

NO ESCAPE: THE REALITY OF CLIMATE CHANGE HERE & NOW



Symposium date:

**30TH
OCTOBER
2019**

Venue:

FUNDACIÓN LUIS MUÑOZ MARÍN



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NO ESCAPE: THE REALITY OF CLIMATE CHANGE HERE & NOW



Landmark meeting on the urgent need for action to lessen the impacts of climate change

San Juan, Puerto Rico. On October 30, 2019, at the Luis Muñoz Marín Foundation (FLMM), a symposium brought together prominent scientists, environmental managers, educators, and citizens concerned about the best way to adapt to the reality of climate change. The symposium entitled “No Escape: The reality of climate change here and now” featured 20 presentations, one 1-hour panel discussion, and 13 exhibitors of various topics focused on climate change, including environmental health, agriculture, forestry, management of urban areas, the built environment, socio-economic impacts, resilience, coastal erosion, research in areas such as El Yunque National Forest, education, and risk mitigation processes, among others. The event included international participants, such as Sir Ghillean Prance, former director of the Royal Botanic Gardens, Kew in United Kingdom, as well as many prominent speakers from Puerto Rico, the Virgin Islands, and the United States. Response to this free public event was fantastic and sold out within days of announcement. The event was broadcasted live on the Facebook page of the Doña Inés Park (<https://www.facebook.com/parquedonaines/>) of the Luis Muñoz Marín Foundation, one of the organizers, together with the Institute of Ecotechnics, & Tropic Ventures Sustainable Forestry Project, Puerto Rico. The event was made possible thanks to the sponsors: Para La Naturaleza; The Nature Conservancy in Puerto Rico; Puerto Rico Science, Technology & Research Trust; Oxfam America; the Puerto Rico Department of Natural and Environmental Resources; Institute for Tropical Ecosystem Studies of the University of Puerto Rico at Río Piedras; Puerto Rico Hardwoods, and private donations.

Reunión histórica sobre la necesidad urgente de actuar para disminuir los impactos del cambio climático

San Juan, Puerto Rico. El 30 de octubre de 2019 tuvo lugar en la Fundación Luis Muñoz Marín (FLMM) un simposio que reunió científicos prominentes, gestores ambientales, educadores y ciudadanos preocupados por la mejor manera de adaptarse a la realidad del cambio climático. El simposio titulado “Sin escape: La realidad del cambio climático aquí y ahora” contó con 20 presentaciones, un panel de discusión de 1 hora y 13 exhibidores de diversos temas enfocados en el cambio climático, incluyendo salud ambiental, agricultura, silvicultura, manejo de áreas urbanas, el entorno construido, impactos socio económicos, resiliencia, erosión de costas, investigaciones en áreas como el Bosque Nacional El Yunque, educación, procesos de mitigación de riesgos, entre otros. El evento incluyó participantes internacionales, como Sir Ghillean Prance, ex director del Royal Botanic Gardens, Kew en el Reino Unido, así como una gran cantidad de prominentes conferenciantes de Puerto Rico, las Islas Vírgenes y Estados Unidos. La respuesta a este evento gratuito para el público fue fantástica y se agotaron las entradas a los pocos días del anuncio. El evento fue transmitido en vivo por la página de Facebook del Parque Doña Inés (<https://www.facebook.com/parquedonaines/>) de la Fundación Luis Muñoz Marín quien fue uno de los organizadores junto con el Institute of Ecotechnics & Tropic Ventures Sustainable Forestry Project. Este evento fue posible gracias a los auspicios de Para La Naturaleza; The Nature Conservancy en Puerto Rico; Fideicomiso para Ciencias, Tecnología & Investigación de Puerto Rico; Oxfam América; Departamento de Recursos Naturales y Ambientales de Puerto Rico; Instituto para el Estudio de Ecosistemas Tropicales del Recinto de Río Piedras de la Universidad de Puerto Rico; Puerto Rico Hardwoods y donativos privados.

Symposium Agenda

8:00 a.m.	Registration and Breakfast
8:40	Carlos Olivencia Gayá , Board of Directors, Fundación Luis Muñoz Marín (FLMM) – <i>Welcome</i>
8:45	<i>Introductions: Christian Torres Santana</i> (Director, Doña Inés Park, FLMM), <i>Cristina Cabrera</i> (Environmental consultant and manager), & <i>Thrity Vakil</i> (Institute of Ecotechnics, Tropic Ventures Sustainable Forestry & Rainforest Enrichment Project, PR)
9:00	Ernesto Díaz , Director, Office for Coastal Management and Climate Change, Puerto Rico Department of Natural and Environmental Resources (DNER) and Coordinator for the PR Climate Change Council – <i>The State of Puerto Rico’s Climate: Assessing Social-ecological Vulnerabilities, Mainstreaming Adaptation and Building Resilience</i>
9:25	Dr. Grizelle González , Research Project Leader with the USDA Forest Service, International Institute of Tropical Forestry (IITF) – <i>Tropical forest response to global change: studies from the Luquillo Experimental Forest</i>
9:40	Minnette Rodríguez Harrison , Environmental Education Teacher, Julián E. Blanco Specialized School of Ballet, Puerto Rico Department of Education & Fundación Amigos de El Yunque – <i>Tools for teachers on how to engage students in learning about climate change</i>
9:55	Honorable Johann A. Clendenin , Commissioner and Chairman Emeritus, U.S. Virgin Islands Public Services Commission – <i>Multicultural Leadership Challenges in Preparing for Evolving Climate Related Disasters</i>
10:15	Ms. Nancy Woodfield Pascoe , Deputy Director for Science, Research and Environmental Policy, National Parks Trust of the Virgin Islands – <i>The importance of identifying Tropical Important Plant Areas in the British Virgin Islands in planning for climate change</i>
10:35	Dr. Frank Wadsworth , Retired Forester & Emeritus Scientist, IITF – <i>Thoughts on Climate change</i>
10:40	Break
11:00	Dr. Chris Nytch , Lead Scientist, El Yunque National Forest Citizen Science Monitoring Program, University of Puerto Rico at Río Piedras (UPR-RP) – <i>Reorienting education towards climate action and global sustainability</i>
11:15	Dr. William Gould , Director of the USDA Caribbean Climate Hub & Research Ecologist, IITF – <i>Climate change in agriculture and forestry in Puerto Rico and in the US Virgin Islands</i>
11:30	Plenary speaker: Sir Ghilleen Prance , former Director of the Royal Botanic Garden at Kew, United Kingdom – <i>The Biological Evidence for Climate Change</i>
12:30 pm	Lunch

