunting (affecting 182 (91%) threatened species). The main causes of habitat loss impacting threatened primates are agriculture (affecting 190 species), and urbanisation (affecting 97 species). Most threatened primate species have relatively restricted ranges, and future primate extinctions could be avoided if habitat conservation and hunting controls could be implemented in relatively few sites. In most, if not all, cases this will involve building collaborative programmes with local human communities and engaging their support in conservation.

Save the primates to save the world

Ian Redmond

Chief Consultant, GRASP - UNEP/UNESCO Great Ape Survival Partnership, c/o RSPCA Building, Lansdown, STROUD Glos. GL5 1BG, UK

As keystone species in tropical forest ecosystems, primates are essential for the health of these forests which are themselves essential for climate stability. Thus, the new climate treaty to be concluded in Copenhagen this December should not only recognise the role of forests, but also the role of primates (and other animals such as elephants and toucans) in maintaining these forests as a permanent store of carbon and a major contributor to the sequestration of CO₂ from the atmosphere. The implications for this in terms of conservation strategy and finance will be discussed.

The disappearing roloway monkey: why is conservation still failing in West African forests, and is there anything we can do to make things better?

John F Oates

Hunter College of CUNY, New York, NY 10065, USA

The roloway monkey (*Cercopithecus diana roloway*) is verging on extinction. Surveys conducted since 2004 within the range of the roloway in the forests of eastern Côte d'Ivoire and western Ghana have yielded sightings of this striking primate (regarded as a distinct species by C. Groves) at only one locality, the Tanoé forest, although hunters have reported its continued presence at a number of other sites. The roloway's decline has been caused largely by hunting for the bushmeat trade. This decline cannot readily be linked to human poverty, a common explanation put forward for such phenomena in recent years. Ghana, for example, has one of the more prosperous economies in West Africa, while conservation projects at some former roloway habitats have laid emphasis on development activities.

Meanwhile, rigorous protection of forest wildlife has not occurred in this region, where human populations have continued to grow rapidly. Warnings have been raised about the roloway monkey's status for over a decade, but such concerns have generally not been met by effective responses on the part of the conservation establishment.

Publications and lectures alone do not solve conservation problems, which need the concerted action of committed people. In particular, primate conservation in western Africa requires actions on the ground to greatly limit hunting. Does the conservation community have the capacity (and sufficient commitment) to help effect such actions? How could we be more effective?

The challenges of protecting a poorly-known genus: Conservation of *Lepilemurs* in Madagascar

Christoph Schwitzer

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Many sportive lemur species (genus *Lepilemur*) have received little attention from scientists and conservationists alike and have consequently been red-listed as Data Deficient, despite the wide distribution of this genus along the periphery of Madagascar. Recent genetic analyses have drastically increased the number of known *Lepilemur* species, with eighteen new sportive lemurs described in the last four years alone. In contrast to the intensive genetic work that has been done, only few studies of sportive lemur population density or abundance are available, and population assessments have so far only been conducted on one of the recently described species.

Lepilemur habitat requirements are also rather poorly understood and it remains unclear how different species respond to habitat degradation, or whether they can use regenerating or replanted forests. The few studies of sportive lemur behavioural ecology, which largely focus on western dry forest species, have revealed that their survival depends on a number of complex factors such as patch size, distance between trees, and availability of suitable sleeping holes or vegetation tangles. Several species are now thought to be in danger of extinction since they occupy shrinking, increasingly fragmented forest habitats with a potentially reduced availability of one or more of these factors. One of the main challenges of protecting sportive lemurs is thus a lack of knowledge. More studies on *Lepilemur* conservation ecology and habitat requirements are urgently needed to enable the establishment and implementation of effective conservation strategies.

Development Assistance and Primate Conservation: A World Bank Contribution

Kathy MacKinnon

Lead Biodiversity Specialist, World Bank

Over the last 20 years the World Bank has been a major provider of biodiversity funding, supporting a portfolio of more than 600 projects, worth \$6 billion, in more than 120 countries. Many of those projects have helped to establish and strengthen protected areas or improve protection of natural habitats in the broader production landscape. Ongoing initiatives are supporting important primate reserves in biodiversity hotspots and wilderness areas from the Amazon and Congo basins to Madagascar and the rainforests of Indonesia and Indochina. A few projects such as the Critical Ecosystem Partnership Fund and a new project under development – Save Our Species – provide explicit resources targeted towards threatened species. The greatest opportunities for the future, however, lie in new opportunities to link conservation to mainstream development sectors, including enhanced protection of natural ecosystems as part of national strategies and programs for adaptation to climate change.

Ten years of the world's 25 most endangered primates

Russell A Mittermeier

Anthony B Rylands

IUCN/SSC Primate Specialist Group, c/o Conservation International, 2011 Crystal Drive, Arlington, VA 22202, USA

In 2000, the *IUCN Red List of Threatened Species* indicated that 120 primates (nearly 20% of all primate taxa) were endangered (categories 'Endangered' and 'Critically Endangered'). To call attention to the ongoing decline and increasing threat to primates worldwide, the IUCN/SSC Primate Specialist Group and Conservation International produced a list of 25 primates that were particularly endangered, and urgently in need of research and conservation measures to guarantee their survival. "The World's 25 Most Endangered Primates" was published in *Time* magazine on 17 January 2000 and, due to its success in advertising the plight of primates worldwide, further lists were produced every two years from then on. The second (2002) was drawn up during an open meeting held at the 19th Congress of the International Primatological Society (IPS) in Beijing, China, and since then has become a regular fixture at the society's biennial meetings, with the world's experts available to discuss and review it. By 2005 the number of endangered primates had increased to 160 (26%), and by 2008, the fifth list, to 206 or 32.5% of the 634 primate species and subspecies assessed on the Red List. The five lists produced to date have included 54 primates in all; 10 lemurs from Madagascar, 15 primates from Africa, 19 from Asia, and 10 from the Neotropics.

