

Final Report

Award ID: 0801577

Final Report for Period: 2009 - 2016

Institution: University of Puerto Rico - Rio Piedras

Title: IGERT: Natural-Human Systems in the Urbanizing Tropics

Research Accomplishments

The main research framework of the program was the Agents of Change projects, which is an innovative program component that provided an opportunity for group research applying a social-ecological framework to current real-world problems. Agents of Change projects were aimed at giving the students the experience of working in groups in a complex applied research problem while aiding government agencies, non-profit organization and private groups who were actively working toward a more sustainable Puerto Rico. The students applied and integrated the knowledge acquired in the core courses to develop an applied research project and a report that presented plausible solutions to current environmental problems in Puerto Rico. Representative projects covered a diverse range of issues: 1) Combating effects of anthropogenic activities on coastal and marine systems in Puerto Rico's urbanizing northeast coast; 2) Social, institutional and economic drivers of Puerto Rico's urbanizing northeast coast; 3) Environmental issues of the low income communities in the watershed of the San Juan Bay; 4) Synthesis of socio-hydrological data and community surveys of flood experience for municipal planning and management of flooding in San Juan, Puerto Rico; and 5) Perceptions, attitudes, and awareness of urban green spaces: The case of Barrio Obrero de Santurce, PR.

The first project, which started in 2013, has continued work in its analysis of anthropogenic activities at the Aguas Prietas Lagoon, an inland water body in the area, and preliminary findings of samples taken by core-bore extraction and submitted to C-14 testing revealed that deposition of 1 meter of sedimentation has occurred during the past 1,300 years. Climatic events increased accrual at certain periods while initially deposition seems slightly less during the period known as The Little Ice Age due to drier climate. This information has bearing on current climate change work. XRF analysis indicated the presence of metals in some samples, which could also have additional implications on water quality.

The third project, also from 2013, had to do with the environmental issues of the low income communities in the watershed of the San Juan Bay Estuary. Once the project was finished, the work was published in the journal "Ecología Política". The students expanded the work in preparing and publishing a chapter in a book with the theme of "Citizen Participation" sponsored by the School of Planning and the School of Social Sciences of the University of Puerto Rico. The chapter outlines the experiences, hardships, work, projects, and dreams of a community that has united and taken responsibility of caring for their environment and improve their quality of life. It also describes the Ciénaga Las Cucharillas swamp restoration projects, the project that has been presented for legislation for the protection of local species, the decrease in crime that has been experienced in the community, and the health impact of the residents.

The San Juan Urban Long-Term Research Area (ULTRA) is a long-term network and research site established in the city of San Juan in 2009 by the USDA Forest Service and NSF to produce knowledge on urban areas and to support policy, education, and local initiatives in order to improve the quality-of-life and environmental conditions in the city. San Juan ULTRA is a collaborative research network composed of multiple academic institutions (including the University of Puerto Rico Rio Piedras), public agencies, non-profit partners, and community leaders, which seeks to conduct and support research about the city of San Juan as a social-ecological system, looking at the complex human-nature interactions, taking into consideration multiple spatial and temporal scales, and how these systems can adapt and be sustainable in the face of future changes, such as climate change. Through the Agents of Change activity, the SAN JUAN ULTRA research network was able to implement a research survey as a tool that explored the interaction of multiple social factors that influence the composition of yard plants. The goal of the project was to understand the factors that may limit or enhance the potential role of residential areas in urban biodiversity conservation. It involved 18 investigators (3 faculty, 5 graduate students, one technician and 10 undergraduate students). Participating faculty were from the Environmental Sciences Department and the Graduate School of Planning of UPR Rio Piedras and the Environmental Health Department of the Medical Sciences Campus. The work produced two presentations and is part of a PhD dissertation.

The first year of the project where we had students was 2009-2010. During that year we had one refereed journal publication and one oral presentation at an international conference. Last year, 2014-2015, we had four journal articles in refereed publications, two journal articles in non-refereed publications, one conference publications, 24 conference presentations (posters), and nine conference presentations (oral).

Educational Accomplishments

The goals of our IGERT program was to train Ph.D. students to apply an interdisciplinary and collaborative approach to environmental problems in urbanizing, tropical landscapes. The novel feature of the research theme was the focus on interactions between human and natural systems in the urbanizing tropics, rather than the more common focus on deforestation and related problems. The interdisciplinary feature was the research and training focus on interactions between human activity and ecological systems. Because of the interdisciplinary relationships between the natural and social sciences and the disciplines concerned with the built environment, we initially housed our project at the Environmental Sciences Program of the College of Natural Sciences and created the curriculum and dissertation structures for a graduate program in Environmental Sciences, offering both MS and PhD degrees. Over the life of the project, we tested and improved the graduate program and the interdisciplinary concepts, which are now a major part of the graduate program in Environmental Sciences. This new graduate program and its associated interdisciplinary culture is the firm, enduring legacy of our IGERT in Environmental Sciences at the now Department of Environmental Sciences at the University of Puerto Rico-Río Piedras.

The Environmental Sciences graduate program was created at the institutional level by Certification 49 2008-2009 of the Board of Trustees of the University of Puerto Rico, dated

March 11, 2009. This certification specifically recognized the importance of NSF-IGERT funding. On June 10, 2009 the Commonwealth accreditation agency, the Council of Higher Education, approved the start of the graduate program and the first 17 students were admitted in August 2009. Of these, eight were IGERT Fellows, one of which has completed her PhD. Due to the rapid growth of the graduate program, the Environmental Sciences Program was merged with the Institute for Tropical Ecosystems Studies in January 24, 2012 to create the Department of Environmental Sciences (Certification 51 2011-2012 of the Board of Trustees of the University of Puerto Rico). As IGERT PI and Chairman of the Environmental Sciences Program and then Environmental Sciences Department (since August 2007 and up to February 2015), I can attest that none of this would have happened without the IGERT grant.

The graduate program in environmental sciences has 68 active students, about 20% of which are international. It has awarded one PhD and eight Master's degrees. There are currently 49 researchers in the graduate program which, reflecting its interdisciplinarity, include faculty from all the departments in the College of Natural Sciences, from the Geography, Psychology, Economics and Sociology departments from the College of Social Sciences, the Institute of Neurobiology, the Graduate School of Planning, the Graduate School of Public Health and others from the University of Puerto Rico and mainland institutions. The main areas of research are ecology, spatial analysis and modeling, environmental neurobiology, biochemistry, urban problems and remediation technologies.

The IGERT program had two aspects that provided exceptional 'added value' to the trainees' educational experience: the IGERT integrative core courses and the Agents-of-Change projects. Since most of today's scientific and social problems lie at the interface of many disciplines, the six, two credit hours each (taken over the course of one year, three per semester) integrative core courses incorporated components of social and natural science and other fields to provide training in the interdisciplinary approach to problems and opportunities in a tropical urbanizing environment. They were specially designed for the interdisciplinary thrust of the IGERT, and to immerse students in real-world problem solving. The components of this core, like the research theme, were based on vital social science and other disciplinary links, in the natural/human systems model and on the main research questions. The courses were: 1) Human Dimensions of Environmental Change; 2) Urban Environment, Expansion, and Design; 3) Ecosystem Services and Ecological Economics; 4) Policy and Ethics for the Environment; 5) Socio-Ecological Models and Ecological Informatics; and 6) Communication on the Environment. Specifically, these courses addressed how human activity alters ecosystems (1, 2), how altered ecosystems affect human activity (3), and on how research findings are used to shape solutions for environmental problems (4, 5, 6). Additional value of the courses was that they trained students to be conversant with informatics and modeling, to manage large databases, project trends, and test hypotheses. IGERT Fellows took this core in the first or second year of graduate study, depending on their previous experience. The IGERT core was open to all qualifying students, which helped enrich the perspective of our students with those from other specialties and graduate programs. Over the seven years of the project, the courses were offered three times and are now part of the regular offer of the Department of Environmental Sciences. Besides being taught by academic experts on the subject, we were able to have one taught by a former Secretary of Natural Resources of Puerto Rico and another one by the current Vice Chairman of the Planning Board, emphasizing the public policy, applied aspects of the program.