1:30 **Panel discussion. Moderator: John Englander**, Founder & President, Rising Seas Institute

- **Sir Ghillean Prance**
- **Ernesto Díaz, DNER**
- **Dr. Elvira Cuevas**, Professor and Director, Center for Applied Tropical Ecology and Conservation, UPR-RP
- **Hon. Larry Seilhamer Rodriguez**, Vice-President of the PR Senate and author of Law 133 of 2019 – Law of Mitigation, Adaptation, and Resiliency to Climate Change of Puerto Rico
- **Fernando Lloveras San Miguel, Esq.**, President, Para La Naturaleza

2:30 **Dr. Ariel Lugo**, Director and Ecologist, IITF & former member of the Intergovernmental Panel on Climate Change – *Novelty: nature's response to climate and environmental change*

2:55 **Break**

3:15 **Dr. Katia Avilés Vázquez**, Organización Boricúa de Agricultura Ecológica – *The importance of socio-environmental diversity for Caribbean islands in the face of climate change: examples since September 2017*

3:30 **Dr. Pablo Méndez Lázaro**, Environmental Health Professor, U.P.R. Medical Science Campus – *Urgent need for a Climate Health and Wellbeing national strategy*

3:45 **Agro. Christian Torres Santana**, Director, Doña Inés Park, FLMM – Integration of NASA G-LiHT technology and i-Tree Eco software to understand climate change mitigation potential of an urban arboretum

4:00 **Brenda Torres**, Executive Director, San Juan Bay Estuary Program – *Comprehensive Strategies for Resilience within an Urban Context*

4:15 **Dr. Maritza Barreto Orta**, Professor and Director of the Coastal Research and Planning, U.P.R. - R.P. – *Coastal erosion in Puerto Rico*

4:30 **Dr. Jess K. Zimmerman**, Professor, Department of Environmental Science, Director, Luquillo Long-Term Ecological Research Program, and Director, El Verde Field Station, U.P.R. - R.P. – *Climate Change: The Perspective from El Yunque National Forest*

4:45 **Kathryn Lipieck**, Hazard Mitigation Branch Director in Puerto Rico, FEMA – *Local Hazard Mitigation Planning Process*

5:00 **Edgardo González**, Executive Director, Centro para la Conservación del Paisaje (CCP) and Dr. Sandra Soto Bayó, Cartographer, CCP and the USDA Caribbean Climate Hub – *Forests Landscapes of Puerto Rico in the Climate Change Equation*

5:15 **Dr. Fernando Abruña**, FAIA, Founding and Past President of the Caribbean Chapter of the US Green Building Council, & Partner, Abruña & Musgrave Architects – *Almost everything with almost nothing: The Built Environment approach to Climate Change*

5:30 **John Englander**, Founder and President, Rising Seas Institute – *Climate change is not a problem, it's 5 separate problems*

6:00 **SYMPOSIUM ADJOURN**

EXHIBITIONS
(8:30am – 3:30pm)

Department of Natural and Environmental Resources
Para La Naturaleza
The Nature Conservancy
Organización Pro Ambiente Sustentable
San Juan Bay Estuary Program
Desde mi Huerto
El Puente: ELAC

Fundación Amigos de El Yunque
USDA Caribbean Climate Hub
USDA Natural Resources Conservation Service
Puerto Rico Hardwoods
terra Firma
Karma Honey Project

Speakers' Abstracts



Ghilleen T. Prance FRS FLS FRSB VMH

Former Science Director at the Eden Project in Cornwall, UK Former Director of the Institute for Economic Botany, New York Botanical Garden, USA Former Director of the Royal Botanic Gardens, Kew, UK

Talk: The biological evidence for climate change

Bio: Sir Ghilleen Prance, D. Phil., FRS, FLS, FRSB, VMH, is one of the world experts on the botany and economic uses of the neotropical rainforests. He has previously held positions as Science Director at the Eden Project in Cornwall, UK, as Director of the Royal Botanic Gardens, Kew, in UK, and as Senior Vice-president for Science and Head of the Institute of Economic Botany at the New York Botanical Garden, USA. A systematic botanist who has made an enormous contribution to the inventory of the Amazon flora and the ethnobotany of the Amazon region, much of his 25-year career at the New York Botanical Garden was spent conducting extensive fieldwork in the Brazilian Amazonia. Dr. Prance has participated in expeditions to Turkey, Surinam, Colombia, Venezuela, French Guiana, Brunei, Malaysia, Madagascar, and Brazil. Prance was knighted in 1995, and he has been a Fellow of the Linnean Society since 1961, where he has served as President. He is a Fellow of the Royal Society since 1993, and was awarded the Victoria Medal of Honor of the Royal Horticultural Society in 1999. He was awarded the Patron's Gold Medal of the Royal Geographical Society in 1994. In 2000 he was made a Commander of the Order of the Southern Cross by the President of Brazil. In 2012 he was awarded the Order of the Rising Sun, Gold Rays, and Neck Ribbon by the Government of Japan.

Abstract: Many recent reports draw attention about the urgency of addressing and halting climate change. No one is more aware of this than biologists who study nature and are observing the changes caused by climate change. Many of these changes are having negative effects and are causing the loss of habitat and species. This lecture will concentrate on some examples of biological indications of climate change such as changes in the phenology of plant flowering times and bird migrations, the advance of plants towards the poles and to higher elevations on mountains and the bleaching of coral reefs. Some of the solutions needed are the halting of deforestation accompanied by an increase in reforestation, a reduction in the amount of cattle accompanied by an increase in fish farming, halting world population growth, and much greater use of sustainable and non-polluting sources of energy. To accomplish the degree of change needed to reverse climate change will require considerable ethical and moral decisions and choices by world leaders and by individuals.



Ernesto L. Díaz, MS, MEM.

