

SAVA Conservation

News from the <u>Sambava-Andapa-V</u>ohemar-<u>A</u>ntalaha region of northeastern Madagascar

SPECIAL POINTS OF INTEREST:

- Director
 Training in
 Environmental
 Education
- Duke Alumni Madagascar Tour
- Reforestation in Antanetiambo

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The SAVA Conservation Initiative Moves into Its Second Year

Hard to believe that the DLC-SC initiative is now officially just over a year old! Never had I dreamed that we would be able to move so far so quickly. Thanks to their experience and contacts in the region, Erik and Lanto have been able to get project activities off to a rapid start. Below is a very brief encapsulation of where we stand today.

The **teacher training program** in environmental education has already moved through the first two stages, and is now poised for the final teacher trainings. Numerous structured **school**

group visits into Marojejy NP have been sponsored by DLC-SC. Project-overseen **construction of a school and footbridge** on the remote west side of Marojejy is two-thirds finished. Our support of **reforestation** through a collaboration with Belgian NGO Graine de Vie has already put thousands of trees in the ground, with tens of thousands of seedlings still in tree nurseries. The first **village fish ponds** are being dug/built as we move to support fish

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Photo by David Haring

farming activities, and a large demonstration pond is up and running. We are presently going through final tweaks of a **bushmeat poster** that will be distributed throughout the SAVA region in the coming months.

Project-sponsored **English classes** have enabled locals in the Marojejy area to take advantage of the growing tourism opportunities at the Park. **Review classes** for admission to secondary school contributed to the success of 20 of 26 students gaining admission into secondary school ("middle school"). Collaboration with **Madagascar National Parks** has increased their ability to effectively protect Marojejy, through project-funded activities such as improved park **boundary demarcation**, and support for a **village guard program**. Through **research missions** and long-term monitoring of the silky sifaka, we have learned more about the natural forests and wildlife of the region. Through our support of **Antanetiambo Nature Reserve**, we expand our influence into the Andapa region while contributing towards reforestation, ecotourism and agricultural initiatives at this model reserve founded by a local Marojejy guide, Mr. Desiré Rabary. Collaboration with the **Center for Renewable Energy (CER)**, a small association in Sambava, has included trainings for rocket stove and green charcoal construction which could reduce local dependence on fuel wood.

In a step that will increase our profile in the region, a building has been rented in Sambava which will serve as our **base of operations**, with both office and living space (for visiting collaborators). And lastly, we are already serving as a **platform for Duke researchers and**

The SAVA Conservation Initiative Moves into Its Second Year Continued

students, whose work also benefits DLC-SC conservation objectives. Whew! And oh yes, we now have a **newsletter** such that we can keep our supporters current on project activities.

That might seem like an overly ambitious list of activities for a first-year conservation project, and I must admit that there are times in which we wonder about that ourselves (with only a total staff of two in Madagascar!). However, it is difficult to overemphasize the urgency of the environmental situation in Madagascar, and in particular the unique SAVA region. The Marojejy and Anjanaharibe-Sud landscape together protect more than 800 km² of mountainous rainforest! We are not expecting to achieve conservation miracles, but our presence in the region is very definitely having an impact. It is important that we move without delay.

Director Training in Environmental Education

By Charlie Welch

L'APPLICATION DE



GUIDE PRATIQUE DU MAITRE

DANS L'ENSEIGNEMENT PRIMAIRE

The DLC-SC teacher training program in environmental education continues to move forward with trainings of school directors over the Easter holidays in April (2012), and in September, at the end of the summer vacation. Now all 325 directors of schools in the Sambava and Andapa school districts have been trained in use of the 64-page Teacher's Training Manual ("Guide Pratique du Maitre"). Once again we owe a great thanks to the Madagascar Fauna Group (MFG) environmental education training team of Mr. André, Mr. Gimod and Mr. Modeste for carrying out the director trainings. The week-long September trainings were held in Sambava, Andapa and Mandena simultaneously.

The next step in the program is the primary objective of the trainings, the actual training of the teachers. The directors will be tasked to execute the teacher trainings, but with assistance from the more experienced MFG trainers.

next stage will take more time

take more time cover to all schools, as there are 2,500+ teachers in the two school districts combined! We are presently seeking funding to carry out this daunting but essential last step in the process.

This



School directors in a training breakout session

Photo by Lanto Andrianandrasana

New School and Footbridge Almost Completed!