During the summer of 2015 we conducted an external evaluation of the project. We evaluated

results from the time each participant entered or started collaborating in the project (Pre time) and the end of the project or the time they ended their collaboration in the project (Post time). We obtained a 91% pre time response rate and a 79% post time rate from all graduate students who have been fellows in the project. Many fellows identified elements of the design and implementation of the Project as its main strengths, including the courses, workshops, professors' mentoring, collaborations and multidisciplinary approach. Two specific comments:

"The IGERT courses have introduced me to some of the important social science components that are relevant to modern environmental and ecological sciences, especially those pertaining to urban landscapes." "The IGERT courses have provided me the tools and up-to-date scientific knowledge that allows me to understand environmental conditions in a broader context."

Our program required that all IGERT Fellows conduct group research. The Agents of Change projects were an innovative program component that provided an opportunity to apply a social-ecological framework to current real-world problems. These research projects were developed while students were engaged in the integrative core courses. Agents of Change projects were aimed at giving the students the experience of working in groups in a complex problem while aiding government agencies, non-profit organization and private groups who were actively working toward a more sustainable Puerto Rico. The students were to apply and integrate the knowledge learned in the core courses to develop a project and a report that presented plausible solutions to current environmental problems in Puerto Rico. Students would also model part of the social and natural components involved in the selected problems. During the summer before the commencement of the core courses a list of possible current environmental problems with relevant contact information was developed by the faculty and the external collaborators. It was required that students meet during the annual orientation week to discuss these problems, decide on groups with similar interest and form a tentative calendar and responsibility description for each member of the group. Then, an initial meeting was held between the students and the professors to determine how each course would provide information and integrate with each project. After the work was done the project and reports were presented to the proposing cooperating agency and evaluated by the IGERT Steering Committee.

As an example, the projects for the last year were: 1) Perceptions, attitudes, and awareness of urban green spaces: The case of Barrio Obrero de Santurce, PR; 2) Synthesis of socio-hydrological data and community surveys of flood experience for municipal planning and management of flooding in San Juan, PR; 3) Wetland restoration and community vulnerability of Torrecilla Baja barrio: Loiza, PR; 4) Flooding and Green Infrastructure in the San Juan/Rio Piedras Watershed, PR; and 5) Evaluation of the current and future socio-environmental impact of interventions in empty spaces in Santurce, PR.

During the aforementioned external evaluation of the project we asked the students and the participating faculty if the IGERT project had been effective in preparing Ph.Ds. with interdisciplinary training in environmental sciences, and other disciplines, to serve as change agents in society? When considering the importance of the different aspects of the program, students and faculty also rated the contribution of IGERT components for fellows to become change agents for the solutions to environmental problems. Fellows rated the 'Agents of Change Project' as one of the three activities that most contributed in this regard. On the other hand, faculty identified the 'Agents of Change Project' firstly in this group.

Our project had other educational components that also provided added value to the trainees' educational experience. In the external evaluation, and again answering the question if the project had been effective in preparing PhDs. with interdisciplinary training in environmental sciences, and other disciplines, to serve as change agents in society, these experiences were rated by the students (mean values presented) as follows (Response format: 4: Very useful; 3: Somewhat useful; 2: Not very useful; 1: Not at all useful; 0: Does not apply): IGERT internship (3.27); Brown bag reading groups (3.25); IGERT workshops (3.25); Retreats (3.20); Teaching experiences (3.00); Fieldtrip experiences (2.91); and Other workshops (2.73).

Major Trainee Accomplishments

Betzaida Ortiz has been working with the El Yaguazo community since the beginning of her involvement in our IGERT project. This low income community, located in the outskirts of San Juan, is located in a highly sensitive environmental area. It has strong leadership that strongly supports environmental conservation efforts. Their leadership has presented various seminars at the Department of Environmental Sciences. Ms. Ortiz involvement with the El Yaguazo community has led to a higher community involvement in the preservation of an important wetland. Betzaida conducted population studies on a local bird species and water quality in the wetland. This work eventually led to a small grant from the Ford Motor Company from their conservation and environment program. This grant was specifically for the establishment of a community market garden for the restoration of the wetland. She then submitted a proposal to the San Juan Bay Estuary Program for a reforestation project to be conducted together with the community organization "El Corredor del Yaguazo, Inc." It was funded for \$5,000. As part of her continued her involvement with the community. she obtained funds for a meteorological station that she installed in the Corredor del Yaguazo, a conservation area managed by the community where ecological research is also done. She was interviewed on November 13, 2013 in the television program called Puertorriqueñísimo, which addresses life in the different town in the Island. She discussed her work with the community and the importance of involving community leadership in conservation projects. Her involvement with the El Yaguazo community resulted in her being recognized by their Quijote annual prize. Betzaida was also involved in the community environmental education program, wrote an article titled "El Corredor del Yaguazo, Inc. más de 30 años conservando el ambiente, mejorando la calidad de vida de Cataño y de Puerto Rico" which was published in the general circulation magazine called Entre Parentesis, and was interviewed in the program Desde mi Pueblo aired by America TV.

Nora Alvarez is a student that has shown multiple abilities. At the end of her IGERT support she was awarded a Graduate Research Fellowship by NSF. She was awarded First Place and Audience Prize for Best Documentary for: "For the Love of Turtles" which competed at the Environmental Short Film Festival of the San Juan Bay Estuary. This documentary was produced as part of the IGERT Scientific Film Making Seminar. She came to the project with research interests in South America. During her Fellowship she traveled to the Peruvian Amazon in three occasions and developed working and research relationships with local and international NGOs working in Perú. She was then invited to participate in a collaborative research with the NGO CIFOR, looking at land changes due to gold mining activities in Latin

America and in Africa. Her paper (coauthored with her advisor) titled Global demand for gold is another threat for tropical forests was widely quoted in the international press. This study provided a regional assessment of gold mining deforestation in the tropical moist forest biome of South America. It analyzed the patterns of forest change in gold mining sites between 2001 and 2013, and evaluated the proximity of gold mining deforestation to protected areas. Annual maps of forest cover were used to model the incremental change in forest in ~1600 potential gold mining sites between 2001-2006 and 2007-2013. Approximately 1680 km² of tropical moist forest was lost in these mining sites between 2001 and 2013. Deforestation was significantly higher during the 2007-2013 period, and this was associated with the increase in global demand for gold after the international financial crisis. More than 90% of the deforestation occurred in four major hotspots, and some of the more active zones of gold mining deforestation occurred inside or within 10 km of ~32 protected area. She concluded that there is an urgent need to understand the ecological and social impacts of gold mining because it is an important cause of deforestation in the most remote forests in South America, and the impacts, particularly in aquatic systems, spread well beyond the actual mining sites.

Eight of our trainees were involved in NSF's Maximizing Yield Through Integration (MYTI): Science and Math Education in the Context of a Disposing Society project. The central subject of the project is solid waste management in an urban environment. Their work included the development of teaching materials, one-on-one mentoring of master teachers in science and mathematics, and participating in monthly workshops with them. For example, one of the students worked with the Visual Arts School in San Juan in the relationship between solid wastes and water quality. The work included the establishment of a water quality measuring station in a nearby creek to determine flow, pH and nitrogen concentrations. The one-on-one mentoring included frequent emails and phone calls and visits by our students to the teacher's schools. This has enhanced the visibility of the IGERT project both inside and outside of the University and has taught our students valuable classroom techniques.

Our program required that all IGERT Fellows conduct group research. The Agents-of-Change reports and projects from three different groups of students proved to be an invaluable contribution to the student's training and to the communities and government/NGO groups that were involved. The projects were selected by students, in collaboration with NGOs, agencies or community groups. The reports (15), which covered a wide variety of issues (e. g. How to integrate the human population into a conservation plan for a river, disruptive development in a watershed, environmental issues of the low income communities in the watershed of the San Juan Bay Estuary, an evaluation of the current and future socio-environmental impact of interventions in empty spaces in Santurce, PR, and the interaction of development and the caves of Puerto Rico) were provided to and were very well received by the cooperating entity.

