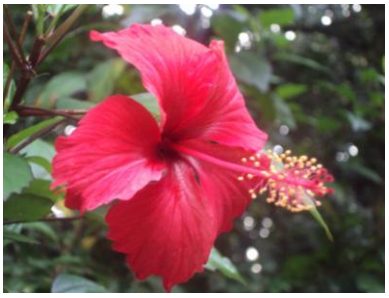
*The Ecological Society of America's SEEDS Program*

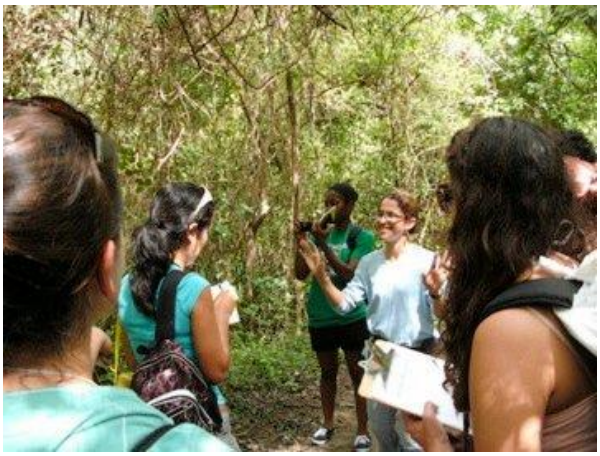
**SEEDS Field Trip Report**
**El Verde Field Station**
**May 23rd– 27th, 2010**

## *Field Trip Overview:*



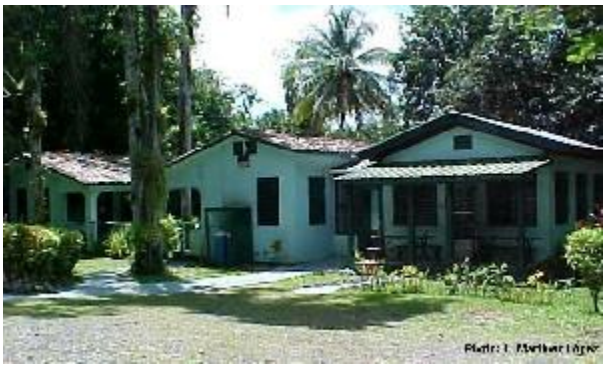
The 2010 SEEDS Spring Field Trip took place from May 23-27, 2010 at the El Verde Field Station, Puerto Rico. EVFS is located within El the Yunque National Forest in Puerto Rico, surrounded by tropical rainforests representative of many Caribbean island ecosystems. Research at El Verde focuses on forest dynamics, stream ecology and hydrology, and ecosystem processes. Most research is conducted by the Luquillo Long-Term Ecological Research (LTER) program and by scientists from the University of Puerto Rico and universities in mainland US.

Intensive ecological research was initiated by the USDA Forest Service in the 1940s, with the establishment of a series of research plots in four vegetation zones at different elevations and aspect positions in the mountains. These plots provide a valuable database to gauge the response of these ecosystems to more hurricanes. Research at the El Verde was oriented toward a multi disciplinary investigation of ecosystem processes during the 5-year Rain Forest Project, sponsored by the Atomic Energy Commission.



Research at El Verde has continued with funding from the National Science Foundation and University of Puerto Rico. In 1988, El Verde Field Station became one of main focal research locations for the Luquillo Long-Term Ecological Research Program (LTER). The emphasis of the LTER program is on disturbance regimes in Tabonuco forest and the role of biota in the recovery of tropical forest ecosystems after disturbance, with an initial emphasis on the effects of Hurricane Hugo.

During the field trip, students toured the El Verde Field Station, met with many faculty, staff and graduate students. Students not only learned of the research being conducted at EVFS, but also had the opportunity to conduct group investigations and share their results. In addition, students toured parts of Puerto Rico, enjoyed hikes in the area, experienced the bioluminescent kayak adventure, conduced and participated in group ecology research projects, and learned about the important cultural history of the area. The career panel discussion gave students some ideas of the diverse career paths in ecology.



Opportunities for undergraduate students at El Verde were presented, including Research Experience for Undergraduates (REU) opportunities.