By Dr. Erik Patel

DLC-SC is facilitating the construction of a new threeclassroom primary school and 40-meter footbridge in the remote village o f Antsahaberaoka, which is near the western boundary of Marojejy National Park (see article in Vol. 1, Issue 1 of the SAVA Conservation newsletter). The project was funded and initiated by Seacology, an environmental organization based in Berkeley, California. As in other Seacology projects, the goal was to engage this island community living adjacent to a threatened high biodiversity habitat in win-win а conservation exchange. In this



Primary school being built in Antsahaberaoka

Photo by Tonkasina Jacques Harson "Jackson'

case, the village signed a locally enforced contract ("dina") agreeing to 30 years of renewed protection for a region of Marojejy National Park which contains an unusually high density of silky sifakas, and where lemur hunting and other forms of habitat disturbance had previously been a problem. It is indeed gratifying to see that the community has made substantial progress towards the completion of the school and footbridge. Due to the remote location of Antsahaberaoka, this has been no small undertaking as all construction materials must be carried manually for nearly two days to reach the village. Fortunately, park rangers concur with our team that habitat disturbance of all kinds has considerably diminished in the Marojejy forests adjacent to this village since the project began.



Foot-bridge foundation in Antsahaberaoka Photo by Tonkasina Jacques Harson "Jackson"



Photo by Tonkasina Jacques Harson "Jackson"

Duke Alumni Travel Tour of Madagascar Visit to Marojejy

By Charlie Welch



Duke Alumni observing wildlife

Photo by David Haring



Marojejy National Park entrance sign Photo by Megan Elwing



Bungalows at Camp Mantella in Marojejy NP Photo by Megan Elwing In October 2012 I had the pleasure to lead a tour of Madagascar for Duke Alumni Travel. The tour participants included DLC-SC friends and supporters Dr. David Howell and Dr. Sara Miller (their second trip to Madagascar), DLC volunteer Megan Elwing and DLC photographer David Haring. The tour took us to national parks and other sites of interest around eastern and northern Madagascar, and included a tour extension to the SAVA region and Marojejy National Park. We were fortunate to have Erik join us and share his experience in an area that he is intimately familiar with.

The visit to Marojejy was the most challenging, though extremely rewarding, part of the entire tour. After making arrangements with porters and paying entry fees, we left the park office on the main road and, after a short drive on a dirt road, walked the next four hours to what is known as Camp Mantella (named after a diurnal frog genus commonly found nearby) or Camp #1. This was also my first visit to Marojejy, and I was very taken with the beauty of the primary rainforest once we were well into the park. Enormous majestic trees towered above us along the trail, as we crossed numerous small rocky streams of shimmering clear water. As the trail took us through a bamboo thicket, we encountered bamboo lemurs (Hapalemur occidentalis) at very close range. An exciting first lemur sighting!

At Camp Mantella we stayed in the quite-civilized bungalows made of tarps spread on wooden frames. We were spoiled by a capable camp cook that made sure we were never hungry. The walking was tough, but roughing it – well not so much! The next day we continued our walk through the national park forest on a more difficult trail that sometimes required using a trail side rope to pull up the steep slopes. After two hours of hard walking we arrived at Camp Marojejia (named after a genus of palm unique to the region) or Camp #2. If you ever imagined an idyllic tropical forest location, this is absolutely it! The bungalows and common dining area sit along (and directly above!) a beautiful tumbling mountain stream, with a stunning view of the vertical rock faces of Mount

Duke Alumni Travel Tour of Madagascar Visit to Marojejy Continued

Ambatotsondrana (which means "leaning rock" in Malagasy) across the valley. If such a place were in a US national park, there would be a paved road right up to it, with constant hordes of visitors! We all felt awed and privileged to simply be there.

All of the following day was reserved for observing the rare silky sifakas (*Propithecus candidus*), and we were not disappointed! After an hour of difficult forest bushwhacking on near-vertical forested slopes, our guides led us to Erik's main study group of silky sifakas. What amazing and gorgeous animals they are – so big and robust with a thick pelage of white fur. And jumping so effortlessly through the mountainous forest. As the group is quite habituated now, we were able to stay with the silkies for hours, watching them feed and the infants play. I have spent many years in Madagascar, but this was one of the most special moments I have ever experienced – just remarkable.