Accomplishments from the International Component

We did not have explicit funding for the international component. However, our research theme is relevant in many other countries and the environmental issues in the theme are affected by global changes in economics and climate. Therefore, international collaboration and experience was a part of the project with the purpose of broadening student experience and

dissertation research across sites, in order to achieve perspective and generality. The training purpose was to expose students to other cultures, issues, methods and study sites. We attempted to develop three kinds of opportunities. The first was participation in relevant research abroad in a well-established project. The second kind provided a variety of student experiences in order to establish original research abroad. Our faculty have many contacts with researchers abroad who work on topics related to the proposed and we made extensive use of them. The third option was to participate in a relevant international course or conference.

Our international experience started with an outreach activity early in the project, presenting the paper titled "Doctoral Program in Natural-Human Systems in the Urbanizing Tropics", (Rios, R., Brokaw, N., & Ward, S. (2008)). at the XXXI Meeting of the InterAmerican Association of Environmental Engineering and Science at Santiago, Chile. It then continued with the three alternatives mentioned above.

As an example of our participation in a well-established project, we participated in the work of the Tropical Ecology Community Laboratory which is related to land change. It is mainly focused on Latin America and the Caribbean, but recently it has expanded its work to Africa. Part of this research has included the development of a web application for integrating satellite image data with training data from Google Earth to produce accurate and current land change maps. Some of the projects that IGERT students conducted with the application and maps were: 1) oil palm expansion in Latin America; 2) patterns of deforestation and reforestation in Haiti; 3) impacts of gold mining in Latin America, and 4) impacts of urban expansion in Latin America.

The participation of one of our students in the fourth item led to the establishment of original research abroad. Nora Alvarez traveled to the Peruvian Amazon in three occasions and developed working and research relationships with local and international NGOs working in Perú. She was then invited to participate in a collaborative research with the NGO CIFOR, looking at land changes due to gold mining activities in Latin America and in Africa. As summarized in *Nature* (*Nature* 517, 415 (22 January 2015)), her article (coauthored with her advisor) titled "Global demand for gold is another threat for tropical forests" was widely quoted in the international press. She found that deforestation due to gold mining is increasing in South America, particularly around biodiversity hotspots, since gold mining has become more feasible in remote tropical forests owing to the drastic rise in demand and price of the metal over the past decade. She analyzed satellite images of tropical forests in South America from 2001 to 2013 and found that roughly 1,700 square kilometers of forest had been cleared and only 250 km² was regenerated in and around gold-mining sites. Although forest loss from gold mining is small compared with that from agriculture, for instance, it is accelerating - unlike deforestation as a result of other land-use changes. Moreover, nearly one-third of the losses are occurring within 10 km of protected areas. She concluded that there is an urgent need to understand the ecological and social impacts of gold mining because it is an important cause of deforestation in the most remote forests in South America, and the impacts, particularly in aquatic systems, spread well beyond the actual mining sites.

Another example of original research that started and is being conducted with collaboration abroad is the work of Angelica Erazo. She traveled to Cali, Colombia during the summer of 2013, hosted by the CINARA research institute at Universidad del Valle, to study small water treatment systems. In October 2013 she presented the paper titled "Slow Sand Filters for Water Treatment at Disadvantaged Communities" at AGUA 2013: Water Quality in Response to

Environmental Challenges, an international conference held at Cali, Colombia, and in November 2014 she presented the paper titled Metagenomic monitoring of the microbial communities of a slow sand filter in order to improve treatment efficiency at the XXXIV Congress of the InterAmerican Association of Sanitary Engineering, Monterrey, México. Since then she has continued work for her doctoral dissertation.

As part of the third option, to participate in a relevant international course or conference, eight of our students have traveled to international courses or attended training courses, visiting countries from Chile to the United Kingdom.

IGERT Project Personnel and Trainees

Principal Investigator(s)

Name: Rafael A. Rios

Project Years Active: 2008-2009, 2009-2010, 2010-2011, 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016

Co-Principal Investigator(s) or Trainee/Associate Advisor(s)

Name: Juan Agar

Project Years Active: 2012-2013, 2013-2014, 2014-2015, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Mitchell Aide

Project Years Active: 2009-2010, 2010-2011, 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Richard S. Appeldoorn

Project Years Active: 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Josefina Arce

Project Years Active: 2010-2011, 2012-2013, 2013-2014, 2014-2015, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Maritza Barreto

Project Years Active: 2008-2009, 2009-2010, 2010-2011, 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016

Role in Project: Co-PI and Trainee/Associate Advisor

Name: Nicholas Brokaw

Project Years Active: 2008-2009, 2009-2010, 2010-2011, 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016

Role in Project: Co-PI and Trainee/Associate Advisor

Name: Carlos Conde

Project Years Active: 2013-2014, 2014-2015, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Carlos Corrada Bravo

Project Years Active: 2013-2014, 2014-2015, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Elvira Cuevas

Project Years Active: 2009-2010, 2010-2011, 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Liz Diaz

Project Years Active: 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Jose A. Dumas

Project Years Active: 2010-2011, 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Ruben Estremera

Project Years Active: 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Qiong Gao

Project Years Active: 2012-2013, 2013-2014, 2014-2015, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Gary Gervais

Project Years Active: 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: William Gold

Project Years Active: 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Rossana Grafals

Project Years Active: 2012-2013, 2013-2014, 2014-2015, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Hector R. Grau

Project Years Active: 2013-2014, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Edwin A Hernández Delgado

Project Years Active: 2010-2011, 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Heelal Janwa

Project Years Active: 2010-2011, 2012-2013, 2013-2014, 2014-2015, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Ariel Lugo

Project Years Active: 2013-2014, 2014-2015, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Olga L. Mayol

Project Years Active: 2009-2010, 2010-2011, 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Elvia J. Melendez-Ackerman

Project Years Active: 2009-2010, 2010-2011, 2012-2013, 2013-2014, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Thomas E. Miller

Project Years Active: 2009-2010, 2010-2011, 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Gabriel Moreno

Project Years Active: 2008-2009, 2009-2010, 2010-2011, 2012-2013, 2013-2014, 2014-2015, 2015-2016

Role in Project: Co-PI and Trainee/Associate Advisor

Name: Criseida Navarro-Diaz

Project Years Active: 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Jorge Ortiz

Project Years Active: 2009-2010, 2010-2011, 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Alonso Ramirez

Project Years Active: 2009-2010, 2010-2011, 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016

Role in Project: Co-PI and Trainee/Associate Advisor

Name: Isabel Rivera-Collazo

Project Years Active: 2014-2015, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Loretta Roberson

Project Years Active: 2009-2010, 2010-2011, 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Manuel R. Rodriguez

Project Years Active: 2012-2013, 2013-2014, 2015-2016

Role in Project: Trainee/Associate Advisor

Name: Mario H. Rodríguez-Sánchez
Project Years Active: 2013-2014, 2014-2015, 2015-2016
Role in Project: Trainee/Associate Advisor

Name: Osvaldo Rosario
Project Years Active: 2010-2011, 2011-2012, 2012-2013, 2013-2014, 2015-2016
Role in Project: Trainee/Associate Advisor

Name: Alberto Sabat
Project Years Active: 2009-2010, 2010-2011, 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016
Role in Project: Trainee/Associate Advisor

Name: Luis Santiago
Project Years Active: 2010-2011, 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016
Role in Project: Trainee/Associate Advisor

Name: Jenniffer Santos
Project Years Active: 2015-2016
Role in Project: Trainee/Associate Advisor

Name: Victor Snyder
Project Years Active: 2015-2016
Role in Project: Trainee/Associate Advisor

