LEMUR VENTURE: RESEARCH TO DATE

INTRODUCTION

Lemur Venture was launched by Azafady in July 2007 with the intention to collect valuable data on the lemur species and forest habitats of south-east Madagascar. Despite being one of the world's top five mega-biodiversity hotspots, Madagascar is still relatively understudied in comparison to many other countries in the world and, although lemurs are the most studied of the Malagasy fauna, there is still a vast deficiency in data collected and information known compared to other primates species found across the tropics.

The lemurs of Madagascar are viewed as being similar to early primates, those that were pushed to extinction, or into the nocturnal niche, by the evolution of monkeys and apes. However, no monkeys and apes exist on the island of Madagascar and hence lemurs have been able to diversify across all forest types and habitat niches, occupying both diurnal and nocturnal lifestyles. Madagascar is home to 11% of primate species found across the world and is the only country on Earth with 100% primate endemism (i.e. all lemur species are found only on the island of Madagascar and nowhere else in the world).

Ring-tailed lemur (*Lemur catta*)	Verreaux's sifaka (*Propithecus verreauxi*)	Reddish-gray mouse lemur (*Microcebus griseorufus*)

Currently, seventy-one species of lemur are recognised. Twenty-six of these were described between 2003 and 2007 and there are already more than ten species discovered over the last few years that have not yet been formally described and therefore not included in the species count. Clearly, the study of lemur taxonomy is far from comprehensive.

For many species of lemur, there are still vast gaps in scientific knowledge. Basic facts such as total population counts and daily activity patterns are commonly unknown and scouring the scientific literature yields many blanks. Traditionally, research in Madagascar has focused on a small number of well-established and well-facilitated sites, which researchers flock to and knowledge from these areas can be prolific whilst other areas across the country have never been visited by scientists.

Deforestation in Madagascar has been extensive. The remaining forest habitat (approximately six million hectares) is less than 10% of the land area. The pressures of an ever-increasing forest-dependent population and large-scale impacts from the likes of mining companies pose an urgent threat on the remaining forests.

Collared brown lemur (*Eulemur collaris*)	Brown mouse lemur (*Microcebus rufus*)	White-footed sportive lemur (*Lepilemur leucopus*)

Lemur Venture aims to collect data to support the need for conservation of the Malagasy forests. Data on lemur populations aids understanding of these flagship species, but to understand their ecosystem as a whole, it is important for data on all the biodiversity to be amalgamated and this involves studying other species as well as collecting much botanical data.

In its infancy, Lemur Venture intended to maintain a solid focus on research but, as the project has evolved, a more developed conservation programme has emerged. Research in isolation does not necessarily provide any benefit. However, combining research with those components essential to achieving forest protection and species conservation, such as education and involvement of local people, means that the programme has a very positive impact.

Lemur masks for environmental education in Sainte Luce	Environmental education in the spiny forest, in the village of Kobokara

Azafady is pleased with the progression the programme has taken. Whilst continuing our lemur research projects to facilitate scientific knowledge, we also incorporate environmental education with local people and seed-collecting and tree-planting for reforestation purposes. This helps us to directly input our data into conservation initiatives. Azafady also works closely with Parc Botanique et Zoologique de Tsimbazaza (PBZT) in Antananarivo. We often invite specialists from the park to join us in the field and also collect behavioural and habitat data relevant to the improved captive management of lemurs for the benefit of the park. Whilst constantly debated, captive management continues to be a mainstay of conservation and Azafady is happy to facilitate PBZT's work and add to the experience and knowledge of the staff for the improvement of conditions for housed animals.

Following a successful pilot scheme in July 2007, Azafady launched the Lemur Venture programme long-term in January 2008, running four schemes annually. We are now one year and four schemes in and much has already been achieved.

JANUARY 2008 TEAM

The majority of field time on the January 2008 team was spent at Azafady's Sainte Luce campsite, studying the collared brown lemurs (*Eulemur collaris*) in the two protected forest fragments S9 and S17. Continuing a research structure initiated on the July 2007 team, behavioural data was collected on all-day and half-day follows, with the focus on recording feeding behaviour and collecting details of plant species fed upon and plant parts eaten. Nutritional data is of real use to the development of PBZT's nutrition programme for their captive lemurs, but also of use to the long-term maintenance of forest habitats. Brown lemurs do not damage seeds in digestion and are therefore known as "habitat germinists", distributing seeds throughout the forest and helping to maintain the floristic diversity of the environment. It is important to know which species are heavily used by the lemurs as this can be useful in reforestation plans. Also, when human impact on the forest is assessed, it is important to recognise which plant species commonly used by people are also a predominant component of the lemur diet since a loss of these species would be more damaging to the lemurs' existence.

