

SPECIAL POINTS OF INTEREST:

- Cyclone Enawo
- Is *Paratilapia* Sustainable?
- Celia's Corner

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Duke **LEMUR CENTER**
SAVA CONSERVATION
M a d a g a s c a r

OCTOBER 2017

Vol. 6, No. 1

Conservation news from the Sambava-Andapa-Vohemar-Antalaha region of NE Madagascar

Building Relationships and Bringing Support After Cyclone Enawo

by Marina Blanco

The immediate aftermath of category 4 tropical cyclone Enawo, which passed the SAVA region in early March of this year, was clearly devastating. Electricity poles, trunks and branches, pieces of corrugated metal were all entangled in massive piles of debris. The town of Sambava, where the DLC-SAVA office is located, suffered significant damage but, as we witnessed in the following days, the destruction was significantly worse in other nearby towns, especially in rural villages.

It took only a few days for the skeletons of damaged houses to get “dressed” with new shiny corrugated metal, fresh planks or a mix of recycled materials. Bamboo walls and Ravinala palm roofs took a bit longer to get replaced in the countryside, however, as leaves and stems had to be cut and dried for a few days. During this post-cyclone period, families reorganized themselves and helped each other to make certain everybody had a shelter. Public spaces, churches, schools, clinics, remained unrepaired, as help from the government and other organizations was needed, and time investment by the local community was devoted to personal needs.

The DLC-SAVA Conservation team based in Sambava reported on the passing of Enawo back in March, and an online fundraiser was quickly organized back in Durham, NC to receive donations. Since then, we have received generous support to assist in relief efforts and we are now reporting on the use of those funds.

Chronology of the relief

April-May

Due to the DLC-SAVA Conservation interest in environmental education, we decided to focus our help on seriously damaged schools. We had to wait several weeks until reports were filed reporting the damage, and a few more weeks until the government and/or other organizations indicated whether or not they would provide assistance. For our visits, two communes with which we have long term collaborations were selected: Maroambihy



School in the village of Mandena after cyclone Enawo

Cyclone Enawo Continued

commune (including the villages of Mandena, Manantenina which are on the way to the entrance of Marojejy National Park) where DLC-SAVA and Duke students have been conducting a variety of research projects, and Marovato commune (close to the town of Andapa, including villages that are close to non-tourist areas of Marojejy National Park) where we have been supporting fish farming efforts.



Mandena village school with repairs almost finished

After examining the official reports, we selected the most affected schools in each commune and visited them with the Chief ZAP (local school district director) to discuss the primary needs with teachers and school directors. With the budget at hand and the detailed needs per school, we came up with the plan to support 4 schools in the Maroambihy commune and 3 schools in the Marovato commune. After discussing with the respective Chief ZAPs, we wrote a letter of agreement to be signed by the DLC-SAVA and each school, detailing the list of materials and the commitment by the local student parent's association to invest time and efforts to fix the schools with donated materials. Before delivering materials, we gathered school teachers and directors to

explain where the funds came from and our specific efforts for each school.

June-July

At this point we thought most of the work was done, and that it was going to be quick to proceed with the plan of delivering materials. Well, we had to face some additional challenges: 1) several materials, including cement, were not available in the local stores in Sambava, due to labor strikes; 2) school desks had to be built to order and it took several weeks for local carpenters to actually make them, in part due to lack of planks; 3) had to find proper transportation as some of the schools were off the main road and dirt paths were inaccessible during rainy periods.

In the end, the timing seemed to have worked in our favor. Schools are on holiday break until early September, allowing for extra time needed for the construction or repairs. We have checked the progress in some of the schools, and feel confident that schools will be fixed by the time the new school period starts.

DLC-SAVA is pleased to contribute support for repairs, but it was difficult to make decisions, as help is needed in so many places. We couldn't reach some of the more remote schools that were completely destroyed by the cyclone because they were far from the main road. We heard of serious damage in several high schools from the same communes (we focused on the EPP, primary schools, for our efforts). In the near future, we would consider broadening the assistance plan to include additional schools reached by our environmental education program, especially providing desks, which are in dire need and



Students helping to move in the new desks supplied by DLC-

unavailable in the countryside.