Name: Juan L Torres
Project Years Active: 2010-2011, 2011-2012
Role in Project: Trainee/Associate Advisor

Name: Alejandro Torres-Abreu
Project Years Active: 2013-2014, 2014-2015, 2015-2016
Role in Project: Trainee/Associate Advisor

Name: Manuel Valdés-Pizzini
Project Years Active: 2010-2011, 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016
Role in Project: Trainee/Associate Advisor

Name: Joseph H. Vogel
Project Years Active: 2009-2010, 2010-2011, 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016
Role in Project: Trainee/Associate Advisor

Name: Sheila Ward
Project Years Active: 2009-2010, 2010-2011, 2011-2012, 2012-2013
Role in Project: Co-PI and Trainee/Associate Advisor

Name: Mei Yu
Project Years Active: 2009-2010, 2010-2011, 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016
Role in Project: Trainee/Associate Advisor

Name: Jess K. Zimmerman

Project Years Active: 2008-2009, 2009-2010, 2010-2011, 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016

Role in Project: Co-PI and Trainee/Associate Advisor

Trainees

Name: Adail Alicea

Total number of months funded: 24

Project Years Active:

2009-2010 Project Year - Trainee supported for 10 months

2010-2011 Project Year - Trainee supported for 12 months

2011-2012 Project Year - Trainee supported for 2 months

2012-2013 Project Year - Trainee supported for 0 months

2013-2014 Project Year - Trainee supported for 0 months

2014-2015 Project Year - Trainee supported for 0 months

2015-2016 Project Year - Trainee supported for 0 months

Name: Natalia B. Alvarez

Total number of months funded: 16

Project Years Active:

2010-2011 Project Year - Trainee supported for 9 months

2011-2012 Project Year - Trainee supported for 7 months

2012-2013 Project Year - Trainee supported for 0 months

Name: Nora L. Alvarez

Total number of months funded: 24

Project Years Active:

2009-2010 Project Year - Trainee supported for 10 months

2010-2011 Project Year - Trainee supported for 12 months

2011-2012 Project Year - Trainee supported for 2 months

2012-2013 Project Year - Trainee supported for 0 months

2013-2014 Project Year - Trainee supported for 0 months

2014-2015 Project Year - Trainee supported for 0 months

2015-2016 Project Year - Trainee supported for 0 months

Name: Maria J. Andrade

Total number of months funded: 24

Project Years Active:

2012-2013 Project Year - Trainee supported for 10 months

2013-2014 Project Year - Trainee supported for 12 months

2014-2015 Project Year - Trainee supported for 2 months

2015-2016 Project Year - Trainee supported for 0 months

Name: Arelis I. Arocho-Montes

Total number of months funded: 24

Project Years Active:

2009-2010 Project Year - Trainee supported for 10 months

2010-2011 Project Year - Trainee supported for 12 months
2011-2012 Project Year - Trainee supported for 2 months
2012-2013 Project Year - Trainee supported for 0 months
2013-2014 Project Year - Trainee supported for 0 months
2014-2015 Project Year - Trainee supported for 0 months
2015-2016 Project Year - Trainee supported for 0 months

Name: Benjamin L. Branoff

Total number of months funded: 24

Project Years Active:

2013-2014 Project Year - Trainee supported for 11 months
2014-2015 Project Year - Trainee supported for 12 months
2015-2016 Project Year - Trainee supported for 1 months

Name: Marianne Cartagena

Total number of months funded: 24

Project Years Active:

2013-2014 Project Year - Trainee supported for 11 months
2014-2015 Project Year - Trainee supported for 12 months
2015-2016 Project Year - Trainee supported for 1 months

Name: Jessica H. Castro

Total number of months funded: 24

Project Years Active:

2011-2012 Project Year - Trainee supported for 10 months
2012-2013 Project Year - Trainee supported for 12 months
2013-2014 Project Year - Trainee supported for 2 months
2014-2015 Project Year - Trainee supported for 0 months
2015-2016 Project Year - Trainee supported for 0 months

Name: Argenis Y. Catala

Total number of months funded: 12

Project Years Active:

2014-2015 Project Year - Trainee supported for 11 months
2015-2016 Project Year - Trainee supported for 1 months

Name: Abelardo Colon

Total number of months funded: 12

Project Years Active:

2014-2015 Project Year - Trainee supported for 11 months
2015-2016 Project Year - Trainee supported for 1 months

Name: Daniel Davila

Total number of months funded: 21

Project Years Active:

2010-2011 Project Year - Trainee supported for 9 months
2011-2012 Project Year - Trainee supported for 12 months
2012-2013 Project Year - Trainee supported for 0 months
2013-2014 Project Year - Trainee supported for 0 months
2014-2015 Project Year - Trainee supported for 0 months

2015-2016 Project Year - Trainee supported for 0 months

Name: Angelica Erazo

Total number of months funded: 24

Project Years Active:

2012-2013 Project Year - Trainee supported for 10 months

2013-2014 Project Year - Trainee supported for 12 months

2014-2015 Project Year - Trainee supported for 2 months

2015-2016 Project Year - Trainee supported for 0 months

Name: Laura L. Fidalgo

Total number of months funded: 12

Project Years Active:

2014-2015 Project Year - Trainee supported for 11 months

2015-2016 Project Year - Trainee supported for 1 months

Name: Paul Furumo

Total number of months funded: 24

Project Years Active:

2012-2013 Project Year - Trainee supported for 10 months

2013-2014 Project Year - Trainee supported for 12 months

2014-2015 Project Year - Trainee supported for 2 months

2015-2016 Project Year - Trainee supported for 0 months

Name: Johnny Lugo-Vega

Total number of months funded: 24

Project Years Active:

2012-2013 Project Year - Trainee supported for 10 months

2013-2014 Project Year - Trainee supported for 12 months

2014-2015 Project Year - Trainee supported for 2 months

2015-2016 Project Year - Trainee supported for 0 months

Name: Nilda I. Luhring

Total number of months funded: 24

Project Years Active:

2009-2010 Project Year - Trainee supported for 10 months

2010-2011 Project Year - Trainee supported for 12 months

2011-2012 Project Year - Trainee supported for 2 months

2012-2013 Project Year - Trainee supported for 0 months

2013-2014 Project Year - Trainee supported for 0 months

Name: Aristides Martinez

Total number of months funded: 21

Project Years Active:

2010-2011 Project Year - Trainee supported for 9 months

2011-2012 Project Year - Trainee supported for 12 months

2012-2013 Project Year - Trainee supported for 0 months

2013-2014 Project Year - Trainee supported for 0 months

2014-2015 Project Year - Trainee supported for 0 months

2015-2016 Project Year - Trainee supported for 0 months

Name: Brenda L. Martinez

Total number of months funded: 12

Project Years Active:

2014-2015 Project Year - Trainee supported for 11 months

2015-2016 Project Year - Trainee supported for 1 months

Name: Jeiger L. Medina

Total number of months funded: 24

Project Years Active:

2009-2010 Project Year - Trainee supported for 10 months

2010-2011 Project Year - Trainee supported for 12 months

2011-2012 Project Year - Trainee supported for 2 months

2012-2013 Project Year - Trainee supported for 0 months

Name: Roselyn Mendez

Total number of months funded: 12

Project Years Active:

2014-2015 Project Year - Trainee supported for 11 months

2015-2016 Project Year - Trainee supported for 1 months

Name: Christopher Nytch

Total number of months funded: 24

Project Years Active:

2013-2014 Project Year - Trainee supported for 11 months

2014-2015 Project Year - Trainee supported for 12 months

2015-2016 Project Year - Trainee supported for 1 months

Name: Glorynel Ojeda

Total number of months funded: 12

Project Years Active:

2014-2015 Project Year - Trainee supported for 11 months

2015-2016 Project Year - Trainee supported for 1 months

Name: Sofia Olivero

Total number of months funded: 24

Project Years Active:

