**LUQUILLO LONG-TERM ECOLOGICAL RESEARCH PROGRAM**

**ANNUAL MEETING 2015**

**AGENDA**

**JUNE 4th: INTERNATIONAL INSTITUTE OF TROPICAL FORESTRY, CONFERENCE ROOM**

8:30 a.m. – Coffee

8:45 – Introductions

9:00 – State of LUQ-LTER & Overview of Current Proposal (Jess Zimmerman)

9:45 – TRACE: The Evolution of a Tropical Warming Experiment (Tana Wood)

10:30 Break

11:00 – Luquillo Critical Zone Observatory: Overview (Bill McDowell)

12:00 p.m. – Lunch (Graduate Student Meeting)

1:00-2:30 – Lightning talks – 5 minutes per person

2:30 – Posters

**JUNE 5th- UPR NEW NATURAL SCIENCES A-211**

8:30 a.m. – Coffee

Reports from planning groups:

9:00 – Modeling (Jess Zimmerman)

9:20 – Biodiversity (Sheila Ward)

9:40 – Stream research (Alonso Ramírez)

10:00 – Succession (Lars Walker)

10:20 – Break

10:50 -- Discussion

11:20 – Planning for LUQ 6. Exploring ideas.

12:00 p.m. – Lunch (MC meets with Associates Researchers)

1:00 – Update on Educational Activities (Noelia Báez)

1:20 – Update on IM System and Web Site (Colibri Sanforienzo)

1:40 – Graduate Student Issues

2:00 – Post-doctoral Associate Issues

2:20 – All Scientists Meeting Plans

2:50 – ESA meeting plans

3:00 – Town Hall Meeting

**OPPOSING EFFECTS OF ARBUSCULAR MYCORRHIZAL FUNGI AND NATURAL**

**ENEMIES ON SEEDLING DYNAMICS PROMOTE TROPICAL TREE COEXISTENCE**

Benedicte Bachelot, María Uriarte, Krista McGuire, Jill Thompson, Jess Zimmerman

Negative population feedbacks mediated by natural enemies can promote species coexistence

through disproportionate mortality of common tree species. Associations with arbuscular

mycorrhizal (AM) fungi can result in positive population feedbacks, which might rescue rare tree

species or alternatively, promote the dominance of common tree species. Yet, no in situ study has

investigated the combined effects of AM fungi and natural enemies on plant dynamics. Using

DNA sequencing of soil AM fungi and seedling foliar damage data, we assessed their combined

effect on tropical tree seedling mortality at local and community scales in a tropical forest.

Locally, AM fungal diversity counteracted negative effects from enemy damage on seedling

mortality. At the community scale, seedling mortality of common tree species increased with

foliar damage and only rare tree species benefited from AM fungal diversity. These counteracting

effects of enemy damage and AM fungi might foster tree species coexistence in diverse tropical

forests.

**AQUATIC ECOLOGY LAB - LABORATORIO DE ECOLOGIA ACUATICA**

Alonso Ramírez

General information poster – Our laboratory at the University of Puerto Rico, Rio Piedras, works on

understanding how tropical stream ecosystems function and how they respond to natural and

anthropogenic changes. We work on natural streams draining El Yunque National Forest and urban

streams draining the San Juan Metropolitan Area. Studies focus on a diversity of topics, including stream

assemblage dynamics, food webs, interactions with the environment, and ecological processes. Our

urban studies include a socio-ecological emphasis as well.

**REU – Project: FACTORS CONTROLLING MACROINVERTEBRATE ASSEMBLAGES IN TWO STREAMS WITH CONTRASTING MACROCONSUMER ABUNDANCES**

Bethany Vazquez, Alonso Ramírez

Abiotic and biotic factors are important drivers structuring stream benthic communities. In tropical

island streams, abiotic factors (e.g., habitat, flow) interact with biotic factors (e.g., presence of

predators) to create conditions that potentially affect macroinvertebrate assemblages. Our goal was to

assess the composition of benthic macroinvertebrate assemblages in two tropical streams and assess

whether habitat and shrimp abundance play a role in explaining patterns in composition and

abundance. Study streams (Prieta and Bisley) were selected in the Luquillo Experimental Forest, Puerto

Rico. Streams were similar in elevation and forest type, but contrasted in shrimp assemblages. Prieta

had high shrimp densities and no predatory fish, while Bisley had predatory fish and few shrimp.

Macroinvertebrate abundances in Prieta riffles were higher than pools, while Bisley pools showed higher

abundance than riffles. Richness followed similar patterns as abundance. Multiple regression analyses

indicated that shrimp abundance was the main factor explaining macroinvertebrate patterns. Overall,

our study found that macroinvertebrate assemblages are strongly related to shrimp presence and

abundance, but other factors might also play a role explaining assemblage structure.

**REU – Project: THE ROLE OF PHYLLOICUS PULCHRUS (TRICHOPTERA: CALAMOCERATIDAE) IN THE**

**DECOMPOSITION OF LEAF LITTER: EVALUATING LEAF SPECIES AND CASE BUILDING EFFECTS**

Limarie Reyes, Pedro Torres

Phylloicus pulchrus larvae are exclusive leaf feeders and key contributors to leaf processing in tropical

streams. Previous studies have determined their feeding preferences, case building behavior and role as

shredders. There is limited information on their effects on decomposition in terms of material used for

consumption and case building. We determined the influence of P. pulchrus larvae on leaf litter

decomposition in Puerto Rico. Our main goals were to assess the effects of leaf species and availability

on leaf decomposition and evaluate the effects of leaf selection for case building. Results indicate that

this shredder is able to discriminate among different leaf species that differ in structure and chemical

composition resulting in differences in decomposition rates among species. Our findings indicate that

leaf decomposition rates are affected by whether leaves are used for case building or consumption. P.

pulchrus behavior may potentially play a major role in ecosystem processes, such as FPOM transport,

since the case material is not released into the water column.