Collecting lemur feeding data in Sainte Luce

Female collared brown lemur (*Eulemur collaris*) feeding on leaves

Female collared brown lemur (*Eulemur collaris*) drinking water from a tree hole

The second field trip of the team was to the spiny forest of Ifotaka. Although the July 2007 team had also conducted research in Ifotaka (at a site called Mahavelo), the January team ventured into the unknown, to establish a camp at a previously un-visited site near a village called Kobokara. This was very much a reconnaissance trip, since the entire area was a big question mark to the staff team, no-one having ever visited the area before. The brief time that the team were at the Kobokara site was spent exploring the surrounding forest in an attempt to establish forest quality and the existence of lemur populations. Having spent a few days in somewhat degraded forest land near Kobokara, the team took a trip across the river into Matsandry forest, where we found a much healthier forest habitat, a plethora of sifaka groups and a terrain which facilitated research efforts (i.e. flat and even). The team ran a couple of transects to record the presence of Verreaux's sifaka (*Propithecus verreauxi*) groups, conducted night walks to establish which nocturnal species were present in the area and went searching (unfortunately unsuccessfully) for the elusive ring-tailed lemurs (*Lemur catta*). The identification of mouse lemurs in the area became a focus of our nocturnal work, as we tried to establish if we were seeing the gray mouse lemur (*Microcebus murinus*) or the reddish-gray mouse lemur (*Microcebus griseorufus*) or both living sympatrically, the answer to which remained unclear as our research time ran out. Finding good quality forest allowed us to begin making plans for subsequent research. According to local people, this area had never before been visited by researchers and hence became a very exciting prospect for Lemur Venture and Azafady. This exploratory trip yielded many ideas for future teams.

APRIL 2008 TEAM

The April 2008 team divided their time equally between the littoral forest of Sainte Luce and the spiny forest of Ifotaka. In Sainte Luce, we initiated a fragmentation study. Littoral forest (coastal forest) is one of Madagascar's most endangered habitats. Of the original littoral forest cover, only 10.3% remains today in small forest parcels. The Sainte Luce forest exists within seventeen forest fragments, varying in size from three to four-hundred-and-fifty hectares. Planned ilmenite mining in the south-east of Madagascar would remove two thirds of the remaining littoral forest cover. The aim of the Lemur Venture research is to study the impact of fragmentation on primate populations and also demonstrate the value and uniqueness of each individual fragment and hence emphasise the worth of protecting all, or as many as possible, of the remaining fragments rather than simply assuming that one fragment is representative of the entire littoral forest ecosystem.

The littoral forest (coastal forest) of Sainte Luce
Forest fragment S17

Deforestation in the forests of Sainte Luce
– a human impact

The volunteers on the April 2008 team created transects through four of the forest fragments (S7, S8, S9 and S17) and collected primate abundance and botanical data from these. The transects were only walked in the daytime and hence the primate data collected refers to collared brown lemur (*Eulemur collaris*) populations, which were found in two of the four fragments. The team also began to collect some ethno-botanical data – i.e. recording the use of plant species to local human communities. In particular, villagers use many different plants for their medicinal properties, as well as regularly using certain species for building materials and firewood. A count of cut stumps along the transects also allowed us to make a basic assessment of human impact within the fragments. Although this impact was less per unit area within the conservation zone, it was unfortunately still significant (regulations governing the management of conservation zones dictate that there should be no local use of products within these forest sections).

On the non-research side of things, the volunteers presented an environmental education project at the local school, attended by one hundred and twenty-eight children. The main focus of the session was a play, created by the volunteers, highlighting the outcome of forest destruction as a loss of habitat for lemur species (and hence the possible extinction of these species) and also the loss of a highly valuable resource to local communities. Another sketch on the need for reforestation was also enacted and this tied in well with the tree-planting activities which the volunteers undertook with the local people. The team managed to plant approximately one thousand five hundred saplings and also packed compost, collected seeds from the forest and planted more than one thousand seeds in the seed nursery – activities all highly beneficial to Azafady's continuing reforestation work in Sainte Luce.