Director, Office for Coastal Management and Climate Change,
Puerto Rico's Department of Natural and Environmental Resources
(DNER) and Coordinator of the Puerto Rico Climate Change Council

**Talk: The State of Puerto Rico's Climate: Assessing Social-ecological
Vulnerabilities, Mainstreaming Adaptation and Building Resilience**

Bio: Mr. Ernesto Díaz is a marine scientist with degrees in Oceanography and Marine Sciences from Shoreline College in Washington State and the University of Puerto Rico. He received a Master's in Environmental Engineering Management from the Polytechnic University of Puerto Rico and conducted post-graduate studies in Energy and Environment at the University of Florida. Mr. Díaz has worked at the DNER for 24 years and has served as Director of the Office of Coastal Management, Administrator, and Assistant Secretary. His career has mostly been devoted to coastal and marine resources management as leader of the Coastal Zone Management Program and the Coral Reef Conservation and Management Program. Since 2009, Mr. Díaz has served as Coordinator of the Puerto Rico Climate Change Council publishing the first State of the Puerto Rico Climate report (2014), and co-leading the first stand-alone chapter for the US Caribbean (2018), as part of the Fourth National Climate Assessment (NCA4) Chapter 20: US Caribbean (2018): <https://nca2018.globalchange.gov/chapter/20/>). Mr. Díaz has served as coordinator of the United Nations Environment Programme - Coastal Management Project for 13 States and Territories of the Caribbean region. Currently, Mr. Díaz is working on the Coastal Engineering handbook and various Engineering with Nature initiatives in Puerto Rico.

Abstract: A panoramic view of the state of the Puerto Rico climate, trends, and projections focusing on coastal and marine environments that lead to the discussion of social-economical vulnerabilities. The impacts of hurricanes Irma and María (2017), Winter Storm Riley (2018), and coastal erosion (2019) are used to illustrate climate and oceanographic drivers of change, as well as potential interventions to ameliorate hazards and build resilience.



Dr. Grizelle González

Research Project Leader with the USDA Forest Service
International Institute of Tropical Forestry (IITF)

Talk: Tropical forest response to global change: studies from the Luquillo Experimental Forest

Bio: Dr. Grizelle González earned a BS in Biology and an MS in Soil Ecology for her research on earthworm ecology from the University of Puerto Rico, Río Piedras (UPR-RP). Then a PhD in Soil Ecology and Biology from the University of Colorado, Boulder. Grizelle joined IITF in 2000 where she is currently the Project Leader of the Research and Development Unit and Assistant Director of Research, and serves as adjunct faculty of the Departments of Biology and Environmental Sciences at UPR-RP. She is also co-principal investigator of the Luquillo Long-Term Ecological Research Program and the Critical Zone Observatory, and member of the editorial boards of the Caribbean Journal of Science and the Caribbean Naturalist. Grizelle has authored over 100 scientific publications and served as editor of special synthesis volumes on diverse topics. Grizelle is a supporter of arts and science collaborations, and believes science is central for the sustainable development and resiliency of tropical America.

Abstract: The Luquillo Experimental Forest (LEF) is located in northeastern Puerto Rico (US Caribbean). The spatial and temporal variability in the climate at LEF is influenced by large-scale movements of air masses, extreme events, and regional and global climate change. Understanding the way in which organisms and ecosystems respond to gradients of climate and land use intensity is vital to the sustainability of populations, water resources, and ecosystem services. In the LEF, these patterns are expressed in the context of the rich biodiversity of the tropics and the complex interplay of land use, hurricanes, and plant and animal responses to resources and competition. This presentation will focus on how long-term data and manipulative experiments conducted at LEF provide a deeper mechanistic understanding of the controls on the structure and functioning of these tropical forests in the context of climate change. Changes in extreme weather patterns, including an increase in hurricane intensity and more frequent drought events are projected to alter the distribution of biota in this tropical forest. Recent studies on cloud base (their lowest altitude) at local and regional scales will be highlighted to help understand tropical montane cloud forest vulnerability to climate change. In addition, recent studies on the effects of the 2017 hurricanes on forest dynamics in Puerto Rico will be presented.



Minnuette Rodriguez, MA

Environmental Science Teacher, Julián E. Blanco
Specialized School of Ballet, Puerto Rico Department of Education
and Fundación Amigos de El Yunque

Talk: Tools for teachers on how to engage students in learning about climate change

Bio: Minnuette Rodríguez Harrison has been an environmental educator for 13 years and currently teaches grade 9-12 students at the Julian E. Blanco Specialized School of Ballet. Minnuette uses innovative, hands-on educational strategies to integrate environmental science with real-world situations. Her students learn about human impacts on the environment by developing physical models that illustrate environmental. Minnuette also serves as coordinator for her school's Eco-School Environmental Program, integrating environmental principles into the curriculum for other school subjects, and enhancing environmental awareness at the school and community. For example, students in the school's history class focus on the history of forests and how people have advocated for forest conservation. In mathematics class, students perform quantitative data analysis and create graphics based on monarch butterfly research and data collected in the school's butterfly garden. In 2015, she received the Presidential Innovation Award for Environmental Educators from the Environmental Protection Agency.

Abstract: As part of its commitment to foster attitudes and behaviors for the benefit of our natural resources and through initiatives that promote conservation, education and responsible recreation, especially in El Yunque National Forest, the Amigos de El Yunque Foundation, developed the publication, "Puerto Rico y el Mundo: el Cambio Climático". The authors of the book, Ariel E. Lugo, Elvia J. Meléndez-Ackerman, Pablo A. Méndez-Lázaro, and Minnuette Rodríguez-Harrison, worked to identify appropriate scientific content to communicate the effects of climate change, global scenarios, how it affects us and what actions we can do to reduce its effects. This publication serves as an educational tool to discuss the issue of climate change and some of its causes. Topics include human intervention in the greenhouse effect, resilience, and resistance of species, biogeochemical cycles, greenhouse gases, anthropogenic causes, and non-anthropogenic causes of climate change, graphics, and tables presenting scientific data, and changes in Puerto Rico's conditions stemming from climate change. Chapter 4, "Puerto Rico Reacts," serves as an inspiration to generate ideas for possible action projects to be developed with students. Minnuette, as an environmental educator and one of the authors of the book, designed a guide for teachers that explains how to use this book with students. The book educates teachers and students



Dr. Katia Avilés Vázquez

Organización Boricúa de Agricultura Ecológica

Talk: The importance of socio-environmental diversity for the Caribbean islands in the face of climate change: examples since September 2017

Bio: Katia holds a PhD in Geography from the University of Texas, Austin, where she studied the cultural and political ecology of small-scale farmers in Puerto Rico. Her research highlights community-based adaptations and engages the topic from a grassroots activism perspective to both continually test its validity and increase its reach. She has co-authored more than a dozen articles, book chapters, and technical reports, including *Organic Agriculture and the Global Food Supply*. After Hurricane María, she has refocused her work on local capacity building and the distribution of resources for local entities, helping to secure more than \$10M for projects by and for Puerto Rico residents. Her work has been highlighted in local and international news outlets, and she has received the EPA Environmental Champion Award, as well as the ESF Graduate of Distinction Award (State University of New York, College of Environmental Science and Forestry, Syracuse).