## *Day One: Monday, May 24th, 2010 - Conservation and a Student Led Initiative*

Group 1 - Delyn Martínez, Laura Quante, Jenna Hamlin, Adrian Cieslak, Alex Lebron, Lillian Smith

Our first full day in Puerto Rico started out with exploring the Northeastern Corridor (NEC) with fellow students from different University of Puerto Rico campuses. Ana Elise told us about the perils of urbanization and what that means for the NEC. The NEC covers more than 3,000 acres and was designated a nature reserve in 2008 by Puerto Rico's governor. Termite mounds can be seen throughout the Corridor they play an important role in the ecosystem of the rain forest. The termites are detritivores that consume the organic matter enable them to contribute to the nutrient cycles of the rainforest. The Northeastern Corridor contains a dry and wet forest. The dry forest consist of deciduous trees that loose their leaves during the dry season, low elevation and the Northeast Trade Winds are some of the major factors that contribute to the dry environment. The wet forest can also consist of a vast array of trees but what are very unique are the white mangrove trees (Rhizophoraceae) that can be found and the harmonious relationship it has with the ocean. The roots are exposed due to the need for oxygen to breath. The salt water that is uptake it eventually expelled through their pours. It provides shelter and nursery for fish and protects the cost from storm surge and tsunamis.

The corridor holds a special place for many Puerto Rican students, citizens, and scientists because it represents a fight and collaboration for the protection of some of their natural areas and the corridor is home to many rare, threatened, endangered and endemic species. They have been fighting to protect the NEC from development by two major hotels. The day was spent walking through the corridor and identifying the flora and fauna of the area. They took us to three different beaches: Seven Seas, Colorá, and Escondida. We had fruit break of mangos and pears up on a private rock cliff overlooking the Atlantic. Upon return to where we started we had a lunch and swim break for the afternoon.

The individuals that were leading the group were very helpful and would answer any questions the students had. It was interesting to know that the white mangroves uptake the salt water and excrete salt which can be tasted on the leaves (which a few students did). As a recent graduate, Delyn Martínez loved how these students were so passionate about the work that they were doing to conserve the corridor, which gets 'me excited to move forward now that I graduated". Since Martínez just graduated she said, "it was nice to understand things that were being explained and to know that all the classes you need for a bachelors in biology has finally paid off!!" For student Laura Quante, learning about the N.E.C. was a great experience. By learning from other students, "it made me feel a stronger connection and comfort." It was clear that they were very passionate about the protection of the N.E.C. This personally relates to me because in Washington

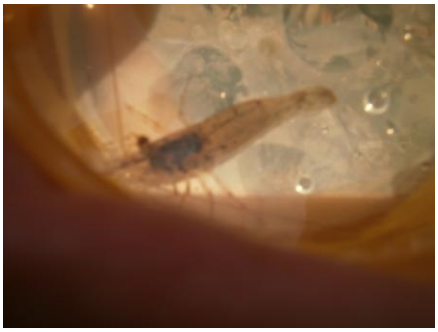
State we have a similar goal of creating corridors with the Mountains to Sound Greenway initiative. The goal is to create a corridor from the cascades to the Puget Sound. The student's arguments for the importance of corridors in nature are necessary across the globe."

The students from the University of Puerto Rico-Río Piedras chapter empowered another recent graduate, Lillian Smith to get involved not only locally but also governmentally. She said, "It means a lot to see other students excited about ecological conservation". After hearing what the UPR-Río Piedras Chapter has done to make a change governmentally and get other Puerto Ricans involved and most importantly aware that their natural rain forest could one day be destroyed. One major disturbance like the building of resort could distort the symbiotic relationship that the marine environment and land environment have. After learning that all it takes to make a difference is a few friends with a common interest, she encouraged to do the same.