The following day we were back on the trail again for the return hike. We took it slowly on the long walk back, which took most of the day. Our uncanny good luck with the weather continued, with no rain to speak of (an unusual occurrence at Marojejy, especially over multiple days!) Along the way, before crossing the park boundary, we were lucky enough to find the spectacular helmet vanga (*Euryceros prevostii*) which has a huge arched blue bill. It was sitting on its nest, which was nestled into the central growing point of a tree fern. We also saw a few white -fronted brown lemurs (*Eulemur albifrons*). But no matter what else we saw, there just really was no comparison to our up-close-and-personal experience with the elegant silky sifakas.



Ambatotsondrona ("leaning rock") at Camp Marojejia

Photo by Megan Elwing



Kitchen and dining area at Camp Marojejia in Marojejy NP Photo by Megan Elwing



Silky sifaka near Camp Marojejia

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The CLP or "Village Guard" Program By Dr. Erik Patel



Lanto distributing DLC-SC raincoats to village guards Photo courtesy of Lanto Andrianandrasana

You may remember in the last newsletter issue an article about DLC-SC supporting the emplacement of new boundary signs along the edge of Marojejy National Park. These new signs are part of an important collaboration between DLC-SC and Madagascar National Parks (MNP) and may soon be expanded to include actual concrete "bournes" or official boundary markers. It is not enough to work on our own towards conservation objectives in the SAVA region - it is critical that we do what we can to cooperate with and enable the Malagasy government in its effort to protect and manage the protected areas of the region. To that end, we have been working with MNP to support a "village guard" or CLP program, which enlists locals that live in villages along the periphery of Marojejy. A first step for the program is equipping the new guards for outdoor work in the We have recently rainforests of the Marojejy massif. transported to Madagascar the last of more than 70 very sturdy American-made raincoats. We have many kind colleagues traveling to Madagascar to thank for the raincoat transport, as well as the participants in the recent Duke Alumni tour of Madagascar! Otherwise we would have been obliged to spend a fortune on shipping the raincoats. Thankfully, Erik has been able to purchase rubber boots for the village guards in Madagascar, thus avoiding complicated transport issues.



Village guards in Andratamarina wearing DLC raincoats and boots

Photo by Lanto Andrianandrasana

New Forest Monitoring Transects Created in Marojejy NP

By Dr. Erik Patel

In addition to providing the village guards with needed gear, we have also created nine new monitoring transects (a technical term for a research trail) in remote regions in the park (see map at right). The transects will be used by park rangers, village guards and researchers to conduct more systematic forest and lemur surveys. The transects, each of which are between 1.5km and 2km long, were made along existing footpaths using marked tree flags every 25 meters without any cutting. Like many parks, the small tourist zone of (central-eastern) Marojejy is the most closely monitored and well preserved. We hope to increase the activity of village guards, rangers and researchers around the park since monitoring presence can, like tourism, discourage habitat disturbance.



DLC-SC to Open Office in Sambava

By Charlie Welch

As mentioned earlier in this newsletter issue, DLC-SC has come far in its first year, and now encompasses a wide array of ongoing conservation activities, from fish farming to reforestation to teacher trainings in environmental education. Erik has overseen the project from his Sambava residence, but we have grown to the point that there is now need for an in-town office. Although we had not expected to find just the right place so quickly, Erik has been able to locate the perfect space, of which we are now the proud renters!

The space has a good central and secure location in Sambava, and is the upstairs of an extremely solid building that houses a business in the downstairs. In addition to a large room that can serve as an office, the space includes a large kitchen, toilet facilities and three bedrooms, one of which will be converted to project equipment storage. So in

addition to serving as an office, we will now be able to host visiting collaborators.

The new DLC-SC office will give both Erik and Lanto a place in which to work, to hold meetings and host visiting professors and other collaborators, as well as carry out a variety of projectrelated tasks. Importantly, the new space will go far to raise our visibility in the community. Tune in to future newsletters to see the office once it is furnished and operational!



New DLC-SC office in Sambava (on the second floor)

Photo by Dr. Erik Patel

History and Language Contest Winners Earn Educational Trip to Marojejy National Park

By Mickael Achard, Director of Alliance Française in Sambava

The Alliance Française of Sambava recently hosted its annual "Questions for a Champion" contest. Since 1995, this Malagasy association has organized the festive event to



DLC-SC supports Alliance Française visit to Marojejy NP Photo by Mickael Achard

foster dialogue between schools and encourage the study of the French history and language. The 2012 contest was specially organized for junior high students in their 7th and 8th year of school. In December, the semifinal brought together eight middle schools represented by teams of three students. For the final, four middle schools faced off in the first round of these duels, earning the winners a trip to discover Marojejy National Park during an educational eco-tour organized and financed by Duke Lemur Center's SAVA Conservation Project.

