

Science and Technology Group Annual Report FY2019

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1 Introduction

I apply a combination of field data, molecular, and spatial analyses to evaluate how human activities impact plant-plant and plant-animal interactions. I have been examining how human activities potentially impact ecosystem services that insects/animals provide such as seed dispersal and the consequences for forest regeneration and biodiversity. My collaborators and I are using a multi-species comparison to study how hunting and the loss of seed dispersal services from hunted mammals could influence gene dispersal and the spatial genetic structure of tropical tree species in the Peruvian Amazon. I also examined the impacts of human settlements on dung-beetle diversity in the Venezuelan, Amazon. In Okinawa, I have initiated preliminary work in collaboration with the Economo lab and OKEON, to apply metabarcoding to assess how insect herbivore diets maybe differ between disturbed and protected forests and whether these interactions changes following severe climate events such as typhoons.

2 Activities and Findings

2.1 Multispecies comparison of hunting impacts on the dispersal and genetic structure of forest plants in the Peruvian Amazon

In FY2019, we completed the field work to map the locations and collect leaf tissues from three tropical plant species in hunted forests and in forests where hunting is minimal or prohibited – *Pseudomalmea diclina*, *Guararibea witii*, and *Sorocea pileata*. The field work for the fourth tree species – *Attalea phalerata* were completed in FY2018. All four species are primarily dispersed by commonly hunted mammals in the region including primates, agouti, and pacas. The genetic analyses, which include marker development and genotyping will commence in FY2020.

2.2 Impacts of an indigenous settlement on the taxonomic and functional structure of dung beetle communities in the Venezuelan Amazon

The above study was completed and published in the journal of *Biodiversity and Conservation*. We found the abundance of roller-species increased but small-bodied beetles decreased away from the settlement. Proximity to the Jotí settlement however did not affect metrics of taxonomic and functional diversity of the dung beetle assemblages in general, although functional evenness was lower away from the settlement. In contrast, we found impacts on the functional composition of dung beetles, with significant increase in the community-weighted means for roller species and large-bodied dung beetles away from Jotí settlement. Our findings suggest that the transition from nomadism to a more sedentary lifestyle has not caused widespread collapse in the diversity of dung beetle assemblages surrounding the settlement, however significant trends were observed in species-specific responses to human impact, and these responses were mediated by functional traits



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2.3 A landscape-scale study of tritrophic interaction networks along disturbance gradients in Okinawa

In collaboration with OKEON field support team, we conducted fieldwork to map and identify plants >1 cm dbh found within 20 x 20 m (0.4 ha) at seven OKEON field sites. The plant species data will provide baseline information about forest diversity at the OKEON sites where we will conduct preliminary studies to understand possible shifts in insect diets among disturbed and protected forest sites. We mapped and identified ca. 1780 plants and the number of species found across the seven sites ranged between 36 to 57 species.



3 Collaborations

Evan Economo, OIST
Varun Swamy, San Diego Zoo
Susan Kennedy, Trier University/OIST

4 Publications and other output

Choo, J., B. Gill, E. L. Zent, and E. P. Economo. 2020. Impacts of an indigenous settlement on the taxonomic and functional structure of dung beetle communities in the Venezuelan Amazon. *Biodiversity and Conservation* 29: 207-228.