Ecological flexibility of the southern gentle lemur *Hapalemur meridionalis* in south-east Madagascar: Implications for conservation in a fragmented and seasonal landscape

Timothy M. Eppley
eppleyti@gmail.com

Department of Animal Ecology and Conservation
University of Hamburg, Germany

Abstract

Ecological flexibility is loosely defined as an organism's ability to adjust to changes within its environment (e.g., anthropogenic, gradual, stochastic, etc.). Specifically, *flexibility* encapsulates modifications to the diet, altering activity and vertical strata, and may also comprise behavioural and physiological components. This ability to expand niche breadth is key to withstanding the risks of anthropogenic and/or stochastic habitat modification. Gentle (aka bamboo) lemurs (*Hapalemur* spp. / *Prolemur simus*), are known for their dietary predilection for bamboo. Due to their low dietary breadth, bamboo lemur species are believed to be inflexible in terms of behavioural and ecological adaptability, and are regarded as a textbook example of primate specialists. However, recent observations of *H. meridionalis* indicate that it

is an exception within the genus: a population within a fragmented littoral forest devoid of bamboo displays an unusually diverse diet. Though this species feeds on bamboo at other locations, the unique matrix of littoral forest, swamp, and invasive mono-dominant swamp habitats available within the Mandena area of coastal southeast Madagascar presented an excellent site model with which to explore the ecological flexibility of this species and to elucidate how they would cope without their preferred resource. To examine whether southern bamboo lemurs exhibit an ecological flexibility, I explored their habitat utilisation, activity patterns, and feeding preferences between October 2012 and December 2013. I first characterized the floristic diversity and structure of the disparate habitats in Mandena. With the help of local assistants, I captured adult individuals across four social groups and collared them with activity data-logging tags. While the tags provided continuous data on diel activity, I conducted daily focal follows to collect continuous feeding and instantaneous behavioural data, noting habitat and height. As the dietary niche/stratum carries with it potentially increased predation risks compared to feeding in the canopy, I attempted to parse these costs from the nutritional gain (via biochemical analyses) provided by food items selected by *H. meridionalis* between arboreal and terrestrial strata. I observed *H. meridionalis* for >1,762 h, during which they utilized disparate habitats including an invasive species mono-dominant swamp, *Melaleuca quinquenervia*. This invasive habitat may provide viable dispersal routes for lemurs existing in a fragmented landscape due to the necessary vertical structure. They also exhibited a cathemeral activity pattern, largely influenced by lunar luminosity. Lastly, southern bamboo lemurs selected for 86 different food items from 72 distinct species. Bamboo lemurs in Mandena display the largest dietary breadth of any *Hapalemur* spp., and spent nearly half of their time feeding terrestrially. In fact, their selection of these terrestrial foods was predicted by an increased intake of metabolizable energy. Taken as a whole, these explorations of specific behavioural and feeding disparities among *H. meridionalis* suggest that this lemurid clade may not be as specialized as once thought, allowing potentially less conventional conservation efforts to take place in populations whose survival appears dire.