Three contest winners and 10 young volunteers from the Alliance Française raised their awareness of environmental issues over three days in Marojejy Park. Located 60km from Sambava and listed as a UNESCO World Heritage Site, Marojejy is home to 11 species of

lemurs, 125 species of birds and even 300 species of ferns. Better still, its primeval rainforests contain many species of plants and animals that exist nowhere else.



Our 13 young ecologists were surprised to find one of the rarest mammal species in the world: the silky sifaka. There are less than a few thousand of these large white lemurs left. They are critically endangered and live in groups of two to nine individuals on territories stretching between 45 to 60 hectares. Protecting them is essential if we want them to survive. Convinced by these findings, the volunteers decided to take

action and will in turn educate their peers on these environmental topics. The Alliance Française of Sambava will devote a special issue of its newsletter to these topics.



Alliance Française students studying in Marojejy NP Photo by Mickael Achard

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Reforestation in Antanetiambo Nature Reserve: Planting 10,000 Trees

By Nicholas Reed-Krase

United States Peace Corps Volunteer, Third Year Extension, Environment Sector

About 7km outside of the city of Andapa in northeastern Madagascar lies a beautiful, private rainforest reserve called Antanetiambo (on the high mountain). Not the normal landowner, the owner of Antanetiambo, Mr. Desiré Rabary, bought the land with the intention of establishing a new protected area. He has been purchasing land at every

opportunity, and in the last two years has considerably increased the size to its current 25 Unfortunately, acres. newly acquired land is seldom ideal forest. Often, people agree to sell their land after they have practiced slashagriculture and-burn (for rice or cassava) on the hillsides leading to partially deforested areas riddled with invasive species and very few trees. The goal of my US Peace Corps Third Year Extension Project, funded by the nonprofit organization SIM-PONA, was to undertake



Community members planting seeds in an Antanetiambo tree nursery Photo

Photo by Nicholas Reed-Krase

a large scale reforestation program in Antanetiambo as well as remove many invasive species such as wild ginger or lingoza (*Aframomum angustifolium*), velatra (*Clidemia hirta*) and bracken ground fern (*Pteridium aquilinum*).

Sustainability was the heart of this reforestation program which was designed to engage, teach and empower local communities to plant trees without huge dependence on outside funding. Aside from planting trees and restoring the reserve, what we are really trying to accomplish is to improve the livelihoods of the Malagasy people and transfer skills so that one day all of our projects will be self-sustaining. Towards this end, salaries are not paid for people working in the tree nurseries or even to plant the seedlings. However, participants do benefit by receiving 40% of the seedlings (to plant or sell), the tools (shovels, machetes, baskets, watering cans, sifters and wheel barrows) to continue the work and the knowledge of how to plant efficiently and successfully in the future.

When I first considered this project design, some had their doubts; but so far we have produced over 10,000 seedlings between three nurseries. Of the 10,000 seedlings, over 8,000 have been produced by no more than 20 people in two different nurseries. We've also worked with 293 students from 10 different local middle schools and high schools to produce 2,500 seedlings as well as teach a little bit of English. I have emphasized to local residents that if we only plant one or two varieties of trees, it's good, but it's not a forest. For that reason, our three nurseries contain

For the future,

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Antanetiambo. In Belaoka, we hope to teach the local people the basics of working in a tree nursery as well as offset some of the pressure for illegal logging in Antanetiambo. As for the three nurseries that are al-

lage

ready

diligently,

we hope to continue our three nurseries as well as create a fourth nursery located in Belaoka, a vil-

Reforestation in Antanetiambo Nature Reserve: Planting 10,000 Trees Continued

over 20 species of trees. We've planted fast-growing trees such as acacia, mandrorofo, and hinstina; hardwoods such as palissandre and ebony; fruit trees such as sapoty, corosol, rotro, jack fruit and mango; medicinal trees such as uapaka, hinstinkintsana and foraha; as well as endemics like haramy and raffia.