In this talk we provide a brief review of the history of, and rationale behind, this listing of endangered primates, and review briefly the major threats to their survival and the successful conservation efforts for four primates of the Brazilian Atlantic forest that were on the first three lists (2000 to 2004): three lion tamarins (*Leontopithecus rosalia*, *L. chrysopygus*, and *L. caissara*) and the largest of the Neotropical primates, the northern muriqui (*Brachyteles arachnoides*).

Three cases of successful contributions of zoos to *in-situ* primate conservation

Jean-Marc Lernoald

CEPA – Conservation des Espèces et des Populations Animales

The contributions of European zoos to *in-situ* conservation are described for three primates, each linked to *ex-situ* breeding programmes. After the discovery in 1983 of the geographic distribution of the Sclater's lemur *Eulemur macaco flavifrons*, one of Madagascar's rarest lemur species, a captive breeding programme and a field and laboratory research programme were initiated by the University of Strasbourg and the Mulhouse Zoo. In 1987 the Association Européenne pour l'Etude et la Conservation des Lémuriens (AEECL) was created by a group of European zoos in order to support this initiative. Over the years AEECL has established a field research station and has been working to create a reserve to help protect the heart of the Sclater's lemur population. The Parc National Sahamalaza Iles Radama became a reality in 2007.

A captive breeding programme for the roloway monkey *Cercopithecus diana roloway*, was initiated in 1987 at Mulhouse Zoo. Other interested zoos were requested to pledge support to *in-situ* conservation when possible. This resulted in the West African Primate Conservation Action (WAPCA) initiative whose aims included support for conservation actions for this monkey and the crowned mangabey *Cercocebus atys lunulatus* in Ghana and Côte d'Ivoire. In 2006 the unprotected Tanoé Swamp Forest in Côte d'Ivoire was identified as the last forest with a viable population of roloway monkeys and populations of other endangered primates. In addition, the Miss Waldron's red colobus *Piliocolobus badius waldronae* is apparently surviving there, despite having been declared extinct a few years ago. Since then research and actions for the implementation of a community-based management system for these critically endangered primates in the Tanoé forest have been developed.

The breeding programme for the yellow-breasted capuchin monkey *Cebus xanthosternos*, initiated by the Rio de Janeiro Primate Center (CPRJ) in 1980, was extended in Europe in 1990 at Mulhouse Zoo, with the idea of requesting the zoos willing to participate in the breeding programme to support *in-situ* conservation. A field conservation research programme started in 2001. Since then it has been regularly financially supported by about 20 European zoos.

PASA Sanctuaries: From primate welfare to proactive conservation

Zena Tooze

PASA

PASA, the Pan African Sanctuary Alliance, is an alliance of 18 African sanctuaries which includes some of the longest running conservation programmes. Sanctuaries proliferated in the early 1990's and have evolved from simply an emotional and passionate reaction to primates in need, to ground breaking, and most importantly, long term, conservation projects which engage local people. Coming together to form the alliance managers discovered they were stronger and more effective as a result, learning from each other in important ways.

Activities include local capacity building, environmental education, forest conservation and regeneration, scientific surveys and successful reintroduction.

DNA, taxonomy and systematics of primates: applications to conservation

Mike Bruford

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Effective conservation of species groups requires an accurate knowledge of the distribution, status and evolutionary relationships among them. Despite the fact that it is commonly believed that the primates are one of the best-known orders within the mammals, large gaps in our knowledge remain, not the least in our understanding of systematics. Knowledge of the systematic relationships of primates is important, given their largely threatened status and the need to prioritise efforts for conservation.

My talk will focus on recent developments of primate systematics in a conservation context, using examples from our own work and that of others. I will argue that much effort is still needed if we are to equip ourselves with the necessary knowledge to manage primate species and populations in the 21st century.

The Dao Tien Endangered Primate Species Centre

Alison Cronin

Director Monkey World – Ape Rescue Centre and
Chief Executive Endangered Asian Species Trust (EAST)

In 2008 the Dao Tien Primate Species Centre, located in Cat Tien National Park (CTNP), in Southern Vietnam was opened. This centre was established following years of work investigating the illegal trade in golden-cheeked gibbons (*Nomascus gabriellae*) and black-shanked douc langurs (*Pygathrix nigripes*) by Monkey World – Ape Rescue Centre and Pingtung Rescue Centre for Endangered Wild Animals. Dao Tien is a 64-hectare island that currently houses 23 golden-cheeked gibbons, two black-shanked douc langurs, and two pygmy loris (*Nycticebus pygmaeus*). All primates that arrive at the centre have been confiscated in cooperation with the Vietnamese Forestry Protection Department and CTNP.