**Spatial distribution of soil and leaf litter fungal communities in a simulated hurricane experiment.**

Sharon A. Cantrell , María F. Barberena, Gabriel Allison, Karleen González, Ivia Moreno, D. Jean Lodge and Grizelle González

Fungal communities play important roles litter decomposition and nutrient cycling from litter to soil. The Canopy Trimming Experiment (CTE) started in 2003 at the Luquillo Experimental Forest was designed to determine the immediate effects of hurricanes on forest floor processes and recovery in a tropical wet forest ecosystem. Changes in fungal community structure in the forest soil and litter layer may influence ecosystem recovery. Canopy trimming was applied again in October 2014 with the purpose of understanding long-term effects of increased hurricane frequency on forest productivity and carbon sequestration. We used the treatment to study short-term effects of canopy opening and debris deposition on litter and soil processes. Nutrient mineralization from green leaves was determined using WesterAG Plant Root Simulator (PRS) Probes placed in the leaf litter fermentation layer (above the mineral soil) one week prior trimming (T0), one (T1), two (T2), three (T3) and five (T4) weeks post trimming. Differences between treatments and among times were analyzed using a linear model in MiniTab. Soil and leaf litter were collected in July 2014 for a pre-treatment sample and at T0, T1, T2, T3 and T4. DNA was extracted using MoBio Power Soil DNA Isolation kit. The TRFLP technique was used to obtain profiles of the fungal communities in each sample using the fungal ITS region. Changes in fungal community structure between samples were analyzed using NMDS and UPGMA. Significant differences in nutrient concentrations between unmanipulated control and canopy opening+debris deposition (T+D) were observed for total N, NH4, Ca, K, P, S and Mg in leachates. Total leachate N, NH4 and P also changed significantly with time, and there was a significant treatment by time interaction. All nutrients increased at T4 (5 weeks). The NMDS clearly separates soil and leaf litter fungal communities. For the leaf litter fungal community we have analyzed up to T1 and for the soil up to T3. The results indicate that the fungal community is highly heterogeneous and samples group by time. It is expected that when samples from T4, T5 and T6 are analyzed, samples will be grouped by treatments.

**Structure of Ammonia-Oxidazing Archaea through an elevation gradient atEl Yunque Rain Forest in Puerto Rico**

Dana Michelle Malavé-Miller, Anamary Carazo-Carrión, Diana Laureano-Córdova, and José R. Pérez-Jiménez

The balance and dynamics of an ecosystem involves continuous processes, which are led by the energy flow and biogeochemical cycles. Microorganisms are an essential part of both processes. Specifically biogeochemical cycles depends on the presence of the microorganism. The nitrogen cycle is divided in three main steps ammonia oxidation nitrification and denitrifiction. Archaeas has a key role in the first step ammonia oxidation. The tropical rain forest El Yunque, in Puerto Rico has a gradient of microclimate and vegetation. This change and extends through five life zones (subtropical moist forest to lower montane rain forest): Xerophytic, Tabonuco Colorado, Elfin and Palm. We hypothesize that a diverse community of ammonia-oxidizing archaea (AOA) inhabit across the life zones of El Yunque. Our objective is to study the biogeographical distribution and diversity of AOA communities along microclimates throughout the elevation gradient. Genomic DNA was extracted from archived soil samples collected in June 2005 (depth of 5-10 cm). AOA community composition was characterized with terminal restriction fragment length polymorphisms of the archaeal ammonia-monooxygenase gene (arch-amoA) amplified from soil samples. A total of 249 phylotypes (TRF) were detected (representing 224 different TRF). TRF abundance ranged among forest from 102 (xerophytic), 89 (palm), 31 (Colorado), 20 (Tabonuco), and 5 (Elfin). TRFLP analysis presented a broad diversity of archaeal communities through the microclimate of El Yunque Rain Forest. This suggests that the temperature

and precipitation influence the AOA diversity across life zones in Tropical Rain Forest.

**Historical and Future Precipitation Variability in Northeast Puerto Rico.**Craig A. Ramseyer and Thomas L. Mote

An overview of completed and ongoing precipitation-related studies in northeast Puerto Rico is presented. The primary objectives of these studies are: (1) produce a homogenized daily precipitation climatology for El Verde; (2) analyze the controlling climate variables on rainfall in northeast Puerto Rico to determine the best predictor variables for use in statistical climate downscaling of precipitation; (3) create climate change scenarios of precipitation using a statisical downscaling methodology involving self-organizing maps. The methodologies and preliminary findings for each objective are discussed.

LIGHTNING TALK ORDER:

Ashley Van Beusekom  
Lars Walker  
Alonso Ramírez  
Bill McDowell  
Tim Schowalter  
Xianbin Liu  
Omar Gutierrez del Arroyo  
Elvis Torres  
Wei Huang