Cyclone Enawo Continued

Summary of expenses

Commune	School	Materials	Costs (Ariary)	Estimated US\$ 1 US\$=~3100Ar
Maroambihy	Manantenina	<i>18 corrugated metal</i>	432,000	139
		<i>18 supporting poles</i>	468,000	151
		<i>5 school desks</i>	650,000	210
		<i>6 kg nails</i>	48,000	15
Maroambihy	Mandena	<i>140 corrugated metal</i>	3,360,000	1,084
		<i>80 supporting poles</i>	2,080,000	671
		<i>40 bags of cement</i>	1,280,000	413
		<i>15kg nails</i>	120,000	39
Maroambihy	Andranomifotitra	<i>12 school desks</i>	1,560,000	503
Maroambihy	Amboangibe	<i>12 school desks</i>	1,560,000	503
Marovato	Antsambalahy	<i>20 corrugated metal</i>	480,000	155
		<i>9 supporting poles</i>	234,000	75
		<i>10 school desks</i>	1,300,000	419
		<i>6kg nails</i>	48,000	15
Marovato	Matsobe	<i>16 corrugated metal</i>	384,000	124
		<i>20 school desks</i>	2,600,000	839
		<i>4 kg nails</i>	32,000	10
Marovato	Belaoka Marovato	<i>80 corrugated metal</i>	1,920,000	620
		<i>6 supporting poles</i>	156,000	50
		<i>25 school desks</i>	3,250,000	1,048
		<i>15 kg nails</i>	120,000	39
Subtotal			22,082,000	7122

Expenses	Costs (Ariary)	Estimated US\$
Materials--schools	22,082,000Ar	7122
Transportation (Maroambihy)	600,000Ar	193
	1,200,000Ar	387
Transportation (Marovato)	1,500,000Ar	484
	1,500,000Ar	484
Waxing desks, porters	500,000Ar	161
Total	27,382,000Ar	8,833



The school at Ambohimanarina with a (mostly) new roof

A Tale of Two Feces

by Lydia Greene

Feces is not always the most palatable topic to discuss around the dinner table, but for lemur researchers, it's often unavoidable. Take, for example, a recent mission to Marojejy National Park conducted by myself and DLC-SAVA project coordinator, Marina Blanco. We went to Marojejy together to collect feces for two different projects, and often found ourselves at the end of a long day, consuming vast quantities of rice and beans, discussing the various lemurs we had seen defecate that day. Ah, field work.

As a PhD student in Duke's Ecology Program, I was on the hunt for fecal samples for my dissertation research on the gut microbiomes of various leaf and fruit-eating lemurs. My research centers around trying to understand the relationship between the multitude of bacteria that inhabit lemur guts and the feeding strategy, geographic location, and evolutionary history of the lemur - that is, are the bacteria in a lemur's gut more reflective of what they eat, where they live, or who they are. It's been a longtime goal of mine to sample the silky sifakas, white-fronted brown and red-bellied lemurs of Marojejy.



DLC-SAVA project coordinator Marina Blanco wondering how a lemur could have passed such a large seed intact!



Seeds of various forest fruits eaten by Marojejy lemurs

Marina's project also centered around the poop of white-fronted brown and red-bellied lemurs, more easily referred to as the *Eulemur*. *Eulemur* are fruit eaters and play a major role in seed dispersal in Marojejy. The idea is that these lemurs swallow whole seeds, soften the seeds' outer layer with intestinal juices, and pass them intact in their feces, where equipped with their own fertilizer, they germinate well. We often think of the ruffed lemurs as being the biggest seed dispersers in Madagascar: Their body size being bigger, they can theoretically poop out bigger seeds. But, there aren't any ruffed lemurs in Marojejy, and so the task falls on the *Eulemur*. Marina's objective was therefore to find *Eulemur* groups, wait for them to poop, identify the seeds in the poop, collect fruit from corresponding trees, and germinate the seeds.

A Tale of Two Feces Continued

We based our team at Camp 2, and our first day was spent getting ourselves there. Camp 2 is a good 6.1km from the park entrance and another 2.7km from where cars can drop you off. You also hike upwards about 800m. Fresh air, clean water, and the sounds of the forest surrounded us as Marina and I pitched our tent. Soon, stars emerged and mouse lemurs bounced around the trees behind us.

To help us both, we hired a crackerjack team of guides. First there is Dezykely, an experienced Marojejy guide who knows the lemurs, but also how to keep me from falling down (don't worry mom, I'm fine). Then there is January, named for his birth month, who is an expert silky tracker. He once spent a year and a half in Marojejy and knows every inch of the park. And lastly we had Yokono, a fresher guide whose enthusiasm and excellent English made up for his youth. These guys seem to swim through the forest with ease on really difficult 'trails'. I would generously describe my hiking style as somewhat less graceful.