New seedlings soon to be planted in Antanetiambo

Photo by Nicholas Reed-Krase

hope that they take a little bit more responsibility in the following year and together we will create a business plan for them to sell trees as an added source of income and rely less on outside funding. It is gratifying and very encouraging that everyone seems to enjoy the work. None of the adults complain about the time they spend each week in the nursery and the students were all fascinated to learn how to plant seeds. By far, the most rewarding aspect is seeing the smiles on their faces when the seeds grow and become healthy seedlings. I can only hope that they keep planting trees and keep smiling in the future.

Antanetiambo Nature Reserve Grows in Size!

By Dr. Erik Patel

Exceptional Marojejy Guide Mr. Desiré Rabary has considerably expanded the size of the nature reserve he founded called Antanetiambo ("on the high hill"), which was described in the reforestation article. Since he won the "Seacology

Prize" in 2010, an international environmental prize which included a cash award of \$10,000 USD, he has been buying land to increase the size of his reserve (see film: <u>http://</u> <u>www.youtube.com/</u> <u>watch?v=gu33LgqWIA8</u>).

In the past two years has impressively he negotiated several large land purchases increasing the size of the main reserve (now about 25 acres) by about 40% and obtaining several satellite parcels of rainforest along the east side of Marojejy National Park. The Duke Lemur Center SAVA Conservation project is supporting his work in a variety of ways, such as by paying the salary of the reserve guardian, creating a dozen new boundary demarcation signs and financing some of the reforestation activities taking place this year. In the future, we hope to assist him in obtaining formal legal land title for his reserve. Desiré still lives in the same small traditional hut where he has lived for many years, preferring to spend his award money on buying land to protect it and not on himself. His passion conservation is a for shining example to his countrymen.



Antanetiambo Reserve founder Mr. Desiré Rabary

Photo by Daniella Herzog



Antanetiambo Reserve is an island of rainforest in a sea of rice fields

Photo by Rachel Kramer

Territorial Scent Marking in Wild Silky Sifakas

By Erik R. Patel, Ph.D., DLC Post-Doctoral Project Director, SAVA Conservation

It was recognized early on in lemur research that amongst primates "prosimians stand out for the wealth and variety of their olfactory communication" (Jolly 1966, p.132). At least 11 different skin glands have been identified which may be used in prosimian chemical communication in addition to bodily excretions (urine and feces) as well as bodily fluids like saliva (Schilling 1979). Other relevant physical adaptations include large olfactory bulbs (in the brain), presence of a vomero-nasal organ, a large interior nasal region, and a wet nose or moist rhinarium (Fleagle 1999).



Adult male silky sifaka with chest staining resulting from chest scent marking.

Photo by Kevin Schafer

Virtually all prosimians engage in scent marking behaviors in which particular glands are rubbed against substrates (like tree trunks), directly against conspecifics ("allomarking"), or where bodily excrements (urine, feces, saliva) are deposited in particular ways at particular locations. Well studied examples include throat or chest marking of tree trunks by male sifakas (Mertl 1979; Lewis 2005; Powzyk 2002), "stink-fighting" in male ring-tailed lemurs who anoint their tails with shoulder and wrist gland secretions, and then waft their odiferous tails at male opponents (Jolly 1966; Mertl 1979), and urine-trail marking seen in all lorisine primates and many nocturnal lemurs (aye aye, dwarf lemurs, mouse lemurs, giant mouse lemurs) in which a trail of urine is laid by dragging the genitalia along a substrate while releasing a small stream of urine. Across lemur species, the most common type is anogenital scent marking which is found in all diurnal and cathemeral species and many nocturnals (Colguhoun 2011; Epple 1986).

Numerous functions of lemur scent marking have been identified including genetic relatedness and genetic quality (Charpentier et al. 2010), estrus advertisement (Kappeler 1988, Scordato et al. 2007), dominance or status signaling (Kappeler 1990), natal status (Pochron et al. 2005), individual identity (Scordato et al. 2007) and territoriality or resource defense (Mertl 1979, Mertl-Millhollen 2006; Irwin et al. 2004). The territorial resource defense function of scent marking may be one of the earliest proposed functions, but for some

lemurs like eastern sifakas, very little is known. Eastern sifakas are considered territorial animals but direct evidence for that is not readily available.