## *Day Two: Tuesday, May 25th, 2010 Morning Reflection*

Group 2 - Dinorah Chacin, Jessica Trevino, Jon Gonzalez, Mariela Rivera, Michelle Nelson

The morning began with a walk into the El Verde Field Station (EVFS) demonstration plots. We visited four sites and were given explanation the different research experiments that are taking place at EVFS. Dianna Garcia introduced us to the canopy trimming/forest recovery experiment. The purpose of this experiment is to understand how rain forests recover from disturbance. The experimental design includes four plots and measures several variables. The treatments include removing canopy and depositing forest litter. Understanding how flora and fauna recover from hurricanes and human disturbance. Elvia Melendez introduced us to the riparian orchid monitoring in El Yunque. This endemic orchid is common in lower elevations of the forest along streams. The study aims to monitor the orchid community that functions as a meta-population. This means that in order to understand the change in community structure, one must account for the loss of communities as well as the colonization of new communities. This organism is thought to be possibly a good indicator of climate change due to its reaction to weather and rainfall. Alonzo Ramirez introduced us to the shrimp populations of El Yunque. Shrimp are the dominant animals of the streams, and live mostly beneath rocks. Different experiments are underway to determine their role in the ecosystem as they have been found to perform numerous functions, namely breaking down organic matter of the forest and limiting the algae population. Chris Nycht introduced us to the El Yunque tree census system. There are over 200,000 trees in the Luquillo Forest Reserve (also known as the 'Big Grid'). Using tools like the densiometer, leaf baskets, range finders, and seedling plots, researchers and assistants measure every tree and several seedlings to determine the activity of the forest. This is truly an amazing feat. Group Opinion: We liked how every Professor or worker was very enthusiastic about each topic, which heightened our enthusiasm for this trip. It was interesting to see different methods of experimentation. We are really stoked to be here.

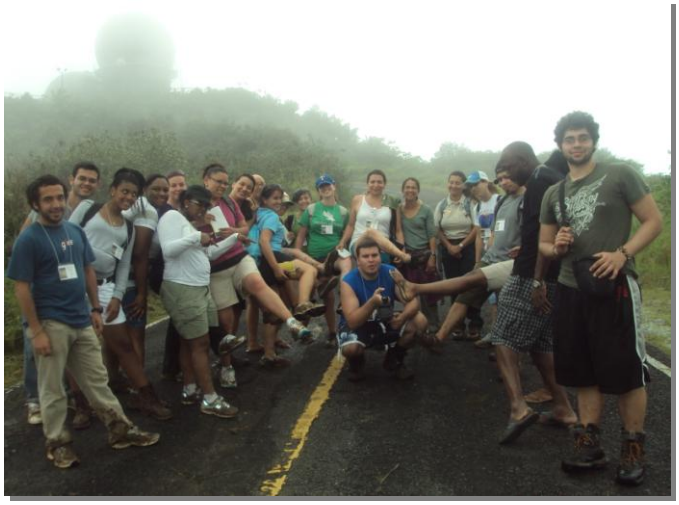


## *Tuesday Afternoon- East Peak*

Group 3 – Carlington Wallace, Kimberly Roper, Pamela Grignon, Cheryl Holling, and Sara Ocasio

On Tuesday afternoon we traveled to East Peak, which is the Elfin forest, and enjoyed a talk by doctor Grizelle Gonzalez (IITF-USDA Forest Service) and Carlos Estrada (Forest Service Technician). Their overall work was to study the effects of the elevation gradient on the Elfin forest. Five meteorological work stations are spread throughout and collect rainfall, humidity, temperature, chemistry differentials, photosynthetic flux (with light sensors), and wind speed. While the tower can not record parameters accurately after wind speeds more than 98 miles per hour, it can physically withstand wind speeds up to 130 miles per hour. They have been collecting data for many years manually, but automated data collection has been in place for 22 years.

Some interesting characteristics of the Elfin forest include low amounts of oxygen in the soils, shallow root systems, waxy and thick foliage, high diversity, and short (wind stressed) plants. Suddenly we were engulfed in tropical mist and flashy rain spells. As we squish-squashed our way through the forest we could feel the super saturated soil sucking at our feet as we trampled the fragile vegetation. We understood how fortunate and privileged we were to be let into this endangered biome where even most native Puerto Ricans have never been allowed.



## *Tuesday Night- Career Panel*

Tuesday night we were given the amazing opportunity to participate in a career panel with a wide variety of professional and aspiring ecologists. Yamara was the first to go. She started with pressures from parents and entered into the field of architecture. She realized into her fourth year that her real passion was ecology and went for it. Jesslyn is a Masters student who overcame a struggle with the English language, analytical writing, and statistics to succeed in her field. Tamara who also struggled with math, begged her way into the field and took extra coursework in order to be accepted, and then received inspiration from the scientists at El Verde when she was a volunteer

that worked there. Dr. Deni Fernandez who is an "ecologist by natural selection". Dr. Alex Sloan aspired to be a marine biologist at 13 years old in his landlocked state of Tennessee. He broke away from his small town and eventually earned his PhD and now inspires students while living the lifestyle of an active research ecologist in Guanica. Ricardo, a student from the University of Puerto Rico, began school with the intentions of studying medicine but through SEEDS he discovered his passion for ecology. Dr. Elvia Melendez credits Mrs. Dickson, her high school science teacher, with her earliest interests in biology. She stressed the importance of taking math, social sciences, and diversifying your experiences with going abroad. If she could go back, these are the things that she would do over again. Diana Guzman, a student at the University of Puerto Rico, gave an emotional testimony of the hurdles of chasing your dreams, battling the demon of family expectations, and defeating self-doubt. She is the perfect example of believing that these barriers are just obstacles and not walls.

From these people we learned to never stop knocking on doors, follow your passions, never take no for an answer, take your coursework seriously, have an action-oriented plan for your goals, and get involved with research and volunteering.

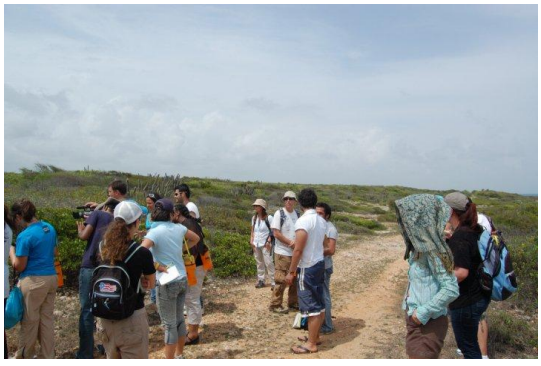
## *Day Three: Wednesday May 26th, 2010 - Guanica Biosphere Reserve*

Group 4 - Albert Davila, Audra Stonefish, Natalia Rincon, Shalantae Hawkins
**"Puerto Rico is an experiment made by nature"**

We departed El Verde Field Station to Guanica Biosphere Reserve early in the morning and arrived at the Visitor Center at 8:30 AM. We met with the Manager of the reserve, Miguel, and the rest of the Guanica Dry Forest research team. Guanica is located in the southwest side of Puerto Rico and it is in the rain shadow of the Caribbean, which consists of the central mountains and the eastern winds. Before we hiked around the reserve, the managers explained to us the importance of the reserve.

Guanica Biosphere Reserve was established in 1919 under the presidency of Teddy Roosevelt. However it was not until 1970's that the United Nations designated Guanica as one of most representative of the Dry/Subtropical forests, and in 1981 it was established to conduct ecological research. It was explained to us that Puerto Rico consists of 47% dry forest of which 4% is under conservation. Out of this percentage, Guanica represents the biggest portion. Guanica, as other dry forests have very sharp dry and wet season. One of the most important roles in managing the land is protecting it from the general public, since humans play the most detrimental role in the destruction of our natural resources.

It is important to pinpoint the differences between a Tropical and a Subtropical or dry forest. Tropical forests have a monthly temperature change of $30C^0$, whereas Subtropical forests have a daily change of $30C^0$ Guanica is one of the driest forests in Puerto Rico. Actually, it rains about 10 inches in an entire year, and there have been times where more than 200 days have passed without a drop of rain. Occasionally, 1/2 inch of rain falls, but there is such a strong heat that the water

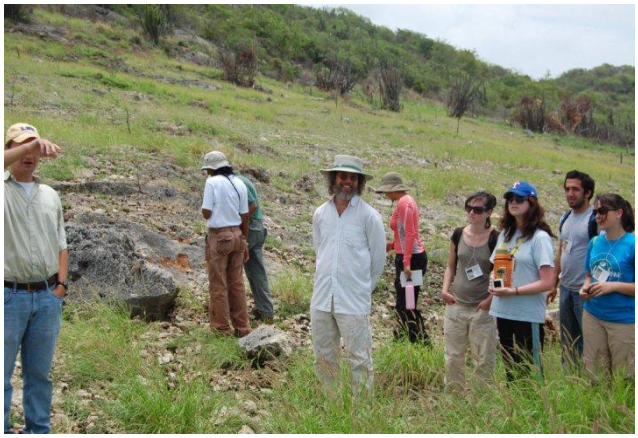


evaporates before it reaches the ground, therefore, it is not worth it to record such data.

Guanica is a very diverse ecosystem. It hosts 167 bird species and more than 700 plant species. It is one of the most diverse areas in Puerto Rico, the Caribbean and the world. A very interesting aspect about the species of birds is that their biology allows them to return to the same tree/area they once inhabited. This, as a matter of fact is one of the biggest worries regarding development projects in the vicinity of the area. As birds return to their previous home, they will find themselves disoriented, which will therefore, increase to a great extent competition amongst species.

Guanica's jurisdiction is 4,000 acres and 11,000 acres of terrestrial forest and its huge variety has served as the site of more than 40 Master's thesis and from 1988 to the present 150 research experiments have been published.

As we drove threw Guanica we pulled off to the side of the road to hear a brief explanation of the impacts of fires within the area. We stopped at a site that had been burned months prior to us arriving there. Dr. Jarred Foxton, who specializes in fire ecology, explained to us how most fires that occurred within Guanica were caused by humans. He then went on to explain how the forest has been pushed back, the soil has been exposed, leaving a very disturbed area. This disturbance has allowed pyrophillic plants to move in and began to take over the area. This has created a very difficult problem from a management prospective. Dr. Foxton went on to describe how they use fire to control these weeds. At the beginning of the dry season these grasses are burned to reduce the fuels. This works as a buffer helping to prevent the fires from reaching the forest. Although these a invasive plants Dr. Foxton explained how there are some positive effects from invasive species. They talked about a non-native tree that has prevented invasive weeds from growing but allowed for the reestablishment of native species. Because Puerto Rico is so old the native plants are well established and able to compete with invasive plants.



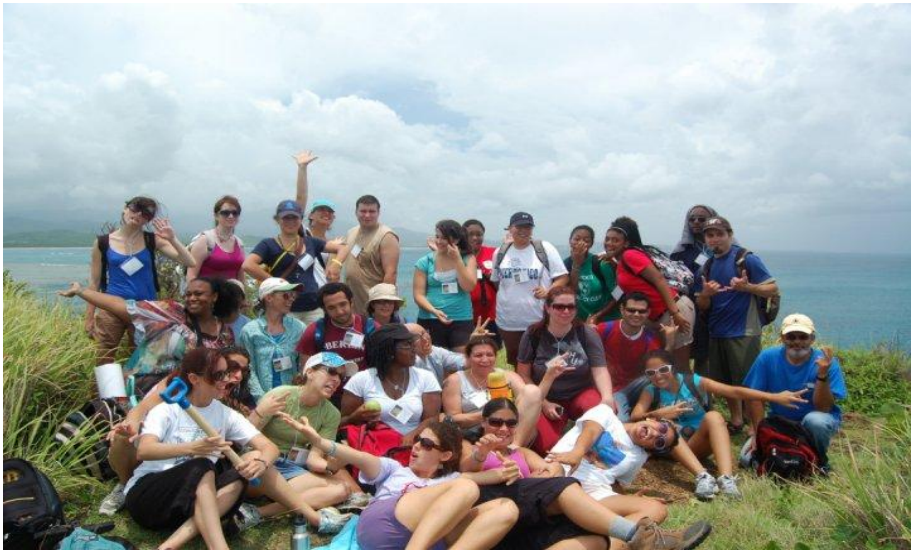
Afterwards, the group hiked through the dry forest with Dr. Alex Sloan to listen to him share his research about the tree species Apocenacae or known as the "Plumeria" and the growth habits of the species. Dr. Sloan also included some information about an invasive insect called Micro borus lotus or the "Bark Beetle". Dr. Sloan spent two years collecting data specifically mapped out Apocenacae locations. Tree growth was measured once per month on each individual tree, over the course of a two year period. After speaking with Dr Sloan personally following the hike, he stated that "collecting this data was like a full time job in itself". Spending time talking with Dr. Alex Sloan gave me a new perspective and respect for his craft; having the ability, drive and commitment to go out every week to collect data in the intense weather conditions is certainly humbling as an undergraduate student in Science.

Once the guided hike was through, the group headed to Tamarindo beach to cool off and relax after our long, adventurous day. This down time was appreciated by the whole group after our day in the new dry heat of the South Western part of Puerto Rico. We all got to cool down in the

water and lay out on the beach. We found a starfish, several sea urchins, and several different species of fish. It is also important that this particular beach is the only location in the world that hosts a particularly rare frog species.

As the day came to an end, we had the opportunity to enjoy a traditional Puerto Rican meal in an establishment named "El Palacio del Mofongo", named after the traditional *mofongo* dish. This was located in a small town called Parguera, relatively close to the dry forsest. There, we had the experience to interact with our fellow seed members and mentors as we enjoyed different dishes. Such delights included *chapin mofongo, shrimp mofongo, empanadilla de pollo, shrimp salad, parcha juice.* Delicious!.

Lastly, as midnight approached, all El Verde Field Station Field Trip participants gathered to discuss and enjoy by a last time this unforgettable experience ESA Seeds offered us.




## Acknowledgements

The success and continued growth of the SEEDS program is due to the support of many organizations, foundations, corporations, and individuals. We would like to acknowledge and extend our sincere thanks to the following for their contributions to the SEEDS Field Trip to Rio Grande, Puerto Rico:

- The El Verde Field Station staff and faculty
- Alonso Ramirez
- Elvia Melendez-Ackerman

*SEEDS University of Puerto Rico- Rio Piedras* - AKKA SEEDS Chapter and Chapter Leaders:
Ana Elisa Pérez-Quintero and Lorna Moreno

Pictures: Courtesy of field trip participants

Appendix A

# SEEDS Participants

SEEDS Field Trip • El Verde Field Station
May 23 -27, 2010 • Rio Grande, Puerto Rico

| SEEDS Students | |
|---|---|
| **Dinorah Chacin**<br>*Florida International University*<br>dinhel@hotmail.com | **Kimberly Roper**<br>*University of Washington*<br>ropes@u.washington.edu |
| **Adrian Cieslak**<br>*Fort Valley State University*<br>cieslak86@yahoo.com | **Lillian Smith**<br>*Oakwood University*<br>lillian.smith@oakwood.edu |
| **Albert Davila**<br>*Oberlin College*<br>adavila@oberlin.edu | **Audra Stonefish**<br>*Sitting Bull College*<br>stonefisha@sbci.edu |
| **Jonathan Gonzalez**<br>*University of Vermont*<br>jbgonzal@uvm.edu | **Jessica Trevino**<br>*University of North Texas*<br>doraemon.0128@gmail.com |
| **Pam Grignon**<br>*College of Menominee Nation*<br>pamjowen@yahoo.com | **Carlington Wallace**<br>North Carolina A & T State University<br>cwwallac@ncat.edu |
| **Jennafer Hamlin**<br>*University of North Carolina, Asheville*<br>japhamli@unca.edu | **SEEDS Staff** |
| **Shalantae Hawkins**<br>*Hampton University*<br>shalantaeh@hotmail.com | **Melissa Armstrong**<br>*Ecological Society of America*<br>Melissa@esa.org |
| **Cheryl Holling**<br>*Colorado State University*<br>dandcholling@q.com | **Charlee Glenn**<br>*Ecological Society of America*<br>charlee@esa.org |
| **Alex Lebron**<br>*Cornell University*<br>aml262@cornell.edu | **Torreka Jordan**<br>*Ecological Society of America*<br>seedsintern@esa.org |
| **Delyn Martinez**<br>*Kansas State University*<br>delyners@gmail.com | **EVFS Staff** |
| **Jorge Mendoza**<br>*Alcorn State University*<br>klunix@ksu.edu | **Alonso Ramirez**<br>*El Verde Field Station*<br>alonso.ites@gmail.com |
| **Michelle Nelson**<br>*North Carolina A & T State University*<br>manelson@ncat.edu | **Elvia Melendez-Ackerman**<br>*University of Puerto Rico- Rio Piedras*<br>elmelend@gmail.com |