When Lemur Venture returned to the spiny forest in May, it was again to our wild campsite near Kobokara. Having established earlier in the year the presence of sifaka groups within good quality forest,

we launched a study of the feeding behaviour of Verreaux's sifaka (*Propithecus verreauxi*), led by Madame Marie Claudine Ranorosoa, a primatologist and Head of Nutrition at PBZT, who joined the volunteers in the field in the spiny forest. Similar to the work the January team had conducted with the brown lemurs in Sainte Luce, we collected all-day behaviour logs for focal animals within two separate groups, recording a huge diversity of different plant species fed upon. In addition to this, herbarium specimens were collected of the lemur food plants and many other species as well. Preserved in a plant press, they were sent to PBZT to be identified scientifically by botanists at the park, to allow us to produce a list of scientific names against the Malagasy names we were being given by local guides. For all the specimens collected, we also gathered ethno-botanical data. There are more plant species with medicinal properties in the spiny forest than in any other habitat type in Madagascar and of the seventy-nine specimens we collected, only a handful of these species had no use to local human communities.

Collecting botanical data in the spiny forest of Matsandry	Collecting herbarium specimens in the Matsandry forest	Verreaux's sifaka (*Propithecus verreauxi*) feeding on leaves

Our interest in the spiny forest site in Ifotaka and our excitement over potential research projects meant that we were keen to establish a good relationship with village communities in the area and work closely with the local people. As such, we introduced a strong community interaction component to our work in the spiny forest. The volunteers taught English in the village school in Kobokara, reinvented their education project to have a spiny forest theme, and also interviewed local people on their use of forest resources and their dependency on the forest and the problems associated with life in such a unique environment.

The team searched for ring-tailed lemurs, again unsuccessfully, and we continued to focus on achieving good sightings of the mouse lemurs on night walks, in the hope of positively identifying the species present.

JULY 2008 TEAM

Following the success of the April team in Ifotaka and the feeling that our presence was accepted and welcomed by local people, the first field trip of the July 2008 team was to the spiny forest. Our main problem on past teams was the inability to conduct night work in the same area of forest where we were following sifaka groups, since this forest was only accessible from our Kobokara campsite by wading across the river, something that was not safe in the dark. To resolve the problem, we re-located our camp across the river and into the forest owned by the village of Matsandry. Now the team was actually camping within the forest itself and just a five minute walk from our habituated sifaka group.

The July team was a big one in terms of group-size and this allowed us to run several different projects all at once, with volunteers rotating through research and non-research based activities. We continued to follow one habituated sifaka group (*Propithecus verreauxi*) to collect feeding data and attempted to habituate a second group, although this proved somewhat difficult. The spiny forests of Matsandry have never been researched by anyone other than Lemur Venture, so it is hard to find detailed maps of the area and hence we set about producing our own, using GPS devices to mark the boundaries of forested areas and slash-and-burn agricultural land. Groups of volunteers also conducted structured interviews with local people in three nearby villages and the information obtained really demonstrated how remote and untouched by the outside world these communities are. When asked about tourism, the local people did not understand the concept. It is very rare to find communities who have never even come across tourists and the western world. Environmental education sessions were run in the villages, with an education specialist from PBZT, and the volunteers created a new environmental education project, this time involving an interactive game with lemur and fossa characters for the kids to participate in, the education theme being to demonstrate the damage caused by loss of the forest.

Verreaux's sifaka (*Propithecus verreauxi*)

The spiny forest of Ifotaka

Local people from Matsandry village and Ifotaka village

Two transects were created in the spiny forest areas north and south of the campsite and walked during the day and at night, to collect data on primate species present in the forest and their abundance. Botanical grids were also set up to collect data on habitat composition within different areas of the forest. To aid the local forest management committee to fulfil some of their required management tasks, we offered to assist with tree-planting, helping to plant octopus tree cuttings, the predominant species within the forest and one that is heavily used for building materials.

Camping within the forest made many activities more feasible and the opportunity to conduct night work in the Matsandry forest was a huge bonus, as we continued to look into the identification of the mouse lemurs. And we finally found ring-tailed lemurs (*Lemur catta*)!

On the July 2008 team's trip to Sainte Luce, we continued the fragmentation study which had been started with the April team. This time, the volunteers were investigating forest fragments more remote from our

campsite and the local villages (S6, S10, S11 and S12). In three of these fragments, we created transects as we had done in April, collecting botanical data and abundance data for the brown lemurs. With fresh skills at GPS mapping from our work in the spiny forest, we also set out to map the perimeter of the forest fragments in which we were working, a task a lot more mammoth than we had initially presumed. Following the tree-line is not always as easy as it seems, and swamp-wading became second nature to the volunteers! S12, although not a fragment in which we were running transects, was of interest to us because local people had reported seeing collared brown lemurs (*Eulemur collaris*) in this forest area, a fact that seemed unlikely due to its small size and heavy use by local villagers. With research, it is always best to test rather than presume, so we conducted a human sweep of the forest, a method possible with a small forest fragment. We did indeed find a group of brown lemurs!