Abstract: After hurricanes Irma and María, the popular response was completely opposite to the institutional government response. A stark contrast to the government's centralized and one size fits "us" approach, the people's response came from, and responded to the needs and conditions of each particular region. Survival, tied here to response success, was due to the wide range of environmental and cultural variables that agroecology promotes, which were put at the forefront after September 2017. Within the farms, agroecological farmers were able to rely on crops coming up almost immediately after the hurricanes due to diverse seed stock and healthy soils. Community support mechanisms sprang from years of mutual support legacies, generating brigades that took on an immediate reconnaissance and direct relief character. At a regional and island level, groups came together to map out recovery efforts, along with farmers preparing for the coming uncertainty of a completely different market, unforeseen personal needs, and new socio-cultural configurations. This planned out response focused on moving from aid and relief to a just recovery platform, where local actors were the protagonists. Puerto Rico is now in a tertiary phase in which we take pre-hurricane assessments, and document immediate action responses to promote long-term autonomous projects that reflect the reality of the diversity of assets and needs within each agroecological farm.



Hon. Johann Clendenin, MA, MBA, MSM
Commissioner and Chairman Emeritus,
U.S. Virgin Islands Public Services Commission

**Talk: Multicultural leadership challenges in preparing
for evolving climate-related disasters**

Bio: The Honorable Johann (John) A. Clendenin was appointed a U.S. Virgin Islands Commissioner in 2014. The Public Service Commission (PSC) is a quasi-judicial, regulatory agency. The PSC has a broad mandate to maintain an important balance between the public utilities in the Virgin Islands and the territory's ratepayers. Clendenin is a member of the National Association of Utilities Commissioners (NARUC). He has been appointed there to the Telecommunications and International Relations Committees. He was appointed by Federal Communications Commission (FCC) Chairman, Ajit Pai, to the Intergovernmental Advisory Committee (IAC) to provide aid to the Commission on the many telecommunications issues affecting local, state, and tribal governments. He is the Chairman of the IAC's Telehealth Working Group.

Abstract: The presentation examines multicultural leadership challenges involved with creating positive approaches in preparing and responding to climate disasters. Highlighted will be best practices from the Virgin Islands Public Service Commission's Hurricane Integrated Telecommunications (HIT) Team. How learning comes by gathering information for mastery and is measurable by accumulated knowledge; and how wisdom comes through metamorphosis within your heart is the central focus. Facts are allusive comforts in many current and often acrimonious debates: too many people seem to prefer their own facts and to ignore the available evidence of long experience and wisdom. Because the evidence doesn't fit their worldview, they conveniently pander to ignorance rather than pursue diligent inquiry to learn and increase their knowledge. In the vernacular, arrogance of privilege, an egocentric desire to affirm their comfort zone of entitled position, eliminates a reasoned chance of effectively resolving the cognitive dissonance offered as alternative facts. In responding to international disasters, I've come to realize that the important things, those that continue to matter most, are those timeless moments where I've chosen to lead with my heart. As many strive for life's success in clinging to the rules and attempting to do things right, our reference of values, our morality, customs and social mores guide us towards completion. Yet, the challenge lies in striving when reason tells you not to, to hear a different drummer, and to do the right thing. The talk will explore beliefs that each of us knows in these moments of choice.



Nancy Pascoe, MS

Deputy Director, National Park Trust of the Virgin Islands,
Government of the British Virgin Islands

Talk: The importance of identifying Tropical Important Plant Areas in the British Virgin Islands in planning for climate change

Bio: Nancy Woodfield Pascoe is the Deputy Director for Science, Research, and Environmental Policy at the National Parks Trust of the Virgin Islands (Trust). Nancy is a BVIlander and began working with the Trust in 1998. Her work covers a broad spectrum of activities from collaborating with international partners such as Royal Society for the Protection of Birds and Royal Botanic Gardens Kew on special projects in the Virgin Islands in order to conduct scientific research, to managing the Territorial Mooring Buoy Programme, providing recommendations to the VI Government on environmental issues and endangered species related to the land development process, mentoring students involved in environmental projects and managing the Geographic Information System.

Abstract: Despite the British Virgin Islands (BVI) having a network of legally protected areas, knowledge of the location and distribution of threatened plants and habitats was still needed to provide a framework for the protection and management of the most important sites for wild plant diversity. The National Parks Trust of the VI and the Royal Botanic Gardens Kew, UK collaborated to identify a network of Tropical Important Plant Areas (TIPAs) in the BVI based on globally threatened plant species, exceptional botanical richness and/or nationally threatened habitats. In planning for climate change, this enables local conservationists to make sound management decisions whilst developing standards and methodologies, which can be applied more broadly in other Caribbean countries in the future.



Dr. Frank Wadsworth

Retired Forester and Emeritus Scientist, USDA Forest Service,
International Institute of Tropical Forestry (IITF),
Director, IITF from 1956-1979

Bio: Dr. Frank Wadsworth has lived for more than 70 years in Puerto Rico. Born in Chicago in 1915, he studied at the University of Michigan, where his PhD dissertation research included a management plan for the El Yunque National Forest. With Puerto Rico as his base, Dr. Wadsworth conducted scientific research that deepened the study of tropical forests, and inspired all those who work in this field. In 1953 he served as a research officer at the island's Tropical Forest Experimental Station in Río Piedras, and in 1956, became its director when it became the Institute of Tropical Forestry, until 1979. It became the International Institute of Tropical Forestry in 1992. He has worked as a researcher and consultant in every country in the tropical Americas. Wadsworth has published more than 100 scientific books and papers, including "Common Trees of Puerto Rico and the Virgin Islands" (1964-1989, co-authored with Elbert Little) and "Flora of Virgin Gorda (British Virgin Islands)" (1976, with Little and R.O. Woodbury). Frank was a founder of the Natural History Society in Puerto Rico. He continues his work as an editor of Tropical Forestry Notes, which he has done since 1980, included in the newsletter of the International Society of Tropical Foresters (ISTF). In the 1950s, Frank was a founder of ISTF and for a long time an editor of its newsletter. The critical discussion that has defined his career is resolving the apparent contradiction between forest conservation and timber production. Frank has no doubt that Puerto Rico has the capacity to produce the hardwood needed for its own development while conserving critical forest coverage. At 104, Dr. Wadsworth has remained active and relevant in public service and scientific research though he retired "officially" in 1988, since then he became a volunteer of IITF.