Western sifakas, such as Verreaux's sifaka, are known to selectively scent mark the periphery of their territory and mark at high rates during intergroup encounters (Mertl 1979). However eastern sifakas have much larger home range sizes (10 to 20 times larger depending on species/site) and far fewer intergroup encounters which can influence the extent of perimeter marking. Recent work in several tamarin species (new world monkeys) has both challenged the territorial function of scent marking and offered various methodological improvements such as controlling for ranging as well as size differences between home range perimeter and core areas (Heymann 2000; Ferrer et al 2011).

Territorial Scent Marking in Wild Silky Sifakas Continued

Moreover, recent improvements in GPS technology offer more precise mapping of the spatial location of scent marks in rain forest habitats.

For those reasons, I conducted a 5 ½ month study of silky sifaka scent marking between July 13 and December 25 2012. The study was conducted in Marojejy National Park with our main silky sifaka study group at Camp 2 which at

the time was composed of six individuals: one adult male (LV), two adult females (AF,BP), one subadult male (MB), one juvenile male (WM), and one infant female (MS). Methods followed recent related research in tamarins (Ferrer et al 2011). Two hour focal animal sampling sessions were conducted all day on a single randomly chosen individual. Data books were not used. Rather, all data was coded directly into powerful handheld GPS units (Garmin GPSMAP 62s) and immediately geo-referenced as waypoints. Location points were taken instantaneously every 10 minutes in addition to points collected for all scent mark types by the focal, the presence or absence of accompanying urine, and the start/end of each focal session. GPS error was generally between 5m and 10m which is quite good considering the mountainous rainforest habitat. This group of silky sifakas exhibits a greater elevational range (700m asl to 1100m asl) within their home range than any other Propithecus group in Madagascar! All points with more than 15m of error were excluded from spatial analyses.

Because we have been studying this well habituated group since 2001, a tremendous amount of data was collected efficiently by myself and two research assistants. In total, 1549 scent marks were recorded during 1390 focal hours. More than 8000 range points were collected as well. The number of scent marks recorded in this study and the number of focal hours exceeds that of most primate scent marking studies. The majority of all marks were deposited by the adult male, specifically: 52.4% by adult male LV, 14.9% by sudadult MB, 12.5% by adult female AF, 9.2% by adult female BP, 8.7% by juvenile male WM, and 2.3% by infant female MS. Urine accompanied 58% of all scent marks. As expected, males were found to scent mark in three major



erange (46 ha) between July 13 and December 25 2012. Top: 318 scent marks by two adult females. Bottom: 725 scent marks by one adult male.

ways (chest marking, genital marking and combined chest-genital marking which is immediately preceded by barkbiting) while females exclusively genital marked and never engaged in bark-biting. For the adult male, combined chest -genital marking accounted for 40.1% of his scent marks, followed by genital marks at 35.3% and chest marks at 24.6%. Diademed sifaka males also mark most using combined chest-genital marking preceded by bark-biting (Irwin 2006). The mean focal scent mark rate for adult silky sifakas in this study was 1.64 marks per hour. The mean adult male mark rate (3.6 marks/hr.) was more than 5 times higher than the adult females (.7 marks/hr.). Silky sifaka mark rates are therefore much higher than Milne-edwards' sifakas (males: .57 marks/hr. and females: .27 marks/hr.) but still lower than Verreaux's sifakas (males: 6.9 marks/hr. and females: 4.2 marks/hr.) (Mertl 1979; Pochron et al. 2005).

The main goal of this study was to test the territorial function of silky sifaka scent marking. To fulfill such a function, silky sifaka scent marks should be selectively deposited along the periphery of their home range. To test this question, a variety of spatial analyses were conducted using the ExpertGPS and Garmin Basecamp software packages as well as Google Earth to confirm certain points. First, the 100% minimum convex polygon (MCP) home range was determined (as 46 hectares) using all range and scent mark GPS points. Secondly, a 25m x 25m grid was overlaid on the home range and territory "periphery" and "core" cells were determined. All territory periphery cells were within three cells or 75m of the 100% MCP line. Finally, the number of scent marks and range points per cell was counted. Following Heymann (2000), expected values of scent marking in core and periphery cells were calculated based upon the size of these zones and the intensity of use based upon the number of instantaneous range points collected. It was important to control for both area and intensity of space use since 34.6% of the home range area was included in the periphery but only 24.6% of range points occurred in the periphery. The *G* test with Yates' correction was used to compare observed and expected distributions.

