

exposed to visual stimuli outside its enclosure. The animal was also anecdotally observed to use more surface area whilst pacing when a larger crowd had formed at the viewing area, thereby potentially reducing the intensity of the stereotypic behaviour displayed. Additionally, some distinction may occur between the presence of primate section keeping staff and staff members from other areas of the Park. It is possible that primate section keepers, who have more frequent visual contact with the animal, may initiate a greater pacing behaviour than other staff members, perhaps due to an association with feeding times. Methods to alter the captive environment of this animal on a continual basis are being investigated, with the aim of determining the trigger(s) for this pacing behaviour and assessing its implications for animal welfare.

Rachael Pipkin is gratefully acknowledged for her time in collecting behavioural data. Paul Crudge is thanked for his input into the development of the ethogram.

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Floristic diversity and implications for conservation of Kenyan coastal forests

Wayne Edwards, Plymouth University and Natasha de Vere, Whitley Wildlife Conservation Trust (now National Botanic Gardens, Wales)

East African coastal forests have been identified as biodiversity hotspots with high plant species diversity and endemism. Over 250 coastal forest areas have been identified but most are small fragments covering less than 30km² and few have protected area status. This survey evaluated the floristic composition of three forest fragments in Kenya to develop a botanical check list and recommendations for management and conservation.

Fieldwork was carried out at three locations along the coast of Kenya; Kaya Kinondo Forest (04°23'36.8"S, 39°32'43.5"E), Charle Forest (04°26'04.7"S, 39°32'21.4"E), both located close to the tourist areas of Diani Beach, and Lumshi Forest (02°27'40.3"S, 40°35'38.7"E) located within Kipini Conservancy near Witu. These three forests were chosen for a number of reasons 1) they have different levels of protection i.e. none (Charle), religious (Kaya Kinondo) or conservancy (Lumshi). 2) Two are relatively close together in the South (Kaya Kinondo and Charle) and one is a long distance away at the Northern end of the Kenyan coast (Lumshi). 3) They are different in size; although the actual size of Lumshi is unknown it's probably fair to say that it is larger than Chale forest which covers an area of approximately 3-4km². Kaya Kinondo has an area of around 0.3km². All plant species were identified and counted in 30-60 10m² quadrats in each forest. Data were subjected to diversity, cluster and multi dimensional scaling (MDS) using Primer 05, further analysis was then carried out on species diversity indices using one way Analysis of Variance (ANOVA) in Minitab 15.

There were significant differences in species composition within and between the three forests. Lumshi, the largest and furthest forest, had the greatest number of species but significantly lower diversity (ANOVA p<0.001) and differed more greatly in composition from the other two forests than they did from each other. A number of rare and endangered species were identified including *Ziziphus robertsoniana*, *Diphasia sp.*, *Pancovia ugandensis* and *Psydrax recurvifolia*. This survey suggests that each fragment of Kenya's coastal forests may have unique vegetation associations, further surveys of other forest fragments are needed to fully describe and understand the plant biodiversity of Kenya's coastal forests. If each forests fragment does have a unique plant community protecting only the largest forest areas such as the Arabuko Sokoke Forest (416km²) may not be enough to conserve a large proportion of the biodiversity within this region. Levels of protection need to be extended to as many as possible of these unique and endangered forests if a large part of the biodiversity within the East African coastal forest systems is to be conserved.

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Thermal imagery for wildlife management applications

Chris Lavers, Plymouth University and Ghislaine Sayers, Paignton Zoo Environmental Park

Until recently only a few animals and the military possessed the ability to 'see' in complete darkness. Thermal imagery techniques provide 'swords into ploughshares' technology for wildlife management and have been used at Paignton Zoo since 2002. Heat cameras demonstrate that vulnerable wildlife species, vulnerable directly to man's activities and to climate change may be evaluated at a distance without stress, now being recognised as a key zoological factor to evaluate and reduce (see Research snippets Vol.9 No.4. October 2008).

We are currently concentrating on temperature accurate (radiometrically calibrated) imagery, but heat cameras are also good at detecting heat from endangered animals in captivity (or the wild) day or night. We can view animal

behaviour and numbers where it would otherwise be difficult to do, e.g. through obscuring forest. Calibrated thermography works for many species and offers safety to zoo staff and researchers and can aid animal diagnosis.