Dao Tien is a rescue, rehabilitation, and release centre; we will not be housing any primates on the island that are not physically or mentally fit for release back into the wild. Once at the centre, primates receive veterinary health checks for parasite, bacterial, and viral infections as well a general assessment of their physical condition. The rehabilitation process is started in cages where the primates' behaviour is assessed and introductions to conspecifics begin. If individuals pass two veterinary checks, are behaviourally sound, and have joined an appropriate social grouping then they will be moved into semi-wild enclosures (Phase II) on Dao Tien Island. Once we are happy that the Phase II candidates thrive in semi-wild enclosures, they will be moved to pre-determined areas of CTNP for release back into continuous forest. Over the past 6 years Monkey World has sponsored a PhD study on the biology and ecology of golden-cheeked gibbons in CTNP so we know where appropriate locations for release are in the national park.

Can we use the media to conserve primates?

Lessons learnt from the “Top 25 Most Endangered Primates” biennial list

Anna Nekaris

Nocturnal Primate Research Group, Anthropology Centre for Conservation Environment and Development, Oxford Brookes University, Oxford, UK

Due to their close relationship with humans, primates have long been chosen as icons by wildlife film makers. Massive media exposure has made animals such as mountain gorillas, Japanese macaques and ring-tailed lemurs household words. Yet more than 600 primate taxa are now recognized, and nearly half of these are threatened with extinction. Perhaps inadvertently, media attention towards a small handful of charismatic species has directed conservation funding and efforts to these species, which due to media enculturation may be viewed as ‘more important.’ Similarly, students entering the field of primatology are naturally drawn to those species with which they are familiar, leaving more than one third of primate species still unstudied in the wild.

In an effort to draw attention to lesser known, yet highly threatened species, in 2000 specialists in the field of primate conservation, drawn from the IUCN Primates Specialist Group, the International Primatological Society and Conservation International began a biennial process of selecting a list of 25 primates to represent the most threatened species or regions in the world where primates reside. 54 species, many of which had never been the topic of field studies, have appeared on this list.

In this presentation I discuss the successes and failures of this list through several case studies. First I examine the number of published field studies conducted on each of the 54 species before and after their appearance on the list; similarly, I examine availability of conservation funding for these species. Finally, I examine the impact that the publication of this list has had on the choices that aspiring primatologists make in designing and implementing field studies, based on ten years of field work in primate conservation by more than 250 MSc students at Oxford Brookes University.

The contribution of zoos to primate conservation: The reality and the opportunity

Leslie Dickie

European Association of Zoos and Aquaria

Primates in intensively managed programmes in zoos can benefit conservation in a number of ways including; the provision of a genetic reservoir and insurance population to support wild populations; to support fundraising opportunities for field conservation; to allow problem-orientated research to be undertaken; and to provide an educational and ambassador resource for promoting primate conservation messages to the public. But how effective are European zoos in utilising the primate populations they maintain?

The European Association of Zoos and Aquaria (EAZA) currently coordinates 76 *ex situ* primate conservation breeding programmes; 50 at the level of EEP and 26 at the less intensive level of ESB. An analysis to assess the self-sustainability of the populations was undertaken in 2009 and is presented here. In addition a review of the EAZA annual conservation campaigns as to where they pertain to primate conservation is discussed, while the number and variety of primate conservation projects in the proto-World Zoo and Aquarium Conservation database are described.

While there have been numerous success stories and clear indicators that zoos can impact positively upon primate conservation much remains to be achieved. Further commitment to species-led conservation, a niche area that zoos are ideally placed to occupy, will be required and the evolution of regional conservation breeding programmes into global programmes will likely be a necessity into the future. EAZA's primate focus in the 2010 International Year of Biodiversity and the future role of zoos in primate conservation will be discussed.

The Value of Great Apes – a community led initiative

Neil Maddison

Bristol Conservation and Science Foundation, Bristol Zoo Gardens, Clifton, Bristol BS8 3HA

Bristol Conservation Science Foundation has been working with communities living in areas where the hunting of apes for meat has historically been high and where the local people are considered to be intrinsic to the bushmeat supply chain. The programme aims to examine the motivation for slaughter of apes (and other threatened species) and develop strategies for reducing hunting.

So far we have gained a greater understanding local people's role in the commercial bushmeat trade and identified realistic alternatives to the existing market. The lessons learned confirm some of our understanding of the trade, but are, in other ways, surprising and lead us to re-examine our intervention strategies.

The project looked at how the communities around the Dja Reserve value 'their' apes; as commodities, opportunities or as individuals worth saving in their own right. With a seemingly global movement from species protection to the sustainability of 'ecological services', does evidence support a strategy of focusing on the great apes as being intrinsic to the health of the forests of central Africa?

Poster Abstracts

Introducing the Rowboat species concept: Can small, traditionally less charismatic species fulfil the dual role of Flagship and Umbrella?

Andrew Arnell

Oxford Brookes University

Flagship species are frequently utilised in conservation to raise support and funding for their conservation and are traditionally large, charismatic taxa. In many areas such species have been virtually extirpated and a stand-in is now required to represent the wealth of endangered, endemic species confined to dwindling forest fragments. In this instance we propose the term “rowboat species” may be more appropriate to describe these smaller, less traditional flagship species. We suggest that they be selected on ecologically and culturally sound reasoning and not solely on their appeal to potentially fickle western donors.

We use the example of the Sri Lankan wet zone and attempt to highlight an appropriate “rowboat species”. In order to compile a short-list of candidates, a variety of criteria from recent literature was utilised including IUCN Red List status, degree of endemism, mobility, and expert opinion.

Flagship qualities were assessed using an internet-based questionnaire to assess the emotional appeal of each species to Sri Lankan residents. Small wild-cats and primates were found to be most the popular taxa from this shortlist.