| | |
|---|---|
| **Sara Ocasio**<br>University of Puerto Rico - Rio Piedras<br>sboo.arte@gmail.com | **AKKA SEEDS Leaders** |
| **Laura Quante**<br>*University of Washington*<br>lauraq@u.washington.edu | **Ana Elisa Pérez-Quintero**<br>*University of Puerto Rico- Rio Piedras*<br>p.anaelisa@gmail.com |
| **Natalia Rincon**<br>*Miami Dade College*<br>natalia.rincon002@mymdc.net | **Lorna Moreno**<br>*University of Puerto Rico- Rio Piedras*<br>lorna.moreno@gmail.com |

# Appendix B
# Trip Itinerary

SEEDS Field Trip • El Verde Field Station
May 23 – 27, 2010 • Rio Grande, Puerto Rico

**Sunday May 23: Arrival**

| | |
|---|---|
| 2:30 pm | First pickup at airport - shuttle to EVFS |
| 7:30 pm | Second pickup at airport - shuttle to EVFS |
| 7:00 pm | Dinner |
| 8:00 pm | Welcome and Orientation<br>El Verde Field Station (EVFS) history: **Alonso Ramirez and Elvia Melendez-Ackerman** Journal Writing – **SEEDS Staff** |

**Monday May 24: Northeastern Ecological Corridor**

| | |
|---|---|
| 7:30 am | Breakfast |
| 8:00 am | Depart for Northeastern Ecological Corridor (NEC) |
| 8:40 – 9:00 | What is the NEC and why is it in peril? – **NEC Coalition members** |
| 9:00 – 11:30 | NEC guided walk and photo marathon. Assist with the completion of a NEC field guide. Take photos of species that will be used in the field guide and mark their position with GPS (cameras and GPS provided). |
| 11:30 – 12:30 | Lunch |
| 12:30 – 3:00 | NEC trail work (signage and clean up) |
| 3:00 – 3:30 | Fruit break |
| 3:30 – 5:00 | Work with Corridor Science Action Group on the NEC field guide. |
| 6:00 pm | Dinner at EVFS |
| 7:00 pm | Bioluminescent kayak tour |

**Tuesday May 25: El Verde Field Station**

| | |
|---|---|
| 7:30 am | Breakfast |
| 7:30a-9:30a | Hike around EVFS with on site discussion of several Long-Term covering aquatic and terrestrial systems (Leaders: **Alonso Ramirez** (Aquatic), **Elvia Melendez-Ackerman** (Riparian Orchid), **Chris Nycht** (Big Grid), **Diana Garcia** (Canopy Trimming Experiment). |
| 10:30a-12:00 | Pterocarpus Forest (Demonstrative Hike) - **Tamara Heartsill** (IITF-USDA Forest Service) |
| 12:00-1:45p | Travel to uppermost Recreation Area at El Yunque for lunch |
| 1:45p-3:00p | Travel to East Peak and talk by **Grizelle Gonzalez** (IITF-USDA Forest Service) |
| 3:00p-4:00p | Return to EVFS, groups work on writing/presentations |
| 6:00 pm | Dinner |
| 7:00 pm | Career panel – SEEDS Chapter advisors and SEEDS alumni |

**Wednesday May 26: Guánica Biosphere Reserve**

| | |
|---|---|
| 6:00 am | Breakfast |
| 6:30 am | Depart EVFS |
| 8:30 am | Arrive at Guanica - Visitor's Center |
| 9:00 am | Guanica as NEON SITE and will provide guided hike - **Skip Van Bloem** |
| 10:30 am | Long-term phenology project with *Plumeria albida*, guided walk **– Alex Sloan**. |

| | |
|---|---|
| 12:00-1:00 | Characterizing habitat for *Peltophryne lemu*, an endangered frog species of the dry forest - **Jorge Ortiz** |
| 1:00 pm | Lunch and beach visit |
| 2:30 pm | Return in vans to EVFS |
| 5:00 pm | Groups work on writing/presentations |
| 6:00 pm | Dinner |
| 7:30 pm | Journal writing report summaries; Evaluation; Closing Social |

**Thursday May 27: Departure**

| | |
|---|---|
| 5:30 am | Breakfast |
| 6:00 am | Departures |