2012-2013 Project Year - Trainee supported for 10 months

2013-2014 Project Year - Trainee supported for 12 months

2014-2015 Project Year - Trainee supported for 2 months

2015-2016 Project Year - Trainee supported for 0 months

Name: Betzaida Ortiz

Total number of months funded: 24

Project Years Active:

2009-2010 Project Year - Trainee supported for 10 months

2010-2011 Project Year - Trainee supported for 12 months

2011-2012 Project Year - Trainee supported for 2 months

2012-2013 Project Year - Trainee supported for 0 months

2013-2014 Project Year - Trainee supported for 0 months

2014-2015 Project Year - Trainee supported for 0 months
2015-2016 Project Year - Trainee supported for 0 months

Name: Osé Pauléus

Total number of months funded: 24

Project Years Active:

2013-2014 Project Year - Trainee supported for 11 months
2014-2015 Project Year - Trainee supported for 12 months
2015-2016 Project Year - Trainee supported for 1 months

Name: Dionisio Perez

Total number of months funded: 24

Project Years Active:

2009-2010 Project Year - Trainee supported for 10 months
2010-2011 Project Year - Trainee supported for 12 months
2011-2012 Project Year - Trainee supported for 2 months
2012-2013 Project Year - Trainee supported for 0 months
2013-2014 Project Year - Trainee supported for 0 months

Name: Norberto Quinones

Total number of months funded: 24

Project Years Active:

2009-2010 Project Year - Trainee supported for 10 months
2010-2011 Project Year - Trainee supported for 12 months
2011-2012 Project Year - Trainee supported for 2 months
2012-2013 Project Year - Trainee supported for 0 months

Name: Molly M. Ramsey

Total number of months funded: 24

Project Years Active:

2013-2014 Project Year - Trainee supported for 11 months
2014-2015 Project Year - Trainee supported for 12 months
2015-2016 Project Year - Trainee supported for 1 months

Name: Natalia M. Rodriguez-Ortiz

Total number of months funded: 12

Project Years Active:

2014-2015 Project Year - Trainee supported for 11 months
2015-2016 Project Year - Trainee supported for 1 months

Name: Julio M. Santiago-Rios

Total number of months funded: 7

Project Years Active:

2011-2012 Project Year - Trainee supported for 7 months

Name: Sheila M. Soler

Total number of months funded: 14

Project Years Active:

2009-2010 Project Year - Trainee supported for 10 months
2010-2011 Project Year - Trainee supported for 4 months

Name: Francisco J. Soto

Total number of months funded: 24

Project Years Active:

2011-2012 Project Year - Trainee supported for 10 months

2012-2013 Project Year - Trainee supported for 12 months

2013-2014 Project Year - Trainee supported for 2 months

2014-2015 Project Year - Trainee supported for 0 months

2015-2016 Project Year - Trainee supported for 0 months

Name: Ana M. Trujillo

Total number of months funded: 24

Project Years Active:

2013-2014 Project Year - Trainee supported for 11 months

2014-2015 Project Year - Trainee supported for 12 months

2015-2016 Project Year - Trainee supported for 1 months

Name: Hagmel A. Vega-Fontanez

Total number of months funded: 24

Project Years Active:

2013-2014 Project Year - Trainee supported for 11 months

2014-2015 Project Year - Trainee supported for 12 months

2015-2016 Project Year - Trainee supported for 1 months

Name: Luis Villanueva-Cubero

Total number of months funded: 24

Project Years Active:

2011-2012 Project Year - Trainee supported for 10 months

2012-2013 Project Year - Trainee supported for 12 months

2013-2014 Project Year - Trainee supported for 2 months

2014-2015 Project Year - Trainee supported for 0 months

2015-2016 Project Year - Trainee supported for 0 months

Publications, Presentations, and Patents

Journal Articles in Refereed Publications

1. Alvarez*, N., & Aide, T. M. (2015) Gold-rush threat to tropical forests, *Nature*, 517, 415, 21 January 2015, doi:10.1038/517415d
2. Alvarez*, N. & Aide, T. M. (2015) *Environmental Research Letters*, 10, 1, 4006 doi:10.1088/1748-9326/10/1/014006
3. Alvarez*, N. (2014) Perspective: Globalization and land use in Latin America. *GLP News*. 10(10). 5-7. http://www.globallandproject.org/arquivos/GLPNews_Jun2014v3.pdf
4. Ramos-Santiago, L. E., Villanueva-Cubero*, L., Santiago-Acevedo, L. & Rodríguez-Meléndez, Y. N. (2014). Green area loss in San Juan's inner-ring suburban

neighborhoods: a multidisciplinary approach to analyzing green/gray area dynamics. *Ecology and Society* 19(2): 4.
<http://dx.doi.org/10.5751/ES-06219-190204>

Colón-Rivera, R., Marshall, K., Soto-Santiago*, F., Ortiz-Torres, D., and Flower, C. (2013). Moving forward: fostering the next generation of Earth stewards in the STEM disciplines. *Frontiers in Ecology and the Environment*, 11: 383391.

Soto-Santiago*, F., Irizarry-Soto, E. (2013). The Sea Urchin *Diadema antillarum* (Echinodermata, Equinoidea), algal cover and juvenile coral densities in La Parguera, Puerto Rico *Cuadernos de Investigación UNED* (ISSN: 1659-4266) Vol. 5(1), Junio, 2013

Soto-Santiago, F. J.* , & Weil, E. (2012) Incidence and Spatial Distribution of Caribbean Yellow Band Disease in La Parguera, Puerto Rico. *Journal of Marine Biology*, vol. 2012, Article ID 510962, 7 pages, doi:10.1155/2012/510962

Alvarez-Berrios, N. L.* , Parés-Ramos, I. K. & Aide, T. M. (2012) Contrasting Patterns of Urban Expansion in Colombia, Ecuador, Peru, and Bolivia Between 1992 and 2009. *AMBIO* doi 10.1007/s13280-012-0344-8

Álvarez-Berrios, N.L.* Parés-Ramos, I.K. & Aide, T.M. Constrasting Patterns of Urban Expansion in Colombia, Ecuador, Peru and Bolivia Between 2001 and 2009. (2012) *AMBIO* 42, 29-40.

Bonilla-Moheno M, Aide T. M., Alvarez-Berrios, N. L.* , Andrade-Nunez, M.J.* , Arache-Martinez, A. V. , Roman, G. P. & Sanchez-Cuervo, A. M. (2012) Environmental Social Science: Human-Environment Interactions and Sustainability. *Conservation and Society* 10: 386-7

Álvarez-Berrios, N.L.* , Redo, D.J., Aide, T.M., Clark, M.L., & Grau, R. (2012) Land Change in the Greater Antilles between 2001 and 2010. *Land* 2013, 2, 81-107.

Parés-Ramos, I.K., Álvarez-Berrios, N.L.* & Aide, T.M. (2013) Mapping Urbanization Dynamics in Major Cities of Colombia, Ecuador, Perú, and Bolivia Using Night-Time Satellite Imagery. *Land* , 2, 37-59; doi:10.3390/land2010037.

Vogel JH, Álvarez-Berrios N*, Quiñones-Vilches N*, Medina-Muñiz JL*, Perez-Montes D*, Arocho-Montes A*, Vale-Merniz N, Fuentes-Ramirez R, Marrero-Girona G, Varcacel-Mercado E, Santiago-Rios J.* (2011). The Economics of Information, Studiously Ignored in The Nagoya Protocol on Access to Genetic Resources and Benefit Sharing. *7/1 Law, Environment and Development Journal*, p. 52, available at

<http://www.lead-journal.org/content/11052.pdf> (Also published in Chinese, French, Spanish and Arabic).

Ortiz-Carrion, B*. and Medina-Muniz, J*. (2011) La voragine del desarrollo industrial y una biofilia prevaleciente: El caso de la comunidad Juana Matos, Cataño, Puerto Rico. *Ecología Política*. Editorial Icaria Volumen 41: 62-66.