In an attempt to predict umbrella characteristics the distribution of each candidate was modelled using occurrence records and the predictive niche modelling software Maxent. GIS analysis of their distribution and a comparison of overlap between candidates were carried out. A paucity of data on habitat preferences, along with current taxonomic uncertainties, were compounded by an inappropriately defined land-use layer. Until further field research and GIS data are made available this technique may not be a viable process for the selection of umbrella characteristics.

Monkey World Ape Rescue Centre: Our Role in Primate Conservation

Holly Barnes and Cara Buckley

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Monkey World Ape Rescue Centre was established in 1987 to re-home and rehabilitate chimpanzees used as beach photographer's props in Spain. Monkey World's aim is to assist governments around the world to stop the smuggling of primates from the wild and to rescue and rehabilitate as many abused primates as possible, encouraging natural behaviours and introducing rescued individuals into conspecific groups.

The rescued primates at Monkey World are generally not bred as many suffer from health problems related to past abuse or have been forcibly removed from their mothers and consequently lack key parenting skills. In addition, many more primates are in need of rescue, so group size and available space must be used wisely. Exceptions include individuals which belong to species managed within a European Endangered Species Breeding Programme (EEP). At Monkey World these include Bornean Orang-utans (*Pongo pygmaeus*), the Golden-Cheeked Gibbon (*Nomascus gabriellae*) and the Woolly Monkey (*Lagothrix lagotricha*). Many of the primates re-homed at Monkey World have been taken from the wild as infants, constitute new blood lines in captivity and are consequently of great value to international breeding programmes.

Over the last 22 years Monkey World has grown considerably and now houses over 230 primates of 15 different species. These primates have been rescued from 17 different countries and Monkey World continues to work with governments around the world to implement conservation laws to protect primates and end smuggling. Whilst Monkey World's work rescuing and rehabilitating is far-reaching its ability to raise awareness of primate conservation issues is far greater. Every year approximately 450,000 people visit Monkey World where signage discusses the rehabilitation of primates and half-hourly talks detail species specific conservation issues. In addition, over 24,000 people subscribed to Monkey World's Ape Rescue Chronicle which provides information on rescue and rehabilitation work and how subscribers can contribute to primate conservation. For the last 13 years Monkey World has been the subject of a documentary series covering the rescues of different primates and following their progress through rehabilitation. At present the series 'Monkey Life' (formally Monkey Business) is broadcast in 167 countries and it is watched by 800,000 people in the UK alone.

Monkey World believes that sanctuaries have an important role to play in primate conservation as awareness-raisers and as conservation facilities in the case of rescued endangered primates. However, sanctuaries only provide a small piece of the puzzle and must work alongside all other key primate conservation initiatives such as *in situ* projects, educational initiatives, habitat preservation/restoration projects, legal protection/enforcement, and field research. Only a multi-faceted approach can be successful in the battle to save primates from extinction.

Key words: rescue, rehabilitation, awareness-raising

Ethogram, time budget and ecology of free-living golden-backed uakaris, *Cacajao melanocephalus*, in black swamp forests of the upper Amazon, Brazil

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Golden-backed uakaris are members of the family Pitheciidae (subfamily Pitheciinae) and are one of three species of black-headed uakaris. They are included in the category 'Least Concern' in the IUCN Red List of threatened species, probably due to their relatively wide distribution when compared to other uakari species. Previously only very preliminary investigations of the diet, sociality and habitat choice have been conducted for this rare and elusive primate, with no detailed field studies performed on its social ecology and behaviour. As very little is known about the behaviour of golden-backed uakaris, one objective of the present study was to establish an ethogram for the species, based on observations of wild animals. Furthermore, we describe features of natural history such as group size and composition, range sizes, time-budgets of behaviours, diet, rare events, interspecific encounters and the presence of other primate species inhabiting the Igapó forest (seasonally flooded rainforest).

The study was entirely conducted in the Igapó forest in Jaú National Park (1°53'15.96"S 61°41'25.46"W), Amazonas, Brazil. A total of 931 hours of fieldwork were conducted between March and July 2007 and between January and June 2008. Data were collected via *ad libitum* and group scanning sampling techniques. Behavioural data were also obtained from video footage of the animals. Whenever possible, the animals were sexed and aged. The three study groups lived in close proximity but never mixed, and their social organisation involved fission-fusion of sub-groups within groups. Sub-group composition and size varied: a multi-male-multi-female with infant(s) structure was observed most frequently, and maximum counts were 5, 26 and 15 individuals for the three study groups. The perimeter of the areas in the Igapó forest used by the study groups varied from 5.2 to 8.2 km.

A total of nine behavioural categories were identified. The animals spent significantly more time engaged in travelling than in other behaviours. We recorded 34 feeding items between January and June 2008 and the monkeys had a more diverse diet in February and March (i.e. about the middle of the wet season). Five other primate species also visited the Igapó study areas, but the golden-backed uakari was observed most frequently. The golden-backed uakaris were tolerant of all primate species that visited the Igapó, with exception of white-fronted capuchin monkeys, *Cebus albifrons*. They were also intolerant of giant otters, *Pteroneura brasiliensis*. This study will facilitate comparative behavioural studies of the species. Furthermore, the information on their ecology will assist with welfare, conservation and management plans of both the species and the Igapó forest.