Territorial Scent Marking in Wild Silky Sifakas Continued



Gouge marks on tree trunks from bark-biting by silky sifakas (top) in Marojejy NP and male Milne-Edwards' sifakas (bottom) in lalatsara Reserve. Barkbiting is a male-only behavior that immediately precedes chest scent marking (on the gouged spot). Bark is almost never consumed.

Results showed that the spatial pattern of the adult males' and adult females' scent marks (considered separately) did deviate from expected distributions based upon intensity of use (Male: G=57.6, p<.0001; Female: G=12.5, p<.0001) but not area (Male: G=1.5, p>.05; Female: G=3.4, p>.05). The territorial function of silky sifaka scent marks has therefore been supported to some extent. 36.8% of the adult males' marks and 31.0% of the adult females' marks occurred in the territory periphery but only 24.6% of range points occurred in the periphery. The effect is statistically significant although the pattern only moderate as silky sifakas frequently scent mark the core of their territory (see Figure); indeed they seem to mark everywhere they go. Further analyses will be conducted to determine if the extent of perimeter marking varies with male scent mark type.

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DUKE CONNECTIONS

Hosting new Duke Professor Charlie Nunn in Madagascar

Our project recently hosted Professor Charlie Nunn during his exploratory research mission in northeastern Madagascar. Dr. Nunn is moving to Duke from Harvard University, where he is currently an Associate Professor of Human Evolutionary Biology. At Duke, he will hold a joint position in the Department of Evolutionary Anthropology and the Duke Global Health Institute.

What are some of your research interests and how do they relate to Madagascar?

I am interested in the ecological and behavioral factors that influence the spread of infectious disease in wildlife. Recently, I have focused on how infectious agents move among different species in an ecological community, and how the composition of a community influences disease risks, including risks to humans. This is of growing interest for diseases like Lyme disease in the northeastern US, but it is rarely investigated in tropical locations undergoing major land-use change. Clearly there is a need for such studies



in places like Madagascar, and the region near Marojejy is particularly well-suited for such investigations.

What are some examples of how biodiversity can act as an ecosystem service to reduce disease risks to humans and threatened wildlife?

Different species respond differently to infectious disease risks. Some host species in a community very effectively amplify a disease – meaning that the parasite replicates effectively in that host – other species act as dead-ends for disease spread, perhaps because they effectively avoid the vector or launch a more effective immune system. If we lose those dead-end or diluting hosts, then the risk of disease will increase for the community as a whole. It is important to note, however, that this "dilution effect hypothesis" requires more testing to assess how robust and general it is across host-parasite systems.

You've traveled to Madagascar several times before, but this was your first trip to Marojejy National Park in the northeast. How does this park and this region stand out in your mind?

I was absolutely blown away by the forest in Marojejy. It is a real gem in many ways. First, large tracts of primary forest remain – there is less disturbance than I've seen in other locations. Second, the altitudinal range creates many types of forest types. We hiked through gorgeous bamboo forests – enjoying of course sighting of bamboo lemurs – and also old growth primary forest of various kinds, along with more open areas. Finally, it was great fun hiking on the trails – a real workout in places, more so than most any other forest I've visited! For me, that is a positive.

What are your thoughts on the new Duke Lemur Center SAVA Conservation Project?

I was very excited to hear about the project when I was originally recruited to Duke, and even more excited after seeing the forest and the region. There is wonderful infrastructure falling into place for conducting research, and excellent possibilities for involving students in research. The area also has many opportunities for development and global health projects, including some obvious student projects. All in all, the Duke Lemur Center SAVA Project was a major draw in my consideration of Duke! I also plan to be doing work at the Lemur Center, which was another big attraction of Duke.

Closing Comments

Thanks for taking the time to learn more about our DLC SAVA Conservation project on the occasion of our one year anniversary. Please do check out our next issue which will have news of a new antibushmeat poster, and an update on the village fish farms.

The activities that you have read about here would not be possible without the commitment of our loyal project supporters. We are sincerely grateful to all of you. If you have only now discovered about our on-the-ground conservation efforts in Madagascar, and are interested in becoming a supporter, please go to the following link and designate your donation to SAVA Conservation: <u>http://lemur.duke.edu/tours-gifts/donate-to-the-duke-lemur-center/</u>



Avahi family

Photo by David Haring

Lastly, a heartfelt thanks to volunteer Patricia Massard who skillfully assembles our SAVA Conservation newsletters each trimester. We would be lost without her!