Most animals emit heat efficiently, allowing heat detection remotely, without disturbing normal behaviour. For most wildlife the heat levels are unknown so we have begun to establish a baseline of 'healthy' animal parameters to provide diagnostic data before discussion of 'sick' animals. As heat cannot be seen it is converted to visible light with false colours representing different temperatures. For example, a healthy black rhino, (figure 1) has cool ears and horn (composed of millions of compacted hair-like fibres without an active blood supply).

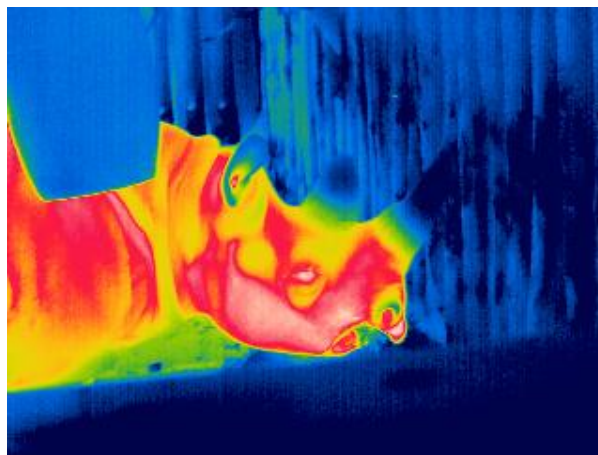


Fig. 1 Thermal image of a black rhinoceros



Heat output varies considerably between species, with the African elephant Duchess at Paignton Zoo Environmental Park radiating nearly 14kW! Ears permit evaporation over a large area and so appear cooler than surrounding parts (figure 2).

Current thermal and night vision systems are capable of counting and monitoring endangered rhino, or tracking suspected poachers on the darkest of nights. We are now looking at the feasibility of using satellite imagery to track and locate wildlife and to generate a GIS mapping database of rhino habitat regions.

Fig. 2 Thermal image of an African elephant

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Announcements

9th International Conference on Environmental Enrichment, 31st May-5th June 2009 (ICEE 9)

ICEE 9 will be hosted by Paignton Zoo Environmental Park at the Riviera International Conference Centre, Torquay, UK from 31st May – 5th June 2009. An excellent scientific programme has been put together including symposia on the use of plants, enrichment for reptiles and enrichment for fish. The conference will be introduced by Leslie Dickie, President of EAZA and include keynote presentations by Jon Coe (zoo enclosure designer, founder of Jon Coe Design, Australia), Prof. Geoff Hosey (University of Bolton) and Prof. Gordon M. Burghardt (University of Tennessee). Theoretical, practical and logistical aspects of enrichment will be covered and the conference will be relevant to those with practical experience with zoo, agricultural, lab or companion animals and those with academic backgrounds and other professionals such as architects, nutritionists and educators. The full scientific and social programmes and registration forms can be seen at www.reec.info/ICEE9.htm or <http://www.enrichment.org/ICEE9.html>. The deadline for registration is 30th April 2009.

How Can We Save Primates from Extinction? Bristol Conservation and Science Foundation 2nd Annual Symposium, 29th October 2009.

Following our 2008 symposium on evidence-based conservation, the Bristol Conservation and Science Foundation has invited primatologists, from the *in situ* (field) and *ex situ* (zoo) sectors, to discuss challenges in primate conservation. We aim to bring together evidence on how well we are doing in saving primates from extinction and to suggest ways forward to ensure the survival of our closest relatives. Special emphasis will be given to the role of zoos in primate conservation. Speakers include Prof. John F. Oates, Ian Redmond OBE, Dr Anthony Rylands, Dr Anna Nekaris, Dr Jean-Marc Lernoould. The symposium will be held at Bristol Zoo Gardens, the registration fee is £75 including lunch. For further info see <http://www.bristolzoo.org.uk/about/conservation/symposium2009> or email to sdow@bristolzoo.org.uk.

Your contributions are needed

Please send articles, announcements, comments or other feedback for the next issue by the end of June to:

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