Key words: golden-backed uakari, *Cacajao melanocephalus*, behaviour, activity budget, natural history

Habitat characterisation of the western hoolock gibbon (*Hoolock hoolock*) by examining home range microhabitat preferences

Alice A. Brindle

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Conserving a species depends on an understanding of its habitat requirements. Primatologists often characterise the habitat requirements of primate species using macro-scale population based approaches whereby they rely on finding correlations between habitat attributes and population abundances between sites with varying levels of disturbance. However, this approach only works for species spread between several populations of varying size. Some critically endangered species of primates only remain in single populations forcing researchers of these species to rely on micro-scale individual based rather than population based approaches for habitat characterisation. However, the reliability of using micro-scale studies to determine the habitat requirements of primate species remains in question.

To examine the reliability of micro-scale habitat characterisations, I studied the microhabitat preferences of a single group of four western hoolock gibbons (*Hoolock hoolock*) in Kalachara Forest Beat, Sylhet Division, Bangladesh in order to compare my results to the habitat preferences of western hoolock gibbons identified during a macro-scale study of populations across Bangladesh. I used stepwise discriminant analysis to discriminate between the areas of low, medium, and high use by the focal group based on the areas' microhabitat characteristics (tree species availability, altitude, canopy connection, distance from forest edge, and levels of human disturbance). The gibbons preferred using areas of their home range positioned away from the forest edge with low human disturbance and high fruit tree and sleeping tree availability. These habitat preferences are consistent with the habitat attributes of Bangladesh's largest remaining western hoolock gibbon populations that live in areas containing low agricultural encroachment and high food tree availability. These findings indicate that conservationists can use micro-scale studies for the habitat characterisation of species in order to rapidly identify the most cost effective habitat improvement schemes.

Key words: primate, ranging pattern, activity budget, Bangladesh, conservation

A parasitological survey of semi-captive drills (*Mandrillus leucophaeus*): implications for reintroduction to the wild

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Found only in fragments of rainforest in Cameroon, Nigeria and Bioko Island, the drill (*Mandrillus leucophaeus*) is a large, terrestrial monkey that occupies the most restricted geographical range of any African primate. Due to hunting and habitat loss, the drill is also one of the most highly endangered primates in Africa. In 1994, in response to these threats, the Drill Rehabilitation and Breeding Centre (DRBC) was established in Eastern Nigeria with the main aim of establishing a semi-captive breeding group of drills with a view to their eventual reintroduction to the wild. Indeed, a reintroduction of 100 animals is planned for the near future.

Parasitic disease poses a threat to the health and survival of endangered species and can seriously undermine the achievements of reintroduction initiatives. Consequently thorough pre-release health screening of all animals is vital. Over a three month period, 85 faecal samples were non-invasively collected from the reintroduction group at the DRBC and examined for the presence of gastro-intestinal parasites. Overall prevalence of infection was 84% with a significantly higher prevalence observed in males. Of 12 parasite taxa that were recovered, Strongylid sp. was the most prevalent (71%), followed by *Balantidium coli* (44%) and *Entamoeba coli* (40%). Our results indicate that although infection is common, these animals appear to be in good health and at low risk of potentially harmful parasitic disease. Furthermore, they provide previously non-existent, baseline parasitological data on the gastrointestinal parasites infecting drills, data which will be of importance to other primate reintroduction projects and to the future survival of the drill.

Key words: *Mandrillus leucophaeus*, reintroduction, gastrointestinal parasites, non-invasive, Nigeria

The Margarita capuchin: an endemic and critically-endangered monkey on Isla de Margarita, Venezuela

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Since 2005, a pioneer long-term project, the Margarita Capuchin Project, has been developed to conduct research and guide decision making toward the conservation of this primate and its habitat. This capuchin, an endemic sub-species of Isla de Margarita, Venezuelan Caribbean Sea, is the only wild primate on this island. It is listed as critically endangered and considered the most threatened primate within the country. Part of its distribution is within protected areas, but it is still threatened by living in a reduced and fragmented habitat and by poaching for pest control and the pet trade. The main goal in this first study is to evaluate the use of habitat by the Margarita capuchin over its fragmented range and generate recommendations for its conservation.

Characterisation of the habitat, line-transect surveys and pet surveys along with interviews with hunters and park rangers were conducted. Distance sampling was used to collect the data recorded on transects. Geographic Information System (GIS) was used for study design and data analysis. The main questions to be answered were related to current distribution and density of this primate, as well as evaluation of threats for its conservation. New records for the distribution of this primate were found, adding another mountain (Taguantar) to make a total of four mountain forest fragments inhabited by Margarita capuchins. Taguantar is entirely covered by dry vegetation, while the other mountains have cloud-forest pockets at exceptionally low altitudes (ca 600m asl), in contrast to the surrounding arid lowlands.

Hunting pressure for pest control has been reduced by park rangers in one of the forest fragments (Cerro el Copey National Park). Nevertheless, hunting and habitat fragmentation still persist across the whole of the capuchins range. Currently, capture of wild capuchins on the island for the pet trade and traffic of other pet primate species to the island are important threats for the wild population. Stopping the pet trade, establishment of a Monkey Rescue Centre to conduct a management programme for the existing Margarita captive capuchin population, increasing the area of the protected areas to include all mountain forest fragments inhabited for this subspecies and linking the mountain forest fragments by ecological corridors are among the urgently needed conservation actions. Future research steps include conservation genetics projects that are already being planned in collaboration with a multi-disciplinary team in Venezuela.