Take for example, the day I went with Dezy and January to find some silky sifakas. We were off the tourist trail, travelling along the guide trails. I think trail is a strong word here, as mostly what I saw were opportunistic roots to grab onto, a few slippery rocks to shuffle along, several trees that looked good on paper, but were really hosts for leech infestations, and several holes masquerading as solid ground. I quickly learned the Malagasy word for 'fall' (lavo) and also the term for sliding on your butt to avoid falling (techniqué vody). This particular mission was successful and I scored samples from 3 adult silky sifakas living together, 2 females carrying infants and the group's dominant male.

Over 10 days of alternate sunshine and monsoon, our team hiked up and down, front to back, and side to side looking for our lemurs and their poop. The lemurs of Marojejy are habituated to people, but carry no tracking devices. We rely completely on our guides to find them based on their instinct and experience. I ultimately collected samples from 9 silky sifakas, 9 red-bellied lemurs, and 14 white-fronted brown lemurs, and Marina identified 9 different types of intact seeds pooped out by her lemurs.

The most impressive part? The sheer size of some of the seeds. One seed, whose mother tree is known as fagnonahona, is literally the size of a quail's egg, but more oblong. Marina saw a red-bellied lemur poop out three of them in a row. Giant yellow bullets raining down from the canopy. If she hadn't seen it, I never would have believed it. Currently, some of these lemur "fe-seeds" are germinating in a small tree nursery at the DLC-SAVA office: We now have proof that red-bellied lemurs act as seed dispersers of this giant seed.

Overall, we had a fantastic time in Marojejy. I love the thrill of hiking for hours to finally find the animals and of waiting for hours to finally get samples. And then I love the calm of ending each exhausting day wrapped in a warm fleece, drinking tea with the team, and discussing lemur poop.



A female white fronted brown lemur (*Eulemur albifrons*) about to make a fecal contribution



A happy lemur researcher (Lydia Greene) and her samples

150th Anniversary of USA/Madagascar Relationships

by Marina Blanco

About 150 years ago, a commercial agent sent by the President of the United States, was appointed to the city of Tamatave, on the eastern coast of Madagascar. Mr. Finkelmeier was there to check the potential for a commercial treaty between the USA and the Queen of Madagascar. Recognizing the abundance of natural resources and willingness for cooperation, a treaty of peace, friendship, and commerce was arranged in 1867. It is that very landmark that triggered the celebrations for the 150th Anniversary of the diplomatic relationships between USA and Madagascar earlier this year. The two-day event, hosted by the City Hall in the capital of Antananarivo, was meant to bring together big and small organizations, funded by the US Embassy or USAID, on a range of activities such as health, education, and conservation.



Lanto and Marina preparing the DLC-SAVA Conservation booth

Our DLC-SAVA team was invited to the event, honoring previous connections with the US Embassy. We were eager to participate to 1) renew our discussions about exchange programs and grants offered by the Embassy that can help our capacity building program in the SAVA region and 2) bring visibility of our program to potential collaborators and others of the interested Malagasy public. In fact, our DLC-SAVA Conservation Initiative table drew a lot of attention from colleagues of other projects, teachers, and students who came by the dozens to ask about our project and objectives.

Lanto and I had to overcome initial intimidation of being surrounded by long-standing, large-scale organizations such as Missouri Botanical Garden, World Wildlife Foundation,



Lanto explaining to event visitors about DLC-SAVA community-based activities.

The Institute for the Conservation of Tropical Environments, Centre ValBio, Ranomafana, and Madagascar Biodiversity Center. We took turns talking about our program and vision, stating the importance of the Duke Lemur Center-SAVA in Sambava, but also highlighting the important role of the DLC in the US, to bring awareness of conservation and environmental issues in Madagascar.

I can only begin to imagine what Madagascar looked like 150 years ago, after reading reports and detailed documentations of naturalists and travelers fascinated by the immensity of forest and uniqueness of the flora and fauna, including the charismatic lemurs. Yet, romantic images get quickly erased by poignant thoughts of the likely future, 150 years from now, stained by threats of inexorable loss. We stand here today, big and small, with the chance to act, inserted in the invisible network that

connects people with similar concerns, motivations, goals and yes, resources and financial means.