Dr. Chris Nytch

Lead Scientist, El Yunque National Forest Citizen Science Monitoring Program, University of Puerto Rico, Río Piedras

Talk: Reorienting education towards climate action and global sustainability

Bio: Dr. Christopher Nytch is an ecologist with interests in the fields of urban, landscape, and forest ecology. He uses interdisciplinary frameworks and tools to investigate vegetation composition, landscape structure, and their influence on functional processes of social-ecological systems. Chris is also an environmental educator and practitioner who collaborates with nonprofit, governmental, and academic organizations, and local communities to advance education for sustainability. Chris holds a bachelor's degree in geology, a master's in natural resources and ecological planning, and a PhD in environmental sciences. He is a Lead Scientist with the Friends of El Yunque Foundation and directs the El Yunque National Forest Citizen Science Vegetation Monitoring Project. He is co-leading efforts to establish Puerto Rico as a Regional Center of Expertise on Education for Sustainable Development. Through his work, Chris aims to promote holistic and regenerative relations between people and places.

Abstract: The science of climate change is clear: the planet is warming rapidly and there will be drastic alterations to Earth's ecological and socio-economic systems. The capacity of the human community to mitigate and adapt to climate change impacts remains uncertain. This talk suggests that the path forward to serious climate action and long-term planetary prosperity should be undergirded by a profound educational transformation that aligns our models of economic, social, and environmental knowledge and development with global sustainability goals. There are several guiding principles for this transformation. First, sustainability education entails downscaling global goals to resonate and engage with the priorities of stakeholders and decision makers across multiple levels of nested governance, from international alliances to the personal choices of individuals. Second, it crosses boundaries, integrating worldviews, epistemologies and methodologies from diverse disciplines and social sectors to cultivate ecoliteracy and resource stewardship in formal, non-formal, and informal learning settings. Third, it focuses on transferring knowledge to action, via identification of leverage points, agents of change, and awareness of their continual evolution. Lastly, sustainability education is not a static curriculum imposed by external actors but rather a dynamic and collaborative platform that is born within communities of practice who aspire to manifest its values. I will present, as an example, the initiative of creating a Regional Center of Expertise on Education for Sustainable Development in Puerto Rico and discuss opportunities for promoting increased understanding and action on climate change.



Dr. William Gould

Research Ecologist, USDA Forest Service,
International Institute of Tropical Forestry
Director, USDA Caribbean Climate Hub

**Talk: Climate change in agriculture and forestry in Puerto Rico
in the US Virgin Islands**

Bio: Dr. William A. Gould is the Director of the USDA Caribbean Climate Hub and a Research Ecologist with the USDA Forest Service International Institute of Tropical Forestry. He is a landscape ecologist with research interests in biodiversity, conservation, forestry, agriculture, land use, land cover, and climate change. As Director of the Caribbean Climate Hub he has the opportunity to work with many of the USDA agencies in Puerto Rico and the US Virgin Islands to develop and deliver climate adaptation tools and information for agency staff, farmers, and forest managers. He helped develop the U.S. Caribbean Chapter of the Fourth National Climate Assessment. The USDA Caribbean Climate Hub is currently focused on Hurricane Assessments, Reforestation Planning, and developing a Wood Industry and Culture to enable sustainable use of forest resources in light of climate change.

Abstract: Projected increases in temperature, decreases in rainfall, rising sea levels, aquifer salinization, and increased likelihood of high energy hurricanes represent direct and indirect risks to agricultural production and forest benefits in Puerto Rico and the U.S. Virgin Islands. Raising awareness of risks, understanding vulnerabilities, and promoting best adaptation practices can reduce these risks. To better understand vulnerabilities to extreme climate events, we assessed farm, forest manager, and agricultural advisor perceptions of the effects of Hurricanes Irma and Maria on agriculture and forestry operations. Loss of power and communications, along with fallen trees, were the top three impacts across all sectors.



Dr. Ariel Lugo

Director and Ecologist, USDA Forest Service,
International Institute of Tropical Forestry (IITF)
Former member, Intergovernmental Panel on Climate Change (IPCC)

Talk: Novelty: nature's response to climate and environmental change

Bio: Dr. Ariel Lugo is a native Puerto Rican educated in public schools, the University of Puerto Rico (BS and MS), and the University of North Carolina, Chapel Hill (PhD). Lugo was a professor of Botany and Plant Ecology at the University of Florida, Gainesville, and Staff Member at the Council on Environmental Quality in Washington, DC. He was also Assistant Secretary at the Puerto Rico Department of Natural Resources. Lugo became Project Leader for the Tropical America Research Work Unit of the Southern Research Station in 1979, and later Director of IITF when the Research Work Unit was elevated to Station Level by President Bush in 1993. Since then he has been a member of the National Leadership Team of the Forest Service. Lugo is an active research scientist studying tropical forests. He is a highly cited scientist with over 500 publications and over 30,000 citations of his work. He has received recognitions from his agency (e.g., Distinguished Scientist, Meritorious Presidential Executive Rank Award), and from other organizations (e.g., Latino Center Legacy Award in the Sciences by the Smithsonian Latino Center, Forest Hero Award – United Nations Forests for People Awards). During his tenure with the Forest Service, Dr. Lugo has focused attention in developing the public profile of the Institute, a conservation ethic for Puerto Rico and other tropical countries, and providing education and research opportunities to under-represented communities and individuals. More recently the Institute is involved in seeking resilient solutions to the problems associated with the Anthropocene Epoch.