Key words: Margarita capuchin, *Cebus apella margaritae*, poaching, habitat fragmentation, use of habitat

First field study of the Yellow-tailed woolly monkeys (*Oreonax flavicauda*) in the district of Amazonas, Peruvian Andes : A comparison of two habitat fragments (lightly disturbed versus disturbed)

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The yellow-tailed woolly monkeys (*Oreonax flavicauda*) are in dire need of habitat protection and management programs to ensure their survival. Limited studies have been carried out on this species and its cloud forest habitat so little is known about their community structure, behavioural and diet ecology or habitat preferences. This project was conducted as the first habitat study of the species in the district of Amazonas in the Peruvian Andes.

Using the point-quarter sampling technique, we sampled two areas known to be inhabited by *Oreonax* and found that they were significantly different based on the density as related to basal cover derived from diameter at breast height (DBH) of the trees. In each area we took 100 sample points, measured 404 trees and collected 153 trees specimens for identification. These were used to describe the habitats and to link tree species utilisation by the monkeys to the size of the trees, since DBH is proportional to fruit yield. We found that the disturbed site, Peroles, had more fruit trees than the healthier site Hierba Buena, despite the degraded state. It was also found that all trees identified as utilised by *Oreonax* were significantly larger in DBH than those not used.

During observations it was noted that the monkeys spent a significant amount of time eating fruits from vines growing on the tall trees and searching in the tree moss for insects. A major output of the project was the identification of all the feeding trees used by the monkeys by scientific and by local names. Of a total of 7 plant genera identified as feeding trees, only 2 were found in both sites and in large numbers. The sites were found to be very different based on their overall composition of tree genera. It was evident that Peroles was a more suited habitat for *Oreonax* based on food availability.

Key words: *Oreonax flavicauda*, cloud forests, point-quarter sampling, habitat utilisation.

A pilot study of a children's story book as an environmental education tool to mitigate primate pet trade in Southeast Asia

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Education is an essential aid to the conservation of wildlife. It raises public awareness on environmental issues and can ultimately change the way of behaving and thinking towards wildlife. In Southeast Asia the pet trade is among the numerous threats that are facing wild primate populations and is constantly growing to supply the international and national demand for primate pets. This practice critically decreases threatened primate species populations.

Children represent the next generation's voices and attitudes towards the natural world. Because of their young age, they have the capacity to quickly acquire new knowledge and therefore act as a good target audience. I aimed to create educational material to avoid children viewing primates as "good pets" by passing to them a simple message: primates should not be kept as pets because they cannot survive without their natural food, their habitat and the other members of their family.

In April and June 2009, I conducted a pilot study in Cambodia and Laos on a children's story book about the primate pet trade designed to be used with children living in Southeast Asia. The results demonstrate that children from either villages or towns confronted the primate pet trade issue. The message given in the story book was understood by children aged 4 to 12 years old. We suggest the dissemination and implementation of the children's story book on a wider scale in Southeast Asia in the near future. The story book should be used on a long term basis and evaluated.

Key words: conservation; education; pet trade; pilot study; primates; Southeast Asia; story book

The influence of a long term research project on the conservation of grey-shanked douc monkeys (*Pygathrix cinerea*) in Kon Ka Kinh National Park, Vietnam

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The grey-shanked douc monkey is an endemic and newly-found primate in Vietnam, but this species is critically endangered due to the loss of habitat and hunting pressure (Nadler 2003). In fact, the species is listed in "The world's top 25 endangered primates" by Primate Specialist Group, IUCN (Mittermeier *et al.* 2008). Conservation action is urgently needed to ensure the long term survival of the species. From 2005 a long term project was conducted to study and conserve the monkeys in Kon Ka Kinh National Park, Gia Lai Province. The aim of this paper is to provide an overview of the results of research and conservation achievements in the project in the last five years.

The group structure of the grey-shanked douc monkeys is a one-male-unit group (OMU), ranging from 5 to 11 individuals. The OMUs often gathered as a large group with about 100 individuals. Young leaves and fruits (including seeds) are the main food sources with 167 species of 41 plant families being eaten by the monkeys.

The existence of the long term research project has positively influenced recovery of the grey-shanked douc monkey population inside the Park. Two more populations outside the Park were found. Hunting of the douc monkeys has significantly decreased in the Park since the project started. An awareness programme on grey-shanked douc monkeys has been conducted in local communities around the Park, which has involved the National Television Company in a campaign to protect the monkeys. A training course on primate conservation for 52 local students at Danang University was also conducted. Cooperation between researchers and local authorities has set up a sustainable foundation for the conservation of grey-shanked douc monkeys in the region.

The Effect of Exhibit Design on Visitor Behaviour and Conservation Action at Cotswold Wildlife Park

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The new mandate for zoos includes educating and raising awareness of biodiversity and conservation (Stoinski *et al.*, 2002), which many believe can be influenced through natural exhibit design (Coe, 1985; Price *et al.*, 1994; Andersen, 2003; Caro *et al.*, 2003). The aim of this research was to evaluate the conservation potential of the newly developed 'Madagascar exhibit', a semi-free ranging walk through lemur enclosure, at the Cotswold Wildlife Park. To ascertain the effect of cage design on the behaviour of visitors, behaviour was compared at a traditional style enclosure and the newly constructed Madagascar exhibit. A total of 397 visitors were overtly observed to determine the length of time that they spend at the exhibits, read information, their perceptions of, and interaction with, two species of lemur (*Lemur catta* and *Eulemur macaco macaco*).