The second half of the team's stay in Sainte Luce was spent conducting night transects to record nocturnal primate fauna. Four transects were used, three in the protected forest fragments. The data collected from these suggested an abundance of nocturnal lemurs. In one evening on a 2.5 km transect, we spotted every species of lemur found in Sainte Luce and a total of twenty-five individuals. Whilst recovering from the newly-introduced nocturnal research lifestyle, the volunteers collected and planted seeds from the forest and introduced their environmental education lemur-fossa tag game to the children of the Sainte Luce villages.

Eastern woolly lemur (*Avahi laniaer*)

Participatory environmental education in Sainte Luce

The lemur / fossa tag game for environmental education – Sainte Luce

July 2008 Lemur Venture team dancing with children from Matsandry village in Ifotaka during an environmental education session

FUTURE PLANS FOR LEMUR VENTURE

Whilst research plans are always destined to change in the field and therefore accurate schedules are impossible to produce in advance, the Lemur Venture team has many ideas for subsequent fieldwork.

Having now established ourselves as an up-and-running programme, we are able to focus on what we believe to be the most important needs within the field of primate conservation in Madagascar. Foremost, we wish to focus on creating an overall conservation programme and not purely a research programme since, to truly understand the relevance of research, it must be viewed in context. This means understanding lemur behaviour and ecology, studying the forest habitat and also the wider ecosystem and all species found within it, and, possibly most importantly, understanding the connection with human communities that live within or depend upon forest habitats. It is important to work with these people to achieve forest protection and regeneration both for the benefit of wildlife and the local human populations, who hold a very real stake in the survival of the forest environment. By considering all of these aspects, we believe our programme can be not only successful but also have a positive impact for the conservation of the areas in which we work.

Forest-dependent family from the village of Esohihy in Sainte Luce, living alongside forest fragment S12

Children from the village of Matsandry, the community of which depends upon the spiny forest for their survival

Having established a very good starting point in Ifotaka, the Lemur Venture team are keen to continue working in the spiny forest. Although we are building up a good knowledge of the Matsandry forest area, there are still many places to explore and much basic information to be established. In particular, we are keen to make a positive identification on the mouse lemurs and this would involve trapping for more detailed study and specimen collection for genetic analysis. The feeding behaviour study of the sifaka needs to be continued since we require data from all seasons of the year. In addition, we would like to habituate further groups, to make our feeding study more comprehensive. We would like to look in more detail at the distribution and abundance of all the lemur species found in this spiny forest habitat (i.e. Verreaux's sifaka [*Propithecus verreauxi*], ring-tailed lemurs [*Lemur catta*], white-footed sportive lemurs [*Lepilemur leucopus*], gray mouse lemurs [*Microcebus murinus*], and reddish-gray mouse lemurs [*Microcebus griseorufus*]) and the micro-habitats in which they exist. We would also like to establish comprehensive lists of all the wildlife we observe. Working with the local people is imperative to our programme and we would like to study the human communities further, extend our environmental education programme and work with the local forest management committees to help them achieve effective management of their forest lands.

In the littoral forests of Sainte Luce, the fragmentation study is well underway but further comparative study between fragments is still needed. Establishing the presence or absence of the primate species within each fragment would be a priority and, following that, ascertaining abundance. Also within the

research plan is to look in more detail at the damage caused by human use and where this human impact is most significant. It is believed that within the Sainte Luce villages, local people still hunt lemurs for food and it would be interesting to discover to what extent this information is true, by interviewing local people. An ethno-botanical survey in Sainte Luce would also allow us to further understand the need of the local people for certain plant species within the littoral forest.

Eastern woolly lemur (*Avahi laniger*) – Sainte Luce	Verreaux's sifaka sunbathing (*Propithecus verreauxi*) – Ifotaka	Infant reddish-gray mouse lemur (*Microcebus griseorufus*) parked in a tree – Ifotaka

Lemur Venture is in a position to collect comprehensive long-term data since our programme is on-going and involves the assistance of many volunteer researchers. This puts us in a special position of having many avenues of research open to us since we are not limited, particularly in terms of time-scale, by a lack of continuous funding. We currently have two very different and interesting sites in which we work and we intend to produce a solid and comprehensive base of data for each of these locations. The specific approach we take on any one team depends on which research priorities are most pressing to us at the time of field work or which are most suitable for the season. With such a need for conservation in Madagascar and so many unknowns still existing within the research field, the development of the Lemur Venture programme is one to watch with interest.

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