Vogel, J.H., *Álvarez-Berríos, N.,* Quiñones-Vilches, N.,* Medina-Muñiz, J.L., *Pérez-Montes, D., *Arocho-Montes, A. I., Vale-Merniz, N., Fuentes-Ramírez, R , Marrero-Girona, G., Varcancel-Mercado, E., Santiago-Rios, J. (2011). The Economics of Information, Studiously Ignored in The Nagoya Protocol on Access to Genetic Resources and Benefit Sharing. *Law, Environment and Development Journal*, 1, available at <http://www.lead-journal.org/content/10001.pdf>

Journal Articles in Non-Refereed Publications

Rivera, A. & Erazo*, A. (2015) Análisis formativo y el inquirir en el estudio de sistemas complejos. *El Sol Journal*, 56, 50-54 Teachers Association of Puerto Rico. ISSN 2372-9635

Ortiz-Quiles, E. O., Martínez, S., Olivero*, S., Berríos, B. (2015) Los colores de mi tierra (The Colors of My Land). *El Sol Journal*, 56, 55-60, Teachers Association of Puerto Rico. ISSN 2372-9635

Santiago-Ríos, J. M.* (2012), En aumento la basura-e en Puerto Rico. *Diálogo Digital* <http://dialogodigital.upr.edu/index.php/En-aumento-la-Basura-e-en-Puerto-Rico.html>

Books

Vogel, J. (2009). *Economics of the Yasuni Initiative: Climate Change as if Thermodynamics Mattered*. Arizona, Anthem.

Vogel, J. (2010). *Museum of Bioprospecting, Intellectual Property and the Public Domain*. Arizona, Anthem.

Book Chapters

Joseph Henry Vogel, Nora Álvarez-Berríos*, Betzaida Ortiz-Carrión* and Omar Oduardo-Sierra, (2013), La financiación y fungibilidad del Museo de Bioprospección, la Propiedad Intelectual y el Dominio Público, edited volume by Elizabeth Hodson de Jaramillo and Teodora Zamudio, *Bioteecnologías e innovación*, Bogotá: Editorial de la Pontificia Universidad Javeriana de Colombia, pp. 283-300, ISBN: 978-958-716-587-6

Vogel, J. H., Álvarez-Berrios, N.* Ortiz-Carrión, B.*, & Oduardo-Sierra, O. (2013) La financiación y fungibilidad del Museo de Bioprospección, la Propiedad Intelectual y el Dominio Público, in E. Hodson de Jaramillo & T. Zamudio (Eds.), *Biotechnologías y Responsabilidad* (pp. 283-300) Bogotá, Colombia: Editorial de la Pontificia Universidad Javeriana de Colombia. ISBN: 978-958-716-587-6

Conference Publications

Alicea*, A. & Rios, R. (2014) Technical, Financial and Administrative Capacity Evaluations and Improvement of Small Community Water Systems in Puerto Rico., In G. Sorial and J. Hong (Eds.) *Environmental Science and Technology*. Paper presented at the Seventh International Conference on Environmental Science and Technology, June 2014. (pp. 128-133). Houston, TX

Conference Presentations

Colon*, A. (2015, June). Nano diamond Powder as Reusable & Bio-compatible Water Disinfection Material. Poster session presented at the XI International Interdisciplinary Congress of Science. Santo Domingo, Dominican Republic.

Posters

1. Lugo-Vega*, J., Villanueva-Cubero*, L., Soto*, F., Furumo*, P. (2015, May). A history of flood, drought and land use: El Niño Southern Oscillation influence over Aguas Prietas Lagoon in Fajardo, Puerto Rico during the Little Ice Age. Poster session presented at UPR Environmental Archeology Lab Inauguration UPR RP REB-121, San Juan, PR
2. Lugo-Vega*, J., Rosim-Fachini, E., Collazo-Martínez-Collazo, A., Piñeiro-González, C., Martínez-Noble, M. (2015, May). Conservation Science Research Project on Three (3) Historic Cannons and Forty (40) Artillery Munitions Shells. Poster session presented at National Park Service meeting, San Juan, PR
3. Lugo-Vega*, J., Rosim-Fachini, E., Collazo-Martínez-Collazo, A., Piñeiro-González, C., Martínez-Noble, M. (2015, May). Conservation Science Research Project on Three (3) Historic Cannons and Forty (40) Artillery Munitions Shells. Poster session presented at Segovia, España. Simposio "Metales España", Segovia, España 3-5 de octubre 2015
4. Villanueva-Cubero*, L., Soto*, F., Furumo*, P. (2015, May). The Northeast Ecological Corridor Forest Reserve and his landscape in 1930's: An environmental history of El Yunque from a small struggled Hill. Poster session presented at 1st National Congress of History Students of Puerto Rico, San Juan, PR
5. Villanueva-Cubero*, L., M.P., Yu, Mei, PhD. (2014, November). Legal and Policy Framework as it Pertains to Puerto Rico Coastal Vegetative Wetlands. Poster session presented at Bi-Annual Symposium of the Restore America's Estuaries and The Coastal Society, Washington, DC
6. Villanueva-Cubero*, L., M.P., Yu, Mei, PhD. (2014, November). Legal and Policy Framework as it Pertains to Puerto Rico Coastal Vegetative Wetlands. Poster session presented at NASA Annual symposium on Land Cover, Denver, CO
7. Colon*, A. (2014, December). Nano diamond Powder as Reusable Nontoxic Water Disinfection Material. Poster session presented at EPSCOR Annual Meeting, San Juan,

PR

8. Andrade*, M. (2014, December). The Spatial Scale of Response of Two Mammal Species in a Human Dominated Landscape in Rivera Uruguay. Poster session presented at III Congreso Uruguayo de Zoología, Montevideo, Uruguay
9. Fidalgo*, L., Cartagena* , M., Trujillo*, A., Nytch*, C., Ramsey*, M., Vega-Fontanez*, H. (2014, August). An assessment of residents' satisfaction and short-term visions for urban yards in San Juan, Puerto Rico. Poster session presented at Ecological Society of America 2014 annual meeting, Sacramento, CA
10. Castro*, J., Quiñones, M. and Gould, W. (2014, June) Effectiveness Assessment of the Network of Terrestrial Protected Areas in Puerto Rico. Poster session presented at the Primer Congreso de Áreas Naturales Protegidas de Puerto Rico- The Nature Conservancy, San Juan, PR
11. Erazo*, A. (2014, September) Metagenomic Monitoring of the Microbial Communities of a Slow Sand Filter in Order to Improve Treatment Efficiency. Poster session presented at the EPA Region 2 Workshop at the University of Puerto Rico, Río Piedras Campus, San Juan, PR
12. Olivero*, S., & Meléndez-Ackerman, E. (2015, April) Local Perception of Ecosystem Services and Green Infrastructure Management in Residential Zones of the Río Piedras Watershed. Poster session presented at the 4th Student Conference for Graduate Research at the University of Puerto Rico, Río Piedras Campus, San Juan, PR
13. Olivero*, S., & Meléndez-Ackerman, E. (2015, March) Ecosystem services by urban green infrastructure in residential yards in a tropical city: Integrating information on social drivers, green infrastructure management and ecosystem assessment tools. Poster session presented at the 35th Puerto Rico Interdisciplinary Meeting / 50th Junior Tech Meeting, San Juan, PR
14. Ortiz*, B. (2014, September) Efecto del cambio de uso de terreno en la hidrología del acuífero de Santa Isabel, Puerto Rico. Poster session presented at the Symposium conducted at the Universidad del Turabo's Ambientis Convention, Gurabo, PR
15. Ortiz*, B. (2015, April) Efecto del cambio de uso de terreno en la hidrología del acuífero de Santa Isabel, Puerto Rico. Poster session presented at the 4th Student Conference for Graduate Research at the University of Puerto Rico, Río Piedras Campus, San Juan, PR
16. Fidalgo*, L., Cartagena*, M., Trujillo*, A., Nytch*, C., Ramsey*, M., Vega-Fontanez*, H. (2014, September). An assessment of residents' satisfaction and short-term visions for urban yards in San Juan, Puerto Rico. Poster session presented at the International Association for Landscape Ecology-UK Region 2014 Meeting, Kings' College, London, United Kingdom.
17. Fidalgo*, L., Cartagena*, M., Trujillo*, A., Nytch*, C., Ramsey*, M., Vega-Fontanez*, H. (2014, August). An assessment of residents' satisfaction and short-term visions for urban yards in San Juan, Puerto Rico. Poster session presented at the Ecological Society of America 2014 annual meeting, Sacramento, CA
18. Nytch*, C. (2014, December) Modeling Rainfall-Runoff Dynamics in Tropical, Urban Social-Hydrological Systems ? Green Infrastructure and Variable Precipitation Interception. Poster session presented at the American Geophysical Union Fall Meeting, San Francisco, CA
19. Nytch*, C. (2015, April) Rainfall-runoff Dynamics in Tropical, Urban Social-Hydrological System: Evaluating the Interception Capacity of Green Infrastructure. Poster session presented at the 4th Student Conference for Graduate