Observations confirmed that exhibit design can have a positive effect on visitors. Visitors spent significantly longer at the Madagascar exhibit than the traditional exhibit and also spent significantly more time reading information. In addition, visitors contributed financially to the conservation of lemurs. Visitor-lemur interactions increased in the Madagascar exhibit, although this did not appear to negatively affect the lemurs.

This research has demonstrated how effective exhibit design at the Cotswold Wildlife Park can influence visitors to contribute to lemur conservation. Visitor donations can be redirected into effective *in situ* conservation programmes in Madagascar for the preservation of endangered species. To date funding has been provided for the Alaotran gentle lemur (*Haplemur griseus alaotrensis*) project at lake Alaotra, the greater bamboo lemur (*Prolemur simus*) in Miaranony and crowned sifaka (*Propithecus coronatus*) in the western part of Madagascar. Zoos that are serious about meeting conservation objectives should consider the use of natural free-ranging walk-through exhibits to enhance visitor experience and their contributions to conservation action.

Key words: behaviour, conservation, exhibit, lemur, visitor

Isolation of added browse and removal of fruit in captive Gorilla diets are associated with reduced regurgitation and reingestion in Western Lowland Gorillas (*Gorilla gorilla gorilla*)

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Regurgitation and reingestion (R/R) is an abnormal behavior that regularly occurs in captive western lowland gorillas (*Gorilla gorilla gorilla*) (WLG) and has been linked to differences in the diets of captive and wild populations. Captive WLG receive excess dietary sugar in the form of fruit but not sufficient fiber. Past evidence has shown links between increasing fiber and browse and subsequent reduction of R/R. We conducted an experimental study which assessed the individual and combined effects of browse and fruit on R/R behaviors in one gorilla group at Port Lympne Wildlife Park, UK. Behavioral observations of R/R were carried out across the following phases of our study: Phase 1: baseline data with regular diet; Phase 2: regular diet plus browse supplementation; Phase 3: regular diet with all fruit excluded; Phase 4: regular diet plus browse supplementation and fruit excluded; Phase 5: return to baseline with regular diet. Each study phase lasted seven days with a three-day transition period between each. Continuous focal sampling techniques were employed.

Addition of supplementary browse, subsequent removal of fruit, and the final combined effects of added browse and no fruit resulted in significant decreases in hourly rate of regurgitation and the amount of time spent reingesting food during all study phases. The results from this study yield information pertaining to the captive gorilla dietary regimens and their effect on behavior. The implications of these results are discussed in terms of their relevance to captive gorilla diets and reducing R/R. We provide systematic, empirical evidence for the relationship between nutritive intake and behavior. This study sheds light onto dietary care in captive great apes and how this contributes to psychological and physical health and welfare.

Social interactions and play behaviour of non-adult wild southern-Bornean gibbons (*Hylobates albibarbis*), in Sebangau National Park, Indonesia

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The study of juvenile gibbon social behaviour is a relatively new area of research and we have limited understanding of the dynamics of inter- and intra-group social behaviours.

We aimed at quantifying the social and play behaviour displayed by juvenile wild-white bearded gibbons (*Hylobates albibarbis*); testing differences in age, sex, social partner choice, group make up effects, between group differences and their interactions. We also constructed activity budgets and compared these with adult activity budgets from groups in the same research area. The gibbons studied were members of three groups of habituated gibbons at the Natural Laboratory Research Area (LAHG), in the Sabangau National Forest; consisting of two infants, two juveniles and four sub-adults.

We found marked difference in play behaviour in terms of age with infants exhibiting higher levels of play behaviour than either juveniles or sub-adults. Differences between groups were small.

The study highlights the social needs of young gibbons. The findings suggest that juvenile gibbons would benefit from being kept in family groups, when possible. This study will be useful to zoos and rescue centres that care for gibbons, as the findings have implications for the husbandry of captive gibbons and highlight the huge impact taking juvenile wild animals away from their familial groups may have on their development and welfare.

Key words: Hylobatidae, social interactions, ethology, peat swamp forest

Preliminary study of the Bengal slow loris at Phnom Samkos Wildlife Sanctuary, Cambodia

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The Bengal slow loris (*Nycticebus bengalensis*) is an infrequently studied primate endemic to Bangladesh, Cambodia, China, India, Laos PDR, Myanmar, Thailand and Vietnam. Classified as Vulnerable based on habitat loss, data from wild populations are scanty. From April to June 2009, we calculated encounter rates of *N. bengalensis* along 10 transects in Phnom Samkos in the Cardamon Mountains, Cambodia, and collected preliminary data on their behaviour and ecology. These data were supplemented with interviews from indigenous people who traditionally collect slow lorises for medicinal purposes. Encounter rates were between 0 and 0.45 loris / km and an average density for the area surveyed of 18.75(SE8.48)/km². Local people reported a decline in lorises, and noted that in order to find lorises, they had to walk further into the forest than they did 5 and 10 years previously. Lorises were ranked as highly important in Khmer traditional medicine, supposedly curing more than 100 ailments. However, the Bengal slow loris is not thought to be as potent as the pygmy slow loris (*Nycticebus pygmaeus*) which can fetch up to \$50 in markets compared with the just \$5 for the Bengal slow loris.

An activity budget was compiled from 39 hours of behavioural observations on 18 unknown individuals. Loris spent the majority of their time resting (41%) or moving (36%); the mean distance travelled in one night was 14m. Feeding observations found loris only spent 4% of their activity budget on feeding, and were observed eating leaves, arthropods and tree bark. Moon and weather affect their behaviour with loris becoming most active in humid conditions and under the new moon. Animals occurred at low abundance and numbers are still declining. A longer-term study currently underway at Phnom Samkos will further address these conservation issues.