Is *Paratilapia* Sustainable in Natural Habitats?

by Marina Blanco and Tsilavina Ravelomanana

Madagascar's SAVA region is especially important in terms of conservation. Though it undergoes high extractive pressures on natural resources, the region comprises vast extensions of natural forests with different categories of protection. Like the diversity of SAVA landscapes, conservation efforts to implement sustainable practices must be equally multifaceted in the SAVA region. One such DLC-SAVA effort includes providing alternatives to bushmeat through the establishment of fish ponds that provide sources of meat (fish), coupled with long term sustainability. Fish ponds have been eagerly implemented in several regions of Madagascar, and are usually managed by local associations, who undertake pond construction and maintenance, as well as care of the young fish. Although fish farming provides desirable fresh fish to local communities, the downside is that harvests are extremely seasonal, rendering mature fish only a couple of times per year. Ideally, the repopulation of local endemic fish in natural streams (along with the establishment of measures to avoid overfishing), would provide more continuous and sustainable food supply for the human population.

DLC-SAVA Conservation has been fortunate to partner with a local expert in the field, Mr. Guy Tam Hyock, who has successfully raised a variety of native endemic fish in the Andapa region. His association, APPA (Association des Producteurs Privées d'Alevins) has been instrumental in not only the implementation and monitoring of dozens fish ponds in the SAVA region, but also in providing training and technical support to local communities.



A *Paratilapia*, known locally as 'fony'

Among the most popular fish to raise is the "fony" (*Paratilapia*), an endemic species that grows well under artificial settings. Fony is also desirable for its taste and size. Once thought to be on the verge of extinction, fony can still be found in some local streams, though rarely. DLC-SAVA has supported the creation of 10 fish ponds in several communes around Marojejy National Park. In trying to set a long term goal for sustainable fishing, it was agreed with the local communities that a portion of the harvested fish were to be released into natural streams, with the hopes that over time, fony would increase in number and "repopulate" these habitats.

Since the inception of the fish-farming project, multiple releases have occurred. However, there has been little monitoring of these habitats to date, to determine whether fony have been able to recolonize these habitats. For this purpose, we brought back Tsilavina and Fetra, expert biologists from the University of Antananarivo, who came to SAVA in 2015, to conduct biological surveys in several streams (see SAVA newsletter, Volume IV, Issue 1, 2015). In addition to surveying release sites, Tsilavina and Fetra's project goals included identifying new potentially viable locations to release young fish.



Fetra and Tsilavina seining to survey fish populations

Is *Paratilapia* Sustainable? Continued

Results from their report outlined below, though positive in some regards, also highlight the complexity of maintaining sustainable fish populations in the face of anthropogenic perturbations. In total they surveyed 16 sites, 5 of which were in comparable locations as those in 2015. In summary they found that:

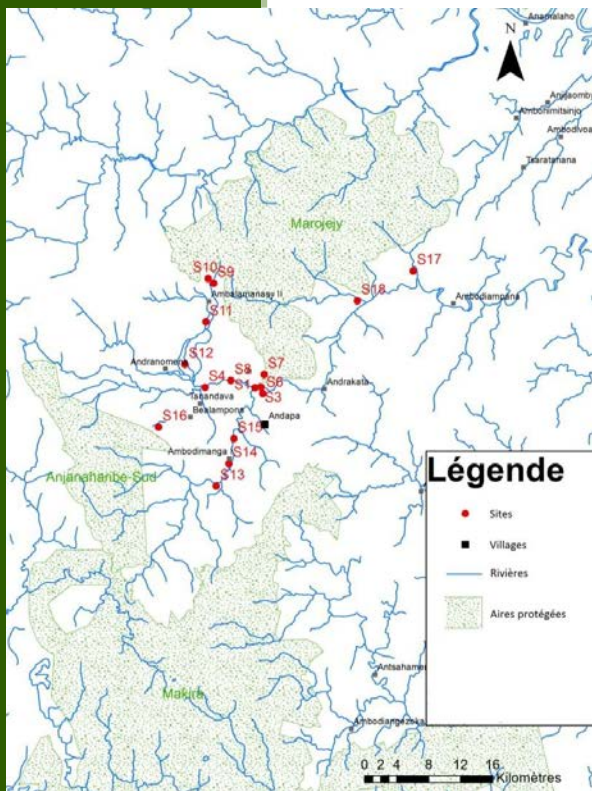


Members of a village association working on constructing a fish pond for fony

- Same surveyed sites showed comparable levels of biodiversity after the ~2-year period.
- As shown in their first report, there was a much greater proportion of exotic species relative to endemic species (~93% exotic) in all surveyed sites.
- No fony was recaptured in known release sites, meaning we cannot confirm restocking efforts have been successful.

Among the reasons to explain the absence of fony at release sites are those that already explain the absence of fony in the first place, namely 1) loss of natural habitat, 2) introduction of exotic species, and 3) overfishing. An unfortunate finding was the detection of insecticides in the water that poison the aquatic fauna. This may be a serious problem in the Andapa region, as there have been reports of hospitalized people intoxicated by consumption of poisoned eels. These chemicals, originally intended for agricultural practices, have the potential to accumulate in biological tissues and have a high destructive and indiscriminant capacity to decimate the aquatic fauna.