Research at the University of Puerto Rico, Río Piedras Campus, San Juan, PR

20. Nytch*, C. (2015, August) The Water Balance of a Tropical Urban Watershed. Poster session presented at the Ecological Society of America 2015 Annual Meeting, Baltimore, MD

21. Castro*, J. (2014, September) Housing and Population in and Around Protected Areas in Puerto Rico. Poster session presented at the Symposium conducted at the Universidad del Turabo's Ambientis Convention, Gurabo, PR

22. Castro*, J. & Gould, W. (2014, September) Urban Change and Housing Growth in and in the Borders of Protected Areas in Puerto Rico. Poster session presented at the Symposium conducted at the Universidad del Turabo's Ambientis Convention, Gurabo, PR

23. Castro*, J., Quiñones, M. & Gould, W. (2014, November) Urban Development, Human Population and Housing in Adjacent Lands to Protected Areas in Puerto Rico. Poster session presented at the XXVIII DRNA Symposium: Manejo del Paisaje en Puerto Rico: Un Espacio de Intercambio Interdisciplinario para la Conservación y el Desarrollo Sustentable, Convention Center, San Juan, PR

24. Torres- Camacho, K., Meléndez-Ackerman, E., Díaz, E., Correa, N. Vila, C., Olivero*, S. , Erazo*, A., Fontanez, J., Santiago, L. & Seguinot, J., (2014, November) How Do People Get Their Yard Plants?. Poster session presented at the Symposium conducted at the Universidad del Turabo's Ambientis Convention, Gurabo, PR

Oral presentations

1. Martinez*, A., Ortiz-Zayas, J.R., Barreto-Orta, M., Navarro-Díaz, C., Rosario-López, O & Díaz-Vázquez, L. (2014, September) Urban Expansion and Trace Metal Speciation in the Sediments of a Tropical Coastal Marsh, Ciénaga Las Cucharillas, Cataño, Puerto Rico. Paper presented at the Symposium conducted at the Universidad del Turabo's Gurabo Ambientis Convention, Gurabo, PR

2. Martinez*, A., Ortiz-Zayas, J.R., Barreto-Orta, M., Navarro-Díaz, C., Rosario-López, O. & Díaz-Vázquez, L. (2015, May) Land/Cover Use Patterns Relationship with Metal Fractionation at Cienaga Las Cucharillas Marsh, Puerto Rico. Paper presented at the Symposium conducted at the Industrial Association of Puerto Rico Convention at Hotel Conquistador, Fajardo, PR

3. Branoff*, B. (2015, February) What is Urbanness and How Does it Influence Urban Mangrove Ecology? A case study of the San Juan Bay Estuary. Paper presented at the Symposium conducted at the Association for the Sciences of Limnology and Oceanography, Granada, Spain.

4. Ortiz*, B. (2015, May) The Economic Benefits of Helping the Environment: Why Pay Being Green. Behaviors of La Chiriria Antillana, Hydrology of Laguna Secreta and Social Impacts of Reforestation in the Cienaga Las Cucharillas at Cataño, Puerto Rico. Paper presented at the Symposium conducted at the Industrial Association of Puerto Rico Convention at Hotel Conquistador, Fajardo, PR

5. Vega-Fontanez*, H. (2014, July) Política Pública sobre el Ambiente Urbano en el Municipio de San Juan, Puerto Rico: Un análisis desde la perspectiva de los espacios verdes en la ciudad. Paper presented at the Symposium at the II Congress of Policy, Law and Environmental Justice. X International Convention on the Environment and Development, La Habana, Cuba.

6. Villanueva-Cubero*, L. (2014, September). Wetland Regulations and Policies in the Commonwealth of Puerto Rico. Paper presented at the Third Student Research

Symposium: Interdisciplinary Approach on the Study of Environmental Sciences, San Juan, PR

7. Colon*, A. (2014, December). Nano diamond Powder as Reusable Nontoxic Water Disinfection Material. Paper presented at the Materials Research Society (MRS) Fall Meeting and Exhibit, Boston, MA

8. Trujillo*, A. (2015, March). Proyecto Imagina a Santurce San Juan, Puerto Rico: Experiencia de planificación participativa comunitaria. Paper presented at the Taller de Planificación Participativa para un Cambio Estructural con Igualdad sponsored by Comisión Económica Para América Latina - United Nations, Santiago, Chile.

9. Rios, R. & Erazo*, A. (2014, November) Metagenomic monitoring of the microbial communities of a slow sand filter in order to improve treatment efficiency. Paper presented at the XXXIV Congress of the Interamerican Association of Sanitary Engineering, Monterrey, México

Erazo*, Angelica, (2013, October). Filtración lenta con arena para el tratamiento de agua en comunidades desfavorecidas. Paper presented at AGUA 2013, Cali, Colombia

Rios, Rafael, (2013, October). Vulnerabilidad y Riesgos en Sistemas Pequeños de Agua y Saneamiento. Paper presented at AGUA 2013, Cali, Colombia

Soto-Santiago*, Francisco J., (2013, September). A social-ecological approach for coral reef conservation in Eastern Puerto Rico. Poster presented at Third Conference for Sustainability IGERTs. Portland State University, Portland, Oregon.

Lugo*, Johnny, (2013, September). The Northeast Ecological Corridor Forest Reserve and its landscape in 1930s: An environmental history of El Yunque from a small struggled Hill, Paper presented at 1st National Congress Of History Students of Puerto Rico, San Juan, Puerto Rico

Davila*, Daniel, (2013, October). Coquí Llanero SLAMM Vulnerability of the coquí llanero, *Eleutherodactylus juanariveroi*, habitat to sea level rise, Poster presented at Cuarto Simposio de Herpetología Puertorriqueña, Arecibo, Puerto Rico

Davila*, Daniel, (2013, November). El Hábitat del Coqui Llanero, *Eleutherodactylus juanariveroi*, y el Aumento en el Nivel del Mar, Paper presented at the XXVII Symposium of the Department of Natural Resources, San Juan, Puerto Rico

Quiñones-Vilches, N.*, Melendez, A., Rodriguez, J., Gervais, G., Roberson, L. & Griebenow, K. (2013, February) Biodiversity Mapping for the determination of Macroalgae biomass mariculture sites in the coastal areas of Puerto Rico. Paper presented orally at the meeting of the Association for the Sciences of Limnology and Oceanography at New Orleans.

Quiñones-Vilches, N.*, Melendez, A., Rodriguez, J., Gervais, G., Roberson, L. & Griebenow, K. (2013, March) Biodiversity Mapping for the determination of Macroalgae

biomass mariculture sites in the coastal areas of Puerto Rico. Paper presented orally in the PRISM 2013 meeting at Turabo University, Puerto Rico.

Quiñones-Vilches, N.*, Melendez, A., Rodriguez, J., Gervais, G., Roberson, L. & Griebenow, K. (2012, July) Habitat and Biodiversity Mapping for the Determination Of Algal Biomass Mariculture Sites in Coastal Areas of Puerto Rico. Paper presented orally at the Biomass 2012 conference of the Department of Energy in Washington DC.

Quiñones-Vilches, N.*, Melendez, A., Rodriguez, J., Gervais, G., Roberson, L. & Griebenow, K. (2012, October) Habitat and Biodiversity Mapping for the Determination Of Algal Biomass Mariculture Sites in Coastal Areas of Puerto Rico. Paper presented orally at the Coastal Management Congress of the Department of Natural and Environmental Resources of Puerto Rico in Ponce, PR.

Santiago-Ríos, J. M. (2012), Emulemos a la naturaleza: La sustentabilidad en Puerto Rico. Poster sesión presented at the 5th Agroecology Symposium of Puerto Rico, UPR-Utuado.

Quiñones, N.*, Melendez, A., Rodriguez, J., Gervais, G., Roberson, L. Griebenow, K.. (2012) Habitat and Biodiversity Mapping for the Determination Of Algal Biomass Mariculture Sites In Coastal Areas Of Puerto Rico, Paper presented in the CESGI 2012 at University of Puerto Rico, Rio Piedras Campus.

Alicea, A.*, Robles, J. & Rios, R. (2011, May). Circuit Riders at Non PRASA Systems: A Tool to Reach Capacity Development Compliance in Small Systems. Paper presented at the Annual Meeting of the PR American Water Works Association. San Juan, PR.

Arocho, A.*, & Sabat, A. (2011, February) Change in Grouper (Serranidae) Stocks in Puerto Real, Cabo Rojo (Puerto Rico): A Test of Two Data Bases. Poster session presented at the Aquatic Sciences Meeting of the American Society of Limnology and Oceanography, San Juan, PR.

Medina-Muñiz, J.* et al (2011, February). Impacts of non-point source pollution in northeastern coral reefs. Poster session presented at the Aquatic Sciences Meeting of the American Society of Limnology and Oceanography, San Juan, PR.

Ortiz-Carrion, B.* & Ortiz, J. (2011, February). Agricultural Dilemma of Land Use Change in the Santa Isabel/Coamo Area, Southern Puerto Rico. Poster session presented at the Aquatic Sciences Meeting of the American Society of Limnology and Oceanography, San Juan, PR.

Ortiz-Carrion, B.* (2010, December) Yaguazo Corridor: Community initiative in the Juana Matos Area Cataño, Puerto Rico. Poster session presented at the 13th Caribbean Conference on Urban Forests and Communities, Ponce, PR.

Ortiz, B.* (2010, February). Hydrologic impacts and community perceptions of land use change in the Southern Aquifer Recharge Area in Santa Isabel and Salinas, Puerto Rico. Poster Session presented at the annual meeting of the Puerto Rico LTER, San Juan, PR.
Ortiz, B.* (2010, March). Hydrologic impacts and community perceptions of land use change in the Southern Aquifer Recharge of the Coamo Watershed, Puerto Rico. Poster Session presented at the annual meeting of the Puerto Rico CATEC, San Juan, PR.

Rios, R., Brokaw, N., & Ward, Sheila. (2008, October). Doctoral Program in Natural-Human Systems in the Urbanizing Tropics.
Paper presented at the XXXI Meeting of the InterAmerican Association of Environmental Engineering and Science, Santiago, Chile

Outreach Activities

Title: Documentary at Film Festival

Media Outlet/Organization: San Juan Bay Estuary Program

Activity Date: 06/25/2011

Description: Nora Alvarez: First Place and Audience Prize for Best Documentary for: "For the Love of Turtles" Environmental Short Film Festival of the Estuary. Co-directed with Ana Elisa Pérez Quintero June 25, 2011

Title: Food security podcast

Media Outlet/Organization: CienciaPR

Activity Date: 01/25/2015

Description: Glorynel Ojeda participated on a podcast on food security for Puerto Rico, what it means and challenges that have to be met. Other participants included the Secretary of Agriculture of Puerto Rico.

Title: Interview in Desde mi Pueblo TV program

Media Outlet/Organization: America TV.

Activity Date: 05/13/2013

Description: Betzaida Ortiz was interviewed concerning her participation in environmental activities with the Cataño community.

Title: Interview of Betzaida Ortiz

Media Outlet/Organization: Radio Station Boricua 740

Activity Date: 12/12/2011

Description: Radio interview relative to article published by her on the Political Ecology Journal (Spain) concerning a local community (Juana Matos) that was being impacted by industrial development.

Title: Interview of Betzaida Ortiz

Media Outlet/Organization: Radio station WKAQ 580

Activity Date: 12/15/2011

Description: Radio interview relative to article published by her on the Political Ecology Journal (Spain) concerning a local community (Juana Matos) that was being impacted by industrial development.

Title: Magazine article

Media Outlet/Organization: EntreParentesis

Activity Date: 05/01/2013

Description: Betzaida Ortiz wrote an article titled "El Corredor del Yaguazo, Inc. más de 30 años conservando el ambiente, mejorando la calidad de vida de Cataño y de Puerto Rico"

Title: Magnifying glass: community and the environment

Media Outlet/Organization: El Nuevo Dia Newspaper

Activity Date: 03/22/2015

Description: Newspaper article on environmental research done by students at the Yaguazo community. Studies (bird population, water quality and hydrology) done by Betzaida Ortiz and Aristides Martinez are included.

Title: Newspaper article

Media Outlet/Organization: El Nuevo Dia newspaper

Activity Date: 04/13/2010

Description: One page article featuring the environmental sciences program, both graduate and undergraduate, where the PI of this project was interviewed. Two pictures of program activities were featured.

Title: Newspaper article on electronic wastes

Media Outlet/Organization: Dialogo electronic newspaper

Activity Date: 03/01/2012

Description: Santiago, Julio, Article titled En aumento la basura-e en Puerto Rico. (<http://dialogodigital.upr.edu/index.php/En-aumento-la-Basura-e-en-Puerto-Rico.html>) (Increase in electronic waste)

Title: Newspaper interview of Rafael Rios

Media Outlet/Organization: Dialogo Newspaper

Activity Date: 04/01/2012

Description: Full page article based on an interview of PI Rafael Rios concerning the solid waste problem in Puerto Rico. An IGERT created video (<http://www.youtube.com/watch?v=IZEgwyHsgpY>) is credited with providing information.

Title: Press conference

Media Outlet/Organization: El Nuevo Dia, Dialogo and other newspapers

Activity Date: 02/07/2012

Description: Press conference by the President of UPR to announce the creation of the Envi Sci Dept. The IGERT program was credited as being a significant reason for the creation of the graduate program. Rafael Rios, PI, was a participant and was interviewed.

Title: Researches study Little Ice Age in Puerto Rico

Media Outlet/Organization: El Nuevo Dia newspaper

Activity Date: 05/27/2015

Description: Newspaper article describing research work by IGERT students Johnny Lugo and Luis Villanueva

Title: Science in art restoration

Media Outlet/Organization: Puerto Rico Museum of Art

Activity Date: 02/13/2013

Description: Johnny Lugo gave a talk and demonstration of scientific techniques used for the conservation of the La Plena mural, a major art work at the Museum.

Title: Television interview

Media Outlet/Organization: WIPR Puerto Rico TV

Activity Date: 11/13/2013

Description: Betzaida Ortiz was interviewed in the program Puertorriqueñísimo, which addresses life in the towns on the Island. She discussed her work with the El Yaguazo community and the importance of involving community leadership in conservation efforts.

Title: Tiny Science. Big Impacts. Cool Videos

Media Outlet/Organization: The National Nanotechnology Coordination Office

Activity Date: 05/25/2015

Description: Abelardo Colon* and Jennifer Gil won first prize for the nanotechnology video contest for students for their video entitled Chlorination-less. The video explains a new method for disinfecting drinking water using a nanodiamond powder.

Printed: Dec 01, 2015