Key words: activity budget, Cambodia, density, feeding ecology, *Nycticebus bengalensis*

Population decline of relocated collared lemurs, *Eulemur collaris*, in the littoral forest of Southeastern Madagascar: an evaluation of the hypotheses

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Many animal relocations, including those with primates, did not follow a post-release monitoring agenda, despite its crucial importance to assess the success of these operations. The absence of these data is particularly serious for prosimian relocations. Human activities have resulted in the severe fragmentation of the littoral forest of Southeastern Madagascar. In the Mandena area this led to the translocation of 28 collared lemurs, *Eulemur collaris*, from a forest fragment destroyed by charcoal makers to a protected, though partially degraded, forest block. The translocation occurred in 2000 and, while the population initially increased, since 2004 it has begun to decrease. Two possible hypotheses have been postulated to explain this population decline: predation by the fossa (*Cryptoprocta ferox*) and food scarcity. In order to evaluate these hypotheses three groups of lemurs, totaling nine individuals, were studied from May to July, 2009. Demographic information were determined, as well as the feeding ecology and health condition of the existing population. The same variables were also examined through the analysis of data collected during the past five years by local assistants.

A continuous decline in the total number of individuals was observed. Group size was low compared to other populations and remained stable over the years. While lack of dead animal bodies prevented an evaluation of the fossa predation, no fossas were captured or observed in the forest since 2006. Feeding data indicated that the lemurs were consistently frugivorous over the last 5 years. Because it is hypothesized that if food is scarce a high proportion of leaves and flowers would be present in the diet, this suggests that food scarcity may not have been a factor for population decline. Alternatively, if this lemur species was not able to shift to fall-back resources, food scarcity could have led to an increase of the ranging area and decrease the carrying capacity of the forest. The finding of very large home-ranges and small size of feeding trees seems to support this idea. If this holds true, some animals could have disappeared since they were forced to leave the forest fragment in search of new areas.

Key words: translocation, collared lemurs, fossa, littoral forest

Reassessment of a proboscis monkey (*Nasalis larvatus*) Population Viability Analysis

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Populations viability analysis (PVA) is a management tool used to assess the vulnerability of a species. Population trends can be modelled using a combination of intrinsic and extrinsic factors. The models can provide information regarding areas of importance for the development of effective management plans. Borneo, a top producer of palm oil and supplier of timber, is home to proboscis monkeys (*Nasalis larvatus*), which live in some of the country's most threatened habitats. The main objectives of this study were to use the PVA model, VORTEX, to a) determine the current status of proboscis monkeys throughout Borneo; and b) determine which factors or activities can be modified in order to prevent a further decline in the population.

The status of proboscis monkeys was reassessed using the PVA program VORTEX 9.2 including more recent data made available after the initial model, as well as including the Malaysian populations. A 150 year scenario, simulated 2000 times, was modelled to determine the viability of proboscis monkeys. Based on suitable habitat availability and isolation between sightings, 19 isolated populations were defined throughout Borneo. From an initial total population size just under 20,000, no mangrove populations were expected to survive, and there is a 0% probability of extinction for the overall population, although local extinctions are predicted in 14 of the 19 populations in the next 15-50 years.

Management scenarios, simulated 100 times for a 150 year period, were run to determine their influence on population trends and final population size. Strategies examined were : 1) eliminating hunting; 2) eliminating fires; 3) eliminating deforestation; 4) reducing deforestation; and 5) reducing deforestation and the frequency of fires. All management strategies improved the final metapopulation size. However, the greatest change was seen by reducing deforestation, thereby reducing the frequency of fires, with a final population size half of the initial 20,000. Management strategies can increase the amount of time before extinction, allowing for plans to be remodeled and new strategies developed as the situation begins to change. These strategies must be developed for specific sites as they each face different variations of threats.

Key words: recovery, conservation, extinction, VORTEX, Borneo

Modelling primate distributions in Sri Lanka's forest fragments: Using ecological niche modelling to set conservation priorities

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Sri Lanka is inhabited by five different primate species, each facing a variety of threats from increasingly fragmented habitats and growing human population pressures. In making relevant conservation recommendations, accurate data on primate distributions are of fundamental importance. We modelled the distributions of the red slender loris (*Loris tardigradus*), grey slender loris (*Loris lydekkerianus*), purple-faced langur (*Trachypithecus vetulus*), Sri Lankan grey langur (*Semnopithecus priam*), and the Toque macaque (*Macaca sinica*) using locality data collected from natural history museum collections, scientific articles, surveys, and fieldwork. Both Maxent and GARP ecological niche modelling software were used in conjunction with information from 20 GIS environmental layers to predict population distributions.

Sample sizes varied for each species and all models were analysed for significance using a receiver operating curve (ROC), comparing the values for the areas under the curve (AUC). Overall Maxent outperformed GARP, making stronger predictions for all twelve species modelled. Predicted distributions were clipped by a current forest layer and compared with protected area networks and human population densities. Gap analysis and risk assessments were carried out to highlight high, medium, and low conservation priority areas. We make recommendations for protected area extensions and dispersal corridors, pointing out the practical difficulties of such projects in Sri Lanka's Wet Zone in particular, where primate endemism is highest, but high fragmentation and small fragment size may lead to many local extinctions in the near future.

Key words: gap analysis, GARP, GIS modeling, Maxent, protected areas, risk assessment, Sri Lanka

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