Abstract: Charles Darwin described the mechanism by which biota responds to environmental change. He argued that novelty (new species) resulted from the action of natural selection on the genetic variation of species. Over time, natural selection favors (chooses) some biological traits over others, resulting in novel adaptations to new conditions. Sixty years later, ecologists described ecological succession, which also generates novelty. Succession is comprised of ecesis (or establishment), growth, and ecological change over time. The succession of species and ecological processes also responds to natural selection at every step. Natural selection favors those species and processes best adapted to prevailing conditions. In both cases (evolution and succession), novelty is the response to environmental change; and in both cases the processes can be rapid or slow, depending on the environmental challenge and the ecological legacies involved. Climate change is a challenge to Holocene biota, which through evolution and succession will continue to generate novelty in ecosystems. Science is responsible for understanding the processes of change and how the consequent novelty affects social-ecological-technological systems or SETS. SETS is the proper context for debating the conservation of novelty in ecosystems in the Anthropocene Epoch because the uncertain future conditions that characterize this Epoch will unavoidably be characterized by accelerating the generation of novelty.



Dr. Pablo Méndez Lázaro

Environmental Health Professor, University of Puerto Rico Medical
Science Faculty

Talk: Urgent need for a Climate Health and Wellbeing national strategy

Bio: Dr. Pablo Méndez-Lázaro is currently an Associate Professor and Coordinator for the Master's degree program at the Department of Environmental Health at the University of Puerto Rico, Graduate School of Public Health. He has been involved in multiple research studies on extreme weather event's impacts on public health, climate adaptation, and resilience. Pablo is a member of the Puerto Rico Climate Change Council, the San Juan ULTRA (Urban Long-Term Research Area), and a City Co-Lead in UREx-SRN (Urban Resilience to Extreme weather events-Sustainability Research Network). He is also the Co-Principal Investigator in the research project "Impact of Hurricane-related stressors, response to oncology care, and health outcomes of women with gynecological cancers in PR and USVI", funded by the National Institute of Cancer (2018-2020), and Principal Investigator in a research project funded by NASA: "Early Warning of Synoptic Air Quality Events to Improve Health and Well Being in the Greater Caribbean Region".

Abstract: Climate change presents evolving challenges to human health. These changes have led to increased risk to exposure to airborne allergens and vector-borne diseases such as West Nile virus, malaria, dengue fever and chikungunya to human populations, particularly in tropical communities. There is also a concern that climate change can reintroduce diseases into geographic areas where they had been previously eradicated. Changing patterns and frequency of prolonged heat episodes, ground level atmospheric ozone concentration or smog, and dust and other aerosols that trigger asthmatic responses are also conditions of concern. Islands such as Puerto Rico are particularly vulnerable because of extreme events associated with changes in both terrestrial and marine weather. Addressing such hazards requires new geospatial and communications approaches to facilitate efforts from public health practitioners and emergency response planners.



Agro. Christian Torres Santana

Director Parque Doña Inés, Fundación Luis Muñoz Marín

Talk: Integration of NASA G-LiHT technology and i-Tree Eco software to understand climate change mitigation potential of an urban arboretum

Bio: Christian Torres Santana is the Director of the Doña Inés Park at the Luis Muñoz Marín Foundation. He oversees a 12-acre native plant arboretum and the 4-acre Historical Estates Gardens for education, research, and conservation. He received an MS in Botany from the University of Hawaii, a BSA in Horticulture from UPR Mayagüez, a Nonprofit Management Executive Certificate from Georgetown University, and is currently completing an Executive MBA from the Inter American University of Puerto Rico. Over the past 15 years, Christian's work has specialized in pollination biology, forest health, biodiversity conservation, particularly on rare plant conservation, conservation horticulture, and environmental education. He recently received the Marsh Award for International Plant Conservation from Botanic Gardens Conservation International and the Kittleman Scholar for Aspiring Public Garden Leaders from the American Public Garden Association. He is a certified international Arborist, a Professional Horticulturist, and a Licensed Agronomist in Puerto Rico. Christian is also a co-organizer of this symposium.

Abstract: In recent decades Puerto Rico has been subjected to urban sprawl, highlighting the importance of urban forests in the struggle to ensure ecosystem services to mitigate the adversities of climate change. Hurricanes María caused substantial damage to the canopy cover of many urban forests on the island including the Doña Inés Park Arboretum, decimating its potential to improve the island's resilience in the face of a rapidly changing climate. Analyzing the NASA G-LiHT airborne images taken in Puerto Rico in April 2017 and in March 2018 has enabled us to understand how the arboretum's canopy cover was diminished. Monthly drone flights were also conducted allowing us to continuously monitor the recovery of the forest's canopy through time. In addition, ecosystem services provided by trees that are directly linked to climate change mitigation were quantified using the i-Tree Eco software. Ecological benefits such as gross carbon sequestration was calculated for about half of the trees in the arboretum's collection. After the hurricane, the arboretum's sequestration was estimated at 8.56 metric tons/yr and the forest's structural value is around is equivalent to \$96,757 US dollars. We expect that these values, along with other service estimates, will be greatly increased as more trees are measured and analyzed by the i-Tree Eco software in future stages of this ongoing project funded by the Toyota Foundation of Puerto Rico. More field measurements, along with drone flights, will be indispensable not only to aid in the understanding of how the arboretum plays an important role in service provision and climate change mitigation, but also to promote the recovery and reforestation efforts of this urban oasis.



Brenda Torres , MEM

Executive Director, San Juan Bay Estuary Program

Talk: Comprehensive Strategies for Resilience within an Urban Context

Bio: Brenda Torres works in the field of sustainability with vast experience in environmental management, corporate social responsibility, and public policy development through empowerment and multisector alliances. She was part of Governor Andre W. Cuomo's executive team as Assistant Secretary for the Environment of the State of New York, where she advised the Governor on environmental policy matters and managed the New York State Environmental Justice Agenda. Before that Brenda served as director of the Northeast Regional Office in the United States for the Puerto Rico Federal Affairs Administration. Currently, Brenda serves as Executive Director of the San Juan Bay Estuary Program, an initiative focused on the restoration of water bodies in the metropolitan area of Puerto Rico, and part of the National Estuary Program. Ms. Torres is a LEED AP and holds a master's in environmental management from Yale University. She has also completed an executive program for nonprofit leaders at Stanford University's Graduate School of Business and earned her BS in Environmental Sciences at the University of Puerto Rico.

Abstract: In 2017, immediately after Hurricane María hit the Island, the San Juan Bay Estuary Program (Estuario) transformed its Climate Adaptation Plan into a relief action platform. The support given to the San Juan Metropolitan region included removal of vegetative and household debris from waterways, provided safe drinking water to those in need, replanted coastal regions, and provided reliable information on the quality of the water of the region. Furthermore, these efforts offered great lessons learned and information on needed resources, platforms, and projects to build a resilient region. Estuario quickly put this information to work by creating three key action platforms related to strengthening the green infrastructure, empowering community leaders and organizations, and detecting and correcting illicit discharges. Brenda Torres, executive director of the Estuario, will brief the audience on such action platforms, and on the role of Estuario in leading the first Watershed Based Mitigation Plan ever developed in Puerto Rico. The Estuario, a National Estuary Program, offers a replicable model for other watershed managers to follow, and an opportunity for governments to build state-of-the-art water infrastructure, one that could withstand the impact of climate change. Its model is a comprehensive one, where the community plays a vital role, ensuring thus, the sustainability of every effort.



Dr. Maritza Barreto-Orta

Geological Oceanographer and Professor, Graduate School of Planning and Director, Institute of Coastal Research and Planning of Puerto Rico (CoRePI), University of Puerto Rico, Río Piedras

Talk: Coastal erosion at Puerto Rico

Bio: Dr. Barreto is a professor in the Graduate School of Planning, University of Puerto Rico, Río Piedras (UPR-RP), and founder and Director of the Coastal Research and Planning Institute of Puerto Rico (CoRePI). She received her B.A. degree in Geography at UPR-RP, her M.S. and Ph.D. degrees in Geological Oceanography at the UPR, Mayagüez. As a part of her doctoral studies, Barreto took graduate courses in Electrical Engineering to support studies in remote sensing research, and began her career conducting studies of shoreline changes in Puerto Rico under the mentoring of Dr. Jack Morelock. She is a member of the American Shore and Beach Preservation Association (ASBPA), Red Pro Playa Latinoamericana, and the American Geophysical Union (AGU). Whilst professor of the Geography Department, UPR-RP from 1997-2012, she conducted various interdisciplinary coastal research supported by NASA, NSF, NOAA, Para La Naturaleza, UPR, and the DNER Division of Coastal Zone Management of Puerto Rico. Currently, she is conducting research in coastal erosion supported by FEMA for the 44 municipalities of Puerto Rico.

Abstract: A historical coastal change analysis indicated that Puerto Rico has been affected by erosion for many years. High and moderate erosion was identified in many beach sites of the Island from 1964 to 1971. A decrease in coastal erosion was observed from 1971 to 1987 except in coastal areas that were impacted by human activities such as sand extraction activities and construction. In 2010, sixty percent of the coastline suffered from erosion problems. Very high and severe erosion were observed at some beach sites from 2010 to 2017. After Hurricane María, most of the beaches suffered a decreased of beach elevation. Beach width losses were identified in beaches located on the southeast, north-central and northwest coasts of the island. Erosion events were related to both natural and anthropogenic activities such as infrastructure build-up, storm and swell occurrences, among others.



Dr. Jess K. Zimmerman,

Professor, Department of Environmental Science; Director, Luquillo Long-Term Ecological Research Program, and Director, El Verde Field Station, University of Puerto Rico, Río Piedras

Talk: Climate Change: The Perspective from El Yunque

Bio: Dr. Jess K. Zimmerman was born in Iowa and graduated from McGill University (1980) before undertaking a master's degree at the University of Windsor (1983). He became interested in tropical ecology while completing his doctorate at the University of Utah (1989), where he developed projects on the evolutionary biology of orchids in Panama. This interest brought him to Puerto Rico in 1991 where he began as Director of El Verde Field Station. Since arriving in Puerto Rico, he has developed an interest in forest ecology, restoration ecology, and landscape ecology. He is currently a Professor in the Department of Environmental Sciences at the University of Puerto Rico where he guides the Luquillo Long-Term Ecological Research Program.

Abstract: El Yunque Rainforest (Luquillo Experimental Forest) is the focus of studies of the Luquillo Long-Term Ecological Research Program. For 30 years we have been investigating the impacts of increased frequency of intense hurricanes and increasing drought and warming on tropical forested ecosystems represented by El Yunque in an effort to project what changes might occur by the end of the century. While increasingly intense hurricanes challenge our forests, the combination of increased hurricane disturbance, drought, and higher temperatures may lead to tipping points of irreversible change. This is difficult to project because future altered environments place ecosystems and its denizens under ecological conditions heretofore never experienced.



Juan Orengo Rolón, BS

Research Assistant and Environmental Interpreter,
Parque Doña Inés, FLMM

Juan Orengo Rolón is a recent graduate from the University of Puerto Rico, Río Piedras with a BS in Environmental Science. He has a passion for urban ecology research, with an interest in how green infrastructure contributes to the wellbeing of city residents. Juan has collaborated in multiple projects related to this topic, but the most relevant one was studying how hurricanes Irma and María affected the vegetation of the San Juan Municipality in Puerto Rico. He has worked with the University of Virginia, with the US Department of Energy, Lawrence Berkeley National Laboratory, and with the San Juan Bay Estuary Program. As a Research Assistant he currently works on a project that seeks to quantify ecosystem services and the climate change mitigation potential of the Doña Ines Park Arboretum and also started a position of Environmental Interpreter.



Edgardo González, MF

Executive Director, Centro para la Conservación del Paisaje
(Center for Landscape Conservation)

Talk: Forests Landscapes of Puerto Rico in the Climate Change Equation

Bio: Edgardo González is a forester who graduated from the Yale School of Forestry and Environmental Studies, where he also conducted doctoral studies. He worked for twenty years in the Puerto Rico Department of Natural and Environmental Resources (DNER), and directed the Forest Service Bureau. In 2009, Edgardo was part of the founders' group of the "Centro para la Conservación del Paisaje" or Center for Landscape Conservation Inc. (CLC), an organization focused in conservation through management initiatives at a landscape level. He has maintained a forestry consultant practice and has worked with the USDA Caribbean Climate Hub, IITF-State and Private Forestry, and manages technical projects with the CLC



Dr. Sandra Soto Bayó

Cartographer, Center for Landscape Conservation
and the USDA Caribbean Climate Hub

Talk: Forest Landscapes of Puerto Rico in the Climate Change Equation

Bio: Dr. Sandra Soto Bayó is a geographer with a Ph.D. in landscape ecology from the University of Girona (Spain) and a M.Sc. in Geography from Louisiana State University. She currently works as a contractor at the Center for Landscape Conservation and the USDA Caribbean Climate Hub. In both organizations she works as a GIS Analyst, cartographer, and collaborates in different research projects related to conservation work.

Abstract: Forests are globally recognized as an important variable in the climate change equation. Considering the environmental services from carbon fixation to habitat and social benefits, we should explore the relevance that this variable has in Puerto Rico. Questions like: Should we work out realignments of forest management strategies as a relief to the effects of climate change? What are some of the significant virtues we can recognize in the increase of forest coverage in Puerto Rico considering the climate change scenarios we should expect? and other questions are considered in the talk. Recommendations toward a stronger recognition and consideration of the forests in the climate change equation in Puerto Rico are presented examining initiatives and programs undertaken. Potential readjustments in forest policies for Puerto Rico and some of the constraints that should be overcome are discussed to open the conversation about recognizing forests in the local climate change discussion.



Dr. Fernando Abruña, FAIA

Founding and Past President of the Caribbean Chapter of the US Green Building Council, & Partner, Abruña & Musgrave Architects

Talk: “Almost everything with almost nothing: the built environment approach to climate change

Bio: Known as “the father of sustainable architecture in Puerto Rico”, Architect Abruña is a retired professor at the University of Puerto Rico, a Fellow of the American Institute of Architects and was honored with the Henry Klumb Award, the highest distinction by the Association of Architects and Landscape Architects of PR. His award-winning work has been recognized by numerous architectural, professional and environmental organizations nationally and internationally. He is currently developing an urban solar car and holds a patent on an Eco Window manufactured in Puerto Rico. The documentary about his work, “The Absent House,” opened the film cycle in the most important sustainability event in the world, “Green Build,” in 2014. His most recent work is the “Resistant House” prototype for victims of Hurricane María in the Caño Martín Peña area in Santurce, which is currently under construction.

Abstract: Close to 40% of greenhouse gas emissions that affect global warming are generated by buildings during their construction, operation, and maintenance. De-carbonization of the built environment is one of the primary strategies to reduce the impact of buildings on climate. This is mostly addressed through the reduction of fossil fuel emissions in their energy use and operations. There is, however, a plethora of other strategies that can be used in the design and construction of buildings to reduce their impact on climate. These strategies will be presented through various case studies from Dr. Abruña’s architectural practice in Puerto Rico. Although these projects include larger building types, such as the Culebra and Dorado Eco-Schools, this presentation will focus on his residential work which can be more easily explained and understood, including: “The Absent House”, “Solaria”, “EcoHab”, “House of the Horizon” and “The Ethereal Cube”.



Kathryn (Katie) Lipiecki

FEMA Director, Hazard Mitigation Branch

Talk: Local Hazard Mitigation Planning Processes

Bio: Kathryn has been with FEMA for eight years and came to Puerto Rico from Region III in Philadelphia where she served as the Risk Analysis Branch Chief, overseeing the regional implementation of flood mapping, risk assessments, hazard mitigation planning, and grant programs including the Dam Safety and Earthquake grants. Prior to working in the Risk Analysis Branch she was in the Floodplain Management & Insurance Branch, providing technical assistance on NFIP compliance to communities. Before joining FEMA she worked as a contractor supporting FEMA's flood mapping program and had a position on a local historic preservation commission in New Jersey, providing guidance on permit applications for compliance with historic district regulations. She holds a master's degree in Urban Planning from Columbia University in the City of New York, and a bachelor's degree in both Historic Preservation and American Studies from Goucher College in Baltimore, MD.

Abstract: The presentation will discuss both the importance of and requirement to include public participation in the Local Hazard Mitigation Planning Processes. We will give the audience a general understanding of what public participation is, will provide examples of different activities that can be done to comply with the requirement, and will also discuss the importance of reaching multiple and diverse audiences during this process, including incorporating children, the elderly, people with disabilities, advocacy groups, and environmental groups. Sound planning practices should include the voices of diverse publics, as it's the State's purpose and mission to support the interest of the general public. The presentation will also cover the linkage between Hazard Mitigation Planning, the Hazard Mitigation Grant Program, and how each of these can support overall community resilience.

CLIMATE CHANGE PANEL DISCUSSION



John Englander



Sir. Ghillean Prance, FRS



Ernesto Díaz, MS, MEM



Dr. Elvira Cuevas

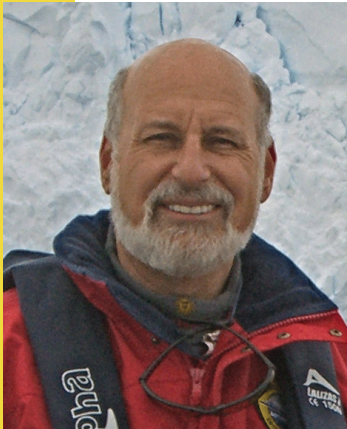


Hon. Larry Seilhamer Rodríguez



Fernando Lloveras San Miguel, Esq.





John Englander

Oceanographer, Founder and President,
Rising Seas Institute

Talk: Climate Change is Not a Problem, It's 5 Separate Problems

Bio: John Englander is an oceanographer, consultant and leading expert on sea level rise. His broad marine science background coupled with explorations to Greenland and Antarctica allows him to see the big picture of sea level rise and its societal impacts. For over 30 years, he has been a leader in both the private and non-profit sectors, serving as CEO for such noteworthy organizations as The International SeaKeepers and The Cousteau Society. Today, Mr. Englander works with businesses, governmental agencies and communities to understand the risks of increased flooding due to rising seas, extreme tides, and severe storms, advocating for “intelligent adaptation”. He is also the founder of the new non-profit, the International Sea Level Institute. His bestselling book, *High Tide On Main Street: Rising Sea Level and the Coming Coastal Crisis*, clearly explains the science, the impending devastating economic effects and the opportunity to design for a more resilient future. Mr. Englander is a Research Fellow at the Institute of Marine Sciences – UC Santa Cruz, a Fellