

AZAFADY CONSERVATION PROGRAMME

JULY-SEPTEMBER 2010 REPORT



July saw the beginning of a new research project for the ACP. The combining of the previous five modules into just two during this scheme has allowed for a more concise and streamlined research programme with both an ecological and a social focus.

The lemur and biodiversity module focuses fundamentally on research within the littoral forests of Saint Luce. The research for the next year will focus on the effects

of forest edges on the vulnerability of nocturnal and diurnal lemur and herpetofauna (reptiles and amphibians) species and gaining valuable knowledge on the *Dypsis saintelucei*.

The human dimension of the project focuses on environmental education, fuel efficient stove building and the Mpingo tree.

LEMUR AND BIODIVERSITY

This report briefly describes the activities and gives a preliminary analysis of the data collected on one scheme. Further analyses are required, using the programme 'DISTANCE', and spatial analysis, using either ArcGIS or Google Earth, to fully conclude the effects of edges on species within the forest fragment of Saint Luce. During this scheme, research focussed initially on S9, and then in the final weeks we made the initial preparations to begin work in S8. The analyses focus on the forest fragment S9.

significant amount of data collection, however, this is an initial summary of the research.

Within two months the diurnal studies for the density and distribution of lemurs in S9 were complete. There is a need to continue collected density and distribution data on nocturnal species within the S9 fragment as well as starting the behavioural data collection. This is a brief account of the results for Southern Woolly, *Avahi meridionalis*, and Brown-collared, *Eulemar collaris*, lemurs.

Lemur Research Objectives:

1. To establish the density and distribution of the diurnal and nocturnal lemurs in the Saint Luce forest fragments.
2. To investigate the influence of edge effects on lemur density and distribution in Saint Luce forest fragments.

S9 is the largest of all the littoral Saint Luce forest fragments. There are various estimations of the area of the littoral fragment S9 being reported by the mining biodiversity team for Rio Tinto varying from 457ha¹ Norscia (2008), which is a 2004 estimate, to 268 ha¹ (Ganzhorn *et al*, 2008), which is a 2000 estimate. Whether there has been this amount of deforestation and a reduction of the forest is currently unknown by the authors.

Diurnal transects were walked through the dense littoral forests searching for individuals and groups of lemurs. Once spotted, volunteers were involved in collecting data on the lemur population and the surrounding habitat. The objectives are long-term and require a



Results:

Fifty transects were walked over 56 days, with 60% success rate at spotting lemurs. 58% of the transects were walked in the morning (n=29) with the remainder in the afternoon. Overall, 127 lemurs were recorded, with almost equal numbers of both collared-brown and southern-woolly lemurs (Table 1). Both species, the Brown-collared lemur and the Southern woolly lemur, have restricted distributions, found only in the south-eastern regions of Madagascar (IUCN, 2010). It is interesting that equal numbers of both lemurs were sighted, though care needs to be taken not to take this as similar densities. Estimations made using simple calculations are unlikely to get accurate densities as they fall for many of the issues highlighted by Plumptre (2000) and Fowster *et al* (2005), and hence further detailed analysis using DISTANCE and taking account of the shortcomings is required to confirm the species densities. Density estimates from the literature vary, with 2004 estimates between 0.4 - 4.2/ha⁻¹ in the intact section of S9 for *Avahi meridionalis*, and

2000 estimates of 0.17 – 1.28/ha⁻¹ for *Eulemur collaris* (Ganzhorn *et al*, 2008).

Transects were chosen daily using a random number table, however, it should be noted that transect 1 was chosen 44% of the time, transect 2 16%, transect 3 18% and transect 4 22% of the time. This bias is due to the initial random number table ranging from 1-10 as the number of transects to be set up was unknown and consequently some numbers were generated more frequently. This was changed during the second half of the scheme and a specific 1-4 random table was generated, reducing this bias further.

Subsequently, it is unsurprising that the majority of lemurs were sighted from transect 1 with transect 4 having only one sighting over the whole period (Table 1). 94% of the lemurs were seen resting, at an average distance of 7.25m from the transect, with 28% spotted 'huddled together', and 22% of the le-



murs in the same tree – not on the same branch but above one another. Lemurs were seen inhabiting areas where 91% of the trees had a DBH (diameter at breast height) of less than 5cm, though the DBH of the trees they were found residing in was substantially larger, averaging at 16.2cm (Table 1). Half of the lemurs observed were under at least a quarter canopy cover with the greatest proportion of lemurs recorded under half canopy cover. Half of the habitat plots recorded directly under the lemurs had the presence of stumps, with 2 stumps per plots as the average. Though the size of these were not recorded, it is an additional piece of data that should in future be collected to add further knowledge to the selection of habitat areas by the lemurs.

Table 1: The preliminary analysis from the lemur transects in S9

	Collared Brown Lemur	Southern Woolly Lemur	Average
Total number lemurs sighted	63	64	127*
% of lemurs on Transect 1	62	66	63
% of lemurs on Transect 2	1	14	9
% of lemurs on Transect 3	32	20	26
% of lemurs on Transect 4	5	0	2
% of males	53	unknown	n/a
% of females	47	unknown	n/a
Distance spotted from transect (m)	8.9	6.2	7.25
Height above ground focal lemur was spotted (m)	15.1	8.5	9
Diameter of tree where focal lemur was sitting (cm)	19.7	13.8	16.2
% habitat plot under lemur <4.9cm	56	90	91
% lemurs found with canopy ½ or less cover	93	70	78

*not an average, is the total number of lemurs



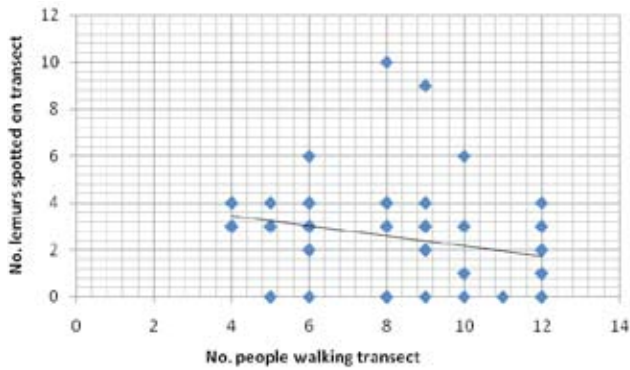
Table 2: Average number of lemurs (no. lemurs seen/no. times on transect) seen on each transect in S9

	Length of Transect (m)	Av. no. Collared Brown Lemur sighted	Av. no. Southern Woolly Lemur sighted
T1	975	4.3	1.6
T2	800	0.2	1.8
T3	950	3.3	2.2
T4	525	0.3	0

Table 1, although only descriptive, shows some clear distinctive differences between the two lemur species;

a larger data set over time will provide more accurate accounts of the changes in species. But, initially, the data shows that Collared-brown lemurs were spotted a lot higher up in trees than Southern woollys. The larger bodied Collared-brown were found in larger trees than the Southern woolly, and with a proportion of larger trees in their surrounding habitat (Table 1).

Graph 1: Number of people walking transect and the number of lemurs spotted



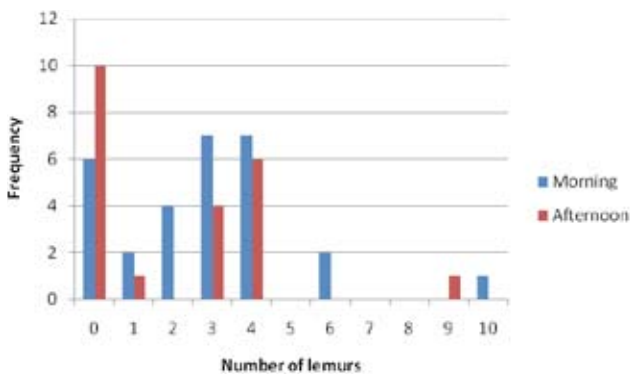
There are two ways of looking at Graph 1. Firstly, from the wildlife disturbance perspective, where a doubling of the number of people walking the transects (volunteers, local staff, Azafady staff) could be said to have had a slight disturbance, possibly scaring lemurs from a group away, as fewer were seen. However, S9 has been heavily researched for years, and so in this case it is unlikely and speculative, as there are many factors that would need to be investigated – for instance the time of day and weather conditions – before it could be validated. It is, however, a consideration for the more remote forest fragments.

Secondly, with more people, there is the theory that this would increase the chances of spotting more lemurs. The transects were walked silently, however only on one occasion was a lemur spotted by a volunteer, the remainder of the time they were seen by the local guide and/or Azafady guides who lead at the front.

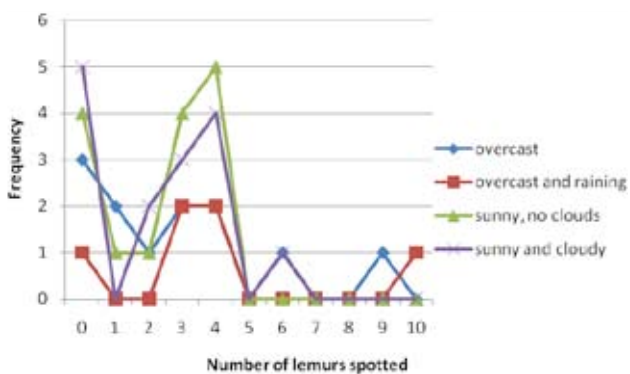




Graph 2: Frequency of lemurs spotted at different times



Graph 3: Frequency of lemurs spotted depending on weather

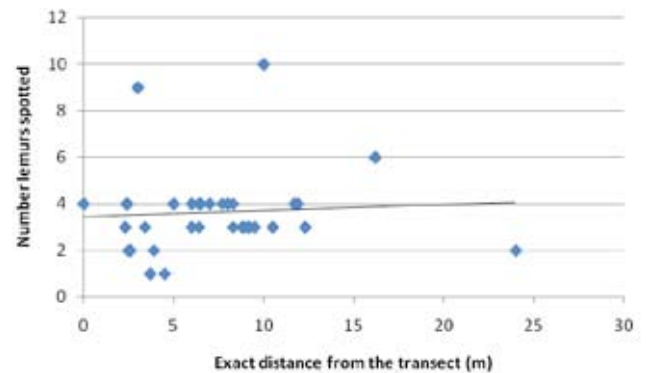


The majority of lemurs were spotted during the morning transects with a higher percentage of afternoon sessions resulting in no sightings (Graph 2). On one occasion, nine lemurs were spotted on transect three, and on another occasion ten lemurs were sighted. On transect one these were split between afternoon and morning session respectively. Graph 3 shows that more lemurs were spotted when transects were

walked during sunny weather. Unfortunately no data is available on the daily temperature – but is worth future consideration.

Surprisingly there was little difference in the number of lemurs spotted and the distance at which they were seen from the transect, between 0-12m (Graph 4). As would be expected, the number of accounts of lemurs being seen decreased as distance from the transect increased (Graph 4).

Graph 4: Distance lemurs were spotted from transects



Ganzhorn *et al*, 2008, states that the larger species, *Eulemur collaris* and *Avahi meridionalis*, showed strong, negative population responses (population decline, reduced group size) in degraded habitats, and eventually disappeared from smaller fragments. It has been noted that the *Eulemur collaris* could be more at threat to degradation within S9 due to its frugivorous natures and larger body size. However *Avahi meridionalis* require a smaller home-range (estimated as 2-3ha⁻¹ in Saint Luce) and are thought to be more tolerant of forest edges (Norscia, 2008).

Biodiversity Research Objectives

1. To establish the density and distribution of diurnal and nocturnal reptiles and amphibians in Saint Luce forest fragments.
2. To investigate the influence of edge effects on the reptile and amphibian populations in Saint Luce forest fragments.

The herpetofauna within the littoral forests of Sainte Luce is highly exceptional and very diverse. The aim of our research is to update the current species lists of the herpetofauna occurring within the fragments of Sainte Luce, assess the role edge effects play in influencing the distribution of species and determine the effects fragment size has on the herpetofauna within them.

Biodiversity work involves ‘sweeping’ the forest floor, searching for herpetofauna (reptile and amphibian species) both diurnally and nocturnally, as well as seeking out species inhabiting palms, logs and leaf litter. Additional transects searching for arboreal species inhabiting higher ground in trees are required.

Results:

Over the ten week scheme, 32 herpetofauna sweeps were conducted, accounting for 53 hours of searching for ground-dwelling species. 84% of those were in S9, with the remaining ones starting the research in S8. Of the sweeps in S9, 45% took place in the morning, 28% in the afternoon and 27% at dusk, in the evening (Table 3). The results will focus on the completed data set from S9.

Table 3: Herpetofauna transect research effort for S9

	RESEARCH EFFORT (mins)	% RESEARCH EFFORT
MORNING	1445	45
AFTERNOON	909	28
EVENING	870	27
TOTAL	3224	100

Graph 5: The number of individuals identified found in S9 sweeps



Table 4: Total number of individual amphibian and reptiles found in each transect in S9

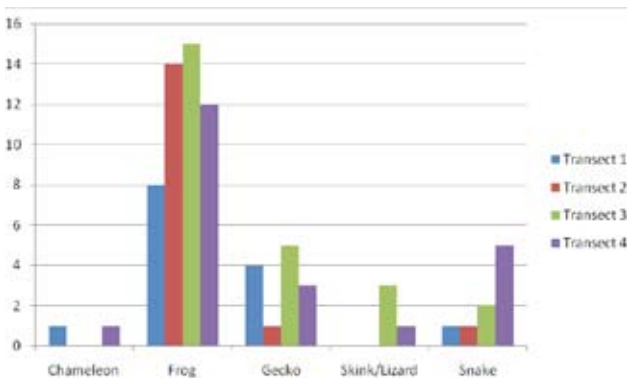
	Cha-meleon	Frog	Gecko	Snake	Skink/Lizard	Total
Transect 1	9	49	10	2	0	70
Transect 2	0	52	1	1	0	54
Transect 3	0	79	44	4	3	130
Transect 4	3	57	24	1	1	86
Total	12	237	79	8	4	340

The majority of the thirty-six species identified were frogs (70%), with one chameleon, five gecko species, three snakes, two skinks and one plated lizard (Graph 5 and Appendix 1). 25% of the frog species found were not identified as being distributed in the Saint Luce region according to Glore and Vences (2006) (Appendix 1) and therefore require more detailed research.





Graph 6: Number of different species found on each transect in S9



Transect 3 not only had the greatest diversity of species, with 38% of the total number of amphibians and reptiles found (Graph 6 and Appendix 1), but also the greatest abundance of all groups, with the exception of chameleons (Table 4). 33% of all frogs, 56% of all geckos and 50% of the snakes were found in transect 3 (Table 4). Only transect 4 had a representation of each of the amphibians and reptile groups (Table 4 and Graph 6).

Gephyromantis leucocephalus was the dominant frog species (27%) found, with *Phelsuma lineata* dominating the gecko species most commonly found (Appendix 1). Geckos and snakes were found across all transects, with chameleons and lizards only occasionally spotted. This is a brief descriptive analysis; much more detailed analysis will identify correlations with habitat characteristics and the addition of detailed knowledge of individual species will further clarify the results of this initial survey. Further analysis looking at the number of

species present in the sweeps conducted at the forest edges versus the edges would reveal the diversity of species and abundances across varying degradation.

The sweeps focus on ground-dwelling amphibians and reptiles and although occasionally chameleons were found, all nine individuals belong to the same species, *Brookesia nasus*, which are known to inhabit areas close to the forest floor. The majority of geckos were spotted within *Pandanus* plants, however most gecko species are arboreal, hence the lack of true representation. A more comprehensive study including arboreal surveys combined with pitfall traps (for tenerecs, snakes etc.) would ensure a more representative proportion of the different taxonomic groups. However, within the limits of this conservation zone, pitfall traps are not an option, but an arboreal survey will be conducted in the following schemes to assess the diversity of arboreal species present in S9.

Habitat Data Collection

How does the vegetation change across the forest fragments of Saint Luce, with particular reference to vulnerability to degradation?

In conjunction with the lemur and biodiversity research, habitat data is collected to assess the extent of human disturbance across the forest fragments.

Currently, data collection is not complete for S9 so no preliminary analysis has been done on the habitat data. What is necessary is to tie in the habitat data with the lemur and herpetofauna results to identify any correlations between habitat characteristics and lemur and biodiversity presence or absence, and more specifically with density and distribution, using GIS analysis.

COMMUNITY CONSERVATION

Environmental Education

During the ten week scheme, volunteers re-assessed the education programme. During the first month, volunteers, the majority of whom were trained teachers, created a lesson plan template, scheme of work and a resource materials list. Ten lessons were conducted during the ten weeks, for over two hundred children. Initially the numbers in the classes were high, with 127 children attending the first lesson. However, this soon decreased to an average of seventeen children per class. It should be noted that initially girls attended the lessons, which were more practical and involved trips to the forest. However, the latter lessons were made up solely of boys. We saw the same children repeatedly come back to the lessons.

The lessons were planned within the Azafady Conservation Program schedule, however we only spread the word through Ambandrika village on the morning of the lesson. It was still summer holidays at the time so children were often close-by and around at the time. Two age-groups were decided upon: 5-8 year olds and 9-15 year olds. This ensured that the lessons were aimed at specific target age groups and would not be too easy for some or too difficult for others. The lessons had a fixed structure, enabling the children to become accustomed to how lessons would be taught. This was a simple format including an ice-breaker game, a story (read, then acted out by volunteers or the pupils), the lesson, an activity relating to the lesson and then ending with a game. With a set lesson plan, the children know what to expect when they attend an ACP lesson. Previous lessons have included forest lay-



ers, food webs and connectivity through ecosystems and included a trip into the forest for each age group.

The scheme of work was established after a brain storming session with volunteers over the main themes of work we decided were important for the children to learn about, relating specifically to the environment and Madagascar (not just Saint Luce). These themes were then divided up into lesson plans, providing details of what the children should know at the end of the lesson, with some suggested activities for future volunteers. This set up was particularly important to maintain a continuum of learning for the children. It was already apparent that the same children were returning to the lessons. This is not to say that new children would not be able to understand the lesson if they attended on



occasions, just that it is intended to add to previous knowledge learnt.

Detailed knowledge is needed on the numbers and sex of the children attending lessons. In addition, it is worth noting that the older age group were not as engaged in the lessons as we would have hoped as the level was, at the time, too easy. The school science books for this age group were found and provided a better indication of their level of knowledge, in order to better set the lesson standard. The only other thing that was discussed briefly with the team was the potential of having a few of the students make up a student body to help with the lesson planning.

An initial meeting with the parental association brought up an interest in trying again with the school garden. Lomba quoted a cost for the work which would make a 5m² school garden where Mpingo, and a compost along with root vegetables would be grown. Lessons relating to both have been incorporated into the scheme of work. This needs to be followed up with a meeting including the Chef de Cartier to ensure that the materials are not stolen again, although necessary precautions have been made (initially made with eucalyptus now planning to use raffia).

Two volunteers – Rebecca Weissman and Jennifer Darby – are working through their respective schools and colleges to raise money for the education aspects of the ACP. Rebecca spoke with the current temporary teacher, Dimby, regarding assisting with a school library on the school premises. Since returning home her school is happy to support her fundraising. Jenny is also keen on supporting the project with the help of her 'A'-Animal Science class.

Fuel Efficient Stoves

In conjunction with Stephanie, the Peace Corp volunteer, there were four main fuel efficient stove sessions. We built 8 in total in Ambandrika village, which were stoves that had been requested by locals to Stephanie. They were built in outhouses or where people had separate kitchens so as to minimise smoke inhalation, but they did not include a chimney. It is worth noting that they were not, to our knowledge, referenced using a GPS, nor does ACP have any paperwork on the community members involved. One point that was raised was that since stoves have been built in Ambandrika a number of times, some of the participants preferred to build their stoves themselves (namely Kolasi). This raised a valid point, namely that maybe these could be run in collaboration with a community liaison officer who has personal experience in working with building and using these stoves.



Volyhazo

No pot-packing activities were undertaken by any ACP volunteers during this scheme. However, volunteers were involved in the planting of *Dyopsis saintelucei* in S17. Initially 247 individuals were planted in accordance with the row system set up by Lala.

More importantly however, the volunteers investigated the health and status of wild individuals in S8, mapping both current and historical plants using Sosoni's local knowledge. These individuals were referenced using GPS's, and their basic status of alive or dead was noted along with their height and any obvious life history information – budding or flowering. More detail is required on this as currently knowledge on the life history of the species is extremely limited.

Our recommendations would include monthly spot checks on all plants, to record their status and changes in their life history, with intensive studies of any plants that are flowering and fruiting, to record the wildlife species that utilise the species. We also recommend a further investigation into the occurrence of sapling plants close to the 'mother' plant, dying when seed dispersal is minimal.

References

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Appendix 1: Number of each herpetofauna species found on each transect in S9

(c)=chameleon, (f)=frog, (g)=gecko, (l)=lizard, (s)=snake and (sk)=skink

Species in red are not thought to be found in Saint Luce, according to Glore and Vences (2006).

Species Genus	T 1	T 2	T 3	T 4	Total
<i>Aglyptotactylus sp. aff. Madagascariensis</i> "south" (f)	0	2	16	2	20
<i>Acrantophis dumerili</i> (s)	0	0	1	0	1
<i>Blommestia blommersea</i> (f)	0	16	7	2	25
<i>Blommestia kely</i> (f)	3	0	0	0	3
<i>Brookesia nasus</i> (c)	9	0	0	3	12
<i>Boophus opishodon</i> (f)	0	2	1	0	3
<i>Blommestia wittei</i> (f)	0	2	0	0	2
<i>Boophis spp.</i> (f)	0	1	1	0	2
<i>Ebenavia inunguis</i> (g)	3	0	1	4	8
<i>Gephyromantis sp. aff. blanci</i> "Andohahela" (f)	0	1	6	1	8
<i>Gephyromantis leucocephalus</i> (f)	23	4	15	23	65
<i>Gephyromantis plicifer</i> (f)	2	0	0	1	3
<i>Gephyromantis spp.</i> (f)	0	0	1	0	1
<i>Guibemantis liber</i> (f)	3	2	0	1	6
<i>Guibemantis punctatus</i> (f)	0	1	0	1	2
<i>Guibemantis sp. aff. Bicalcaratus</i> (f)	14	0	10	11	35
<i>Heterixalus bottgeri</i> (f)	1	10	0	1	12
<i>Lygodactylus miops</i> (g)	2	0	1	0	3
<i>Mantydactylus betsileanus</i> (f)	0	6	13	11	30
<i>Madagascincus melanopleura</i> (f)	0	0	2	0	2
<i>Mantydactylus colubrinus</i> (s)	1	1	3	1	6
<i>Mantydactylus femoralis</i> (f)	0	2	2	1	5

<i>Mantydactylus majori</i> (f)	0	0	1	0	1
<i>Mantydactylus tricinctus</i> (f)	0	2	2	0	4
<i>Mantydactylus spp.</i> (f)	0	0	0	1	1
<i>Phelsuma lineata</i> (g)	0	1	28	14	43
<i>Phelsuma quadriocellata</i> (g)	4	0	12	5	21
<i>Phelsuma spp.</i> (g)	1	0	2	0	3
<i>Plethodontohyla bipunctata</i> (f)	2	1	1	0	4
<i>Rombophryne alluaudi</i> (f)	1	0	0	0	1
<i>Stenophis arctifasciatus</i> (s)	1	0	0	0	1
<i>Stumpffia tetradactyla</i> (f)	0	0	1	1	2
<i>Trachylepis elegans</i> (sk)	0	0	1	0	1
<i>Trachylepis gravenhorstii</i> (sk)	0	0	1	1	2
<i>Zonosaurus aenus</i> (l)	0	0	1	0	1

Identifications were supported using Glore and Vences (2006) and with unsure individuals photos were presented to biodiversity specialists at QMM