To end on a more positive note, Tsilavina and Fetra identified more suitable sites for future releases. Though location of upstream sites would be ideal, most of the suitable water sources originate in areas currently under protection (Marojejy National Park, Anjanaharibe Sud Reserve) where releases are not permitted. New sites were located between protected areas and the highly anthropogenically-disturbed Andapa basin. These locations provide appropriate conditions for fony (calm water) along with conditions that would make overfishing unlikely (isolation and depth of the body of water). DLC-SAVA will be working closely with Tsilavina and Guy to determine the next steps. Minimally, these steps will include surveys



Sites sampled

of natural streams under protection to determine fony populations naturally occurring in this region without the effect of human disturbance.

AnkomPalooza!

by Lydia Greene

For most school kids, the idea of coming to extra school on a Saturday morning seems like punishment. Sure, school can be fun and learning is great, but Saturdays are for sleeping in, relaxing with friends and family, and enjoying a break from academic rigor. In Madagascar, Saturdays are also a time for kids to help their parents out at home, in the fields, or with whatever chores need doing.

I was therefore a bit worried when we decided to host a lemur festival, AnkomPalooza, ('ankomba' means lemur in Malagasy) at the local primary school in Manantenina village on a Saturday morning. Would the students come? Would it be fun and educational? Would they learn something about lemurs?

But, let me back up a bit. Why AnkomPalooza in the first place? On the SAVA team, we firmly believe that early environmental education is critically important to developing a generation of Malagasy who will tackle current and future environmental problems. Although many adults in Madagascar care about, and are fearful for, the sustainability of resources and biodiversity, today's kids will be taking up the conservation mantle in just 10 years. We want to give them as much know-how, training, and enthusiasm as soon as possible. We have facilitated the environmental training of local teachers throughout the SAVA region for years, but now we want more. We want to get into the classrooms and work directly with teachers and students. AnkomPalooza was a test balloon.

On the day of our AnkomPalooza, I nervously expected maybe 20 kids to show up to see what the fuss was about. Those who could convince their parents to give them the day off, or those whose parents were interested to see what we wanted to teach them. What I wasn't prepared for was 100+ young and eager faces staring at us as the car rolled up. I immediately thought 'what have I gotten myself into?' How will I speak to these kids? I don't speak Malagasy!

But, it went off without a single hitch! The school's Director and teachers joined us for the day and carefully kept the kids engaged and in line. We began the day with a short lecture on lemurs, to see what kids already knew about them. We taught the kids that over 100+ species of lemur live in Madagascar, and only in Madagascar. We talked about types of lemurs and I learned a favorite new fact: In Malagasy, the term for 'bamboo lemur' roughly translates to 'belly-full-of-bamboo lemur' (or Bokombolo). I was shocked, however, to learn that only a handful of kids had ever seen a lemur. Manantenina lies within walking distance of Marojejy National Park and many of the village's inhabitants work as guides, cooks, and porters. Surely these kids have the opportunity to explore the awesome biodiversity that lives in their backyard? For Manantenina's youngest residents, Marojejy might as well be on Mars. The vast majority of these kids had never been into the forest.

After our short lecture, we ran a suite of activities, including art projects (draw or paint your favorite animals), screenings of the Lemurs of Madagascar IMAX film, boys and girls soccer games, a snack break, and at the very end, a lemur-fact competition. We quizzed kids on what we taught them earlier and what they could have picked up from the movie. We gave out notebooks, t-shirts, and art supplies as prizes for correct answers and for the best lemur drawings. The kids were super eager to participate, especially when they saw the prizes. Lanto asked 'how many types of lemur are there?' Nearly every hand shot up into the air and many voices screamed out 100. We ran out of prizes.

Exhausted and sweaty, Marina, Lanto, myself, and our dependable driver Feno, packed up our supplies, handed out the remaining snacks, and got ready to head home. We want to say an enormous thank you to the teachers and director, but it was them who gave us a heartfelt farewell. 'Thank you for choosing our school and for giving this event to



Hard at work

AnkomPalooza! Continued

our students.' As we got in the car, I saw the same eager 100+ faces waving goodbye and thanks. I spent the drive home in a state of considerably reduced anxiety.

