M.A. in Conservation biology – Research project opportunities

Project title

Studies of Comparative Root Functional Ecology with Forest Trees and Living Collections

Date Submitted	October 2007
Advisor	Hilary Callahan, Barnard College
Email	hcallahan@barnard.edu
Institution	Department of Biological Sciences (Barnard)
Geographic location (if applicable)	Altschul building on Barnard campus; Black Rock Forest; NYBG; field site at Penn State University

	Yes	**No**
Existing Dataset		x
Field work required	x	
Funding available		
Housing		x
Travel	x	
Stipend (can possibly apply on students behalf for BRF seed grant)	maybe	
Research costs (e.g. instruments, lab analyses, software, etc.)	x	

Project description (brief description of data collection, type of analyses and expected outputs)

I currently have an NSF funded project studying root functional ecology in a comparative/phylogenetic framework. I have several students but could probably include more.

Students interested should be willing/available during early spring 2008 to help with installation of manipulative experiments on roots of mature canopy trees of diverse species in forests at Black Rock Forest and, possibly, at Stone Valley Exptl Forest in Pennsylvania. (Field transport and housing will be provided, and possibly some modest wages for field work.) Also during June/July 2008 to harvest and process samples.

Opportunities to collect parallel experiments involving manipulation of tree seedling roots in the Barnard College Greenhouse. (One masters student already working on this; potential to expand.)

Opportunities to do work on comparative biology of root functional traits on basal angiosperm taxa and seed plant outgroups using living collections at NYBG and Barnard (and possibly BBG).

DNA Barcoding project could be an add-on to our experiment, as it can be difficult to validate species identites of trees we are working on in the forest from underground tissues and winter characteristics. I cannot train a student in this or host in my lab, but probably could do all lab work in E3B lab. Would encourage this option for students with reasonable/basic genetics skills (PCR amplification of chloroplast genes from pre-optimized universal primers, management and analysis of database of sequence data). Sequencing will be outsourced. Will need to scrape together money to support even the materials/supplies for this, so additionally would welcome student interested in helping with a seed grant proposal.

Notes/skill/Special Requirements

Experience with scanning and image analysis software desirable but will train.

Field experience but will train

Good understanding of basic plant biology essential

For barcoding project, need experience/confidence with generating and analyzing DNA sequence data.

Project title

Is chronic wind exposure a good predictor of vegetation composition in Puerto Rico?

Date Submitted	Oct 19, 2007
Advisor	Maria Uriarte
Email	Mu2126@columbia.edu
Institution	CU
Geographic location (if applicable)	New York and Puerto Rico

	Yes	**No**
Existing Dataset	x	x

Field work required	x	
Funding available		
Housing	x	
Travel	x	x
Stipend		x
Research costs (e.g. instruments, lab analyses, software, etc.)	x	

Project description (brief description of data collection, type of analyses and expected outputs)

Will combine GIS data analyses with field sampling in Puerto Rico during summer of 2008. See Maria Uriarte for more details.

Notes/skill/Special Requirements

Basic GIS knowledge preferred. Botany experience preferred.

Project title

Green roofs in NYC: Environmental education and ecology research

Date Submitted	October 2007
Advisor	Matt Palmer
Email	mp2434@columbia.edu
Institution	E3B
Geographic location (if applicable)	NYC

	Yes	**No**
Existing Dataset		
Field work required		
Funding available		
Housing		
Travel		
Stipend	X	
Research costs (e.g. instruments, lab analyses, software, etc.)		

Project description (brief description of data collection, type of analyses and expected outputs)

The Fieldston School in Riverdale, NYC recently installed a green roof on their new middle school building. The roof has extensive environmental monitoring equipment (a climate station, soil water sensors, etc.), which will be used for microclimate modeling and assessing the biophysical aspects of green roof function under the direction of Dr. Stuart Gaffin at GISS. The lower portion of the roof is also being used for ecological research under my direction. See below for an abstract of the ecological research program. Fieldston is interested in working with me and a student to help their faculty develop a curriculum which uses the green roof and the associated experiments. This opportunity would likely entail some fellowship funding (amount TBD), including the possibility of funding over the summer. This project could be incorporated into an MA thesis for a student in the education track. Research track MA students with an interest in urban and/or restoration ecology who may be interested in this project can also contact me. The research program for this roof is still being developed and we are open to student involvement.

Abstract: The plants used in most green roof projects are Sedum species, which are tolerant of the environmental stresses found on rooftops. While Sedum has functioned well for many biophysical aspects of green roof function, it is unlikely to provide much habitat value for other organisms or much educational value for biology classrooms. In contrast, native plants form the the foundation of natural communties and, when used on green roofs, increase the value of those roofs as habitat for insects and birds. Patches of native vegetation are scarce in urban areas so establishing them as part of a green roof project provides multiple benefits including the overall increase of habitat, improving connectivity of existing green spaces, and providing student access to a living laboratory. The Fieldston School in Riverdale, NYC installed a multi-level green roof in 2007 with a traditional mix of Sedum species and two native plant communities based on natural grasslands found in the region. The natural grasslands share some characteristics with the rooftop environment - high light, thin soils, limited water ñ so the plants found there may be well adapted to survive on the green roof environment. The three plant community types are replicated in plots with both flat substrate and in plots with pronounced microtopography (raised mounds and adjacent low points). The roof is also equipped with a weather station and sophisticated real-time environmental sensors. Students will gather data on the development of plant and animal communities as these roofs mature and will compare the ecological value of the three different types. The combination of ecological and environmental data will be used in middle- and high-school science classes including

biology, physics, and environmental science.

Notes/skill/Special Requirements