Ultimately, I hope that we can repeat our AnkomPalooza at other schools in the region and brainstorm new ways of getting these students into the forest and face-to-face with their primate cousins. The kids, though shy at first, really seemed to have a good time. We heard 'gasps' when different lemurs leapt across the movie screen, and saw smiles when lemur drawings took the shape envisioned by the artist. At the end of the day, every student retained a few facts. Hopefully we injected a tiny bit of enthusiasm and interest in the forest and environment. There's still a lot of work to do.



In the class



Energy release time!

Celia's Corner

by Marina Blanco

Back in February 2016, “Celia” was one of the 6 dwarf lemurs captured in Tsihomanaomby, a subhumid site north of Sambava during our hibernation project. At the time, she looked young, estimated to be around a year old, no evidence of fat in her tail. She quickly became a “camp-hold” name: almost every night, invariably, she would find a trap to get a steady dose of banana. Cuteness turned into annoyance, as we were hoping to capture new individuals rather than provide non-forest food for a needy dwarf lemur. Because we fitted a collar on her, we were able to track her and find her sleeping sites. Later in the year, we returned to Tsihomanaomby, retrieved her from her hibernaculum and conducted a short study on hibernation (see “Brief but Meaningful”, Vol. V, issue 2, SAVA newsletter). At the time she shared her dreams with us...literally – we obtained good EEG records showing REM-like activity. A few days later, we rewarded her by letting her go back to the forest collarless.

In March this year, we went back to Tsihomanaomby for another capture season. To our surprise, we got “Celia” right away. At first, I refused to place another collar on her, but lack of captures and repeated trapping got her in trouble again. We placed another collar on her, and tracked her during the day to locate her sleeping sites. This time, however, things have changed: when we handled her to take measurements and fit the collar, she looked skinny, but couldn't hide obvious signs of motherhood. She showed 6 swollen nipples, 4 of them larger than the others, indicating ongoing lactation. Later nocturnal observations, while waiting close to her sleeping sites, confirmed that she was sharing, at times, tree holes with at least 3 other individuals, two of them clearly smaller than she was.

Once again we returned in July, ready for another hibernation study, and searched for Celia. Our team got ready for the retrieval operation. The signal from her collar came from a relatively small tree with a small hole covered by a couple of dry leaves (this gave away her location, as those leaves must have been placed intentionally). We expected a hibernating lemur, so arrangements had been made close to camp for her accommodations. Elie, our expert climber, got her out triumphantly from the hole, but right away he looked a bit puzzled. ‘Misy iray’! He said. There is one (after getting Celia)...meaning another dwarf lemur was sharing the tree hole. After he placed the second lemur in the bag he realized that again, ‘misy iray’! Another dwarf lemur was hiding in the crowded hibernaculum. We were exchanging surprised faces when Elie got yet another lemur from the tree hole, as we were all looking in disbelief. A total of 4 dwarf lemurs were hibernating, all together in the same tree hole.

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I should clarify: although this may not sound that crazy to most people, because “Celia” had shared tree holes with other individuals during the active season, I was not expecting communal hibernation at all. For



The entrance of the ‘Celia family’ tree cavity

Celia's Corner Continued

several years, I have tracked other, larger species of eastern dwarf lemurs that hibernate underground. Although they can share tree holes or nest-like structures during the active season, they always hibernate individually, with some individuals from the same “family unit” hibernating in close proximity, and others separated by long distances.



Difficult access to the tree cavity nest. Carefully passing hibernating dwarf lemurs down in a basket!

Even fat-tailed dwarf lemurs (*Cheirogaleus medius*, Celia’s “type”), that hibernate inside tree holes in Kirindy, a dry deciduous forest in western Madagascar, tend to do so individually. Dr. Dausmann, who has studied hibernation in fat-tailed dwarf lemurs extensively, reported some cases of communal hibernation in Kirindy, but she was not sure why they would do that. She showed that there were no energetic benefits of social hibernation. In fact, dwarf lemurs hibernating in large groups showed asynchrony in their arousal periods (when individuals produce heat to increase body temperature for a day or so) meaning that animals that were reheating were “disturbing” others in the process by increasing their metabolic rates. Most interestingly, however, was her observation that adult dwarf lemurs were never found hibernating with their young offspring from the most recent breeding season. As very young lemurs do not build significant fat reserves prior to hibernation, they must maximize energetic savings, which appears to be accomplished better by hibernating alone. Two of Celia’s “roommates” were individuals ‘Jonas’ and ‘Hansel’, young dwarf lemurs aged a few months old, based on dental observations and morphometric data. Although we cannot confirm yet they are Celia’s sons (future

genetic analyses are required!), this is highly likely. Given the fact that this is a single observation, we cannot speculate at large – we don’t even know if this is common practice in this forest. What we can say is that Tsihomanaomby is less “seasonal” than Kirindy based on temperature and rainfall data, suggesting a more flexible or “relaxed” hibernation schedule. In other words, energetic constraints may still be pressing in young dwarf lemurs, but not to the same degree. Social benefits here may outweigh energetic deficits.

More data are needed, and more animals will need to be studied, but, for now I praise “Celia” from whom I have learned a lot during our tenure. I am now looking forward to capturing her again in future expeditions.

Celia's Corner Continued



A fat-tailed dwarf lemur coming out of hibernation as evidenced by the tired face



The dwarf lemur team from left to right in the back: Elie (expert climber Andrahanjo), Landry (MBG guide), LagyJean (local cook/assistant), with Lydia and Marina in the front.

A New Member of the DLC-SAVA Team!

DLC-SAVA is pleased to announce the addition to the project team of Fusiane Razafindrainibe as Environmental Education Coordinator. Fusiane fills a critical newly created position, which will reduce the work burden on Lanto and Marina, and will allow us to expand and improve our environmental education activities and their impact in the SAVA region. Fusiane is from the SAVA region and has worked as an environmental technician for an emergency food security project, and as consultant for a recent population census. She has multiple diplomas from the 'Institut Supérieur en Sciences de l'Environnement et Gestion'.

In her own words "Since I was a child I have loved nature – the ocean, the forest, rivers, animals, and even flower gardens! My love of nature inspired me to follow advanced studies in the environment at the university. In my job with DLC-SAVA I hope to share my acquired environmental knowledge and experiences with everyone around me, with a primary objective of reaching students from primary school level to university. With a view to the degradation of the Madagascar landscape by uncontrolled deforestation, we envision to do all that we can to promote the "re-greening" of Madagascar!"



DUKE CONNECTIONS

Let's Get Cooking!

Researching the impacts of traditional cooking practices in the SAVA and a way forward

by Tommy Klug

The impacts of traditional biomass cooking in developing countries is becoming increasingly evident. The World Health Organization estimates that air pollution (particularly indoor air pollution) causes over 7 million premature deaths every year. Biomass cooking, such as with wood and charcoal, also places high demand on the environment, and is a global driver of deforestation. Madagascar is no exception.

This summer, I spent 10 weeks in the SAVA working with the DLC to conduct research on the impacts of traditional cooking and learn about what efforts are already underway to combat the issue. DukeEngage funded my summer as an extension of the work done by the Bass Connections team last summer.

I spent half of my time in Mandena (a small village outside Marojejy National Park) collaborating with the Bass team to study the effects of indoor air pollution on respiratory health. We enrolled about 23 individuals to wear a personal exposure backpack for 24 hours while another device recorded lung function and heart rate variability.

Personal exposure monitors measured particulate matter (2.5 microns), carbon monoxide, and carbon dioxide. These backpacks helped provide us a better idea of how much air pollution Malagasy cooks are exposed to on a daily basis. Additionally, we surveyed homes on their wood collection habits to give us an understanding of the stresses fuel collection places on the local environment.

For the second half of the summer, I lived in Sambava and tested stove models at the DLC office. I found these stoves for sale in the SAVA region towns of Sambava, Andapa, and Antalaha. Community cookstove competitions were held in Antalaha and Andapa with the help of the DLC-SAVA team. Competitors checked in their stoves and were given a standard amount of fuel. They were tasked with boiling 3L of water as quickly as possible, and then competitors had to cook two standard cups of rice (which was eaten afterwards!). All participants were awarded with certificates, pots, and spoons.

In addition to the competitions, cookstove maker surveys were conducted across the region to supplement the cookstove preference data that third year Peace Corps Volunteer and project collaborator Libby Davis will be collecting over the next year with the DLC. The work I completed this summer will come together in a cookstove catalogue for DLC-SAVA to use as a reference guide for their clean cooking initiative in the future. Once the data are analyzed, our hope is to identify a cookstove model that reduces toxic emissions and burns fuel more efficiently. This would create positive outcomes for both the Malagasy people and the environment.

Thank you to the DLC-SAVA team for working with me this summer and supporting this project!



Different stove models lined up for competition

Let's Get Cooking! Continued



A stove being tended by a competition participant



Tommy working hard to get a cook stove to boil water



Libby and Tommy with competition winners

2017 Duke Alumni Travel Tour Visits the SAVA!

by Charlie Welch

DLC first collaborated with Duke Alumni Travel for a Madagascar tour in 2007, and we have been doing the tours annually now since 2014. The tours have included travel to different regions of Madagascar, and a visit to the Madagascar Fauna and Flora Group conservation site of Ivoloina has always been on the itinerary. What has not been on the itinerary is a visit to the SAVA region and DLC-SAVA – that is, until this year! In the past we have not included the SAVA region on the tours, because of the difficulty of getting into protected areas such as Marojejy National Park, which requires a half day's walk just to access. However, the opportunity to meet the DLC-SAVA team and observe directly DLC-SAVA activities on the ground, coupled with the stunning landscape and scenery of the SAVA region, convinced us to give a SAVA visit a try. Despite enduring a high decibel, dusk to dawn night of Madagascar Independence Day revelry while in Andapa, our group of travelers did not seem disappointed with their SAVA excursion. In fact, the feedback was so positive that we have decided to offer the exact same itinerary for the 2018 Madagascar tour! I hope that you will think about joining us!

We owe many thanks to Duke Alumni Travel and especially to Director Beth Ray-Schroeder for support of continuing the Madagascar tour on an annual basis, and for allowing us to organize the tours in a way that not only maximizes the travelers' experience, but also exposes DLC conservation work in Madagascar. Thanks, Beth!



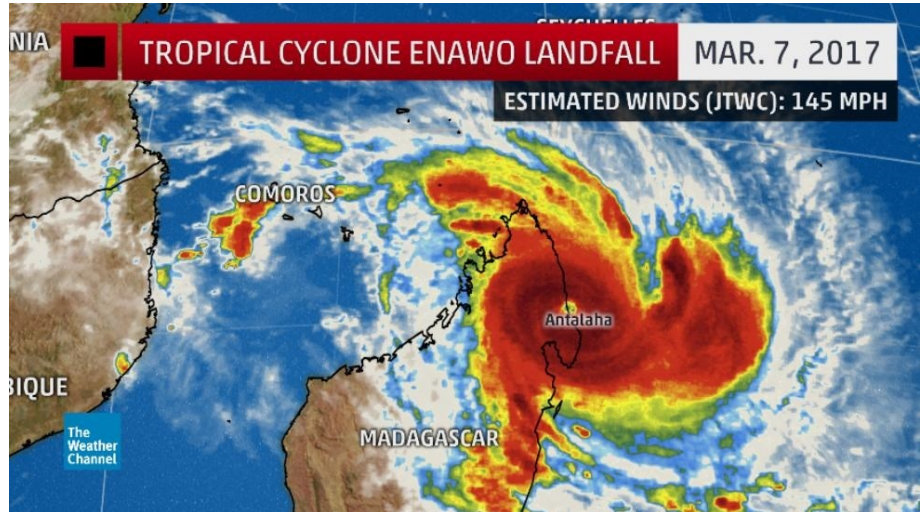
2017 Duke Alumni Travel Tour Continued



Photos by Rebecca Fabbro, Patrick Hamrick and Charlie Welch

Closing Comments

This year in the US and Caribbean we are enduring one of our worst hurricane seasons in history, yet we are not the only part of the planet to experience increasingly severe tropical storms. Eastern Madagascar is periodically hammered by strong tropical cyclones coming off the warm waters of the Indian Ocean. As Marina explains in her article, category 4 Cyclone Enawo of this past March was such a storm, devastating the SAVA region. Passing cyclones cause much hardship for the people of Madagascar, destroying not only houses and infrastructure, but damaging crops as well. Although there is some level of international aid after such events, local people, especially in rural areas, are mostly on their own. Hence, we feel a responsibility to do what we can to help the local communities in the SAVA, even though we can only scratch the surface of considerable need. **DLC-SAVA would like to**



extend a heartfelt thank you to all who answered our on line appeal for cyclone aid for the SAVA community after Enawo. And a special thank you to MJ Chapman whose donation formed the significant core of our cyclone aid. As you can see in the cyclone article and financial accounting, through rebuilding and repairing of local schools, donations have gone far towards giving young students of the SAVA region a sheltered place in which to learn. Thanks to all who pitched in!

Charlie

The SAVA Conservation Team

Charlie Welch – DLC Conservation Coordinator
Dr. Marina Blanco – SAVA Conservation Project Coordinator
Lanto Andrianandrasana – SAVA Conservation Project Manager
Fusiane Razafindrainibe – SAVA Conservation Environmental Education Coordinator
Lydia Greene – SAVA Conservation Liaison
Libby Davis – SAVA Conservation Liaison/Peace Corps

Miaro atiala, mamboly fiainana
 “Protect the forest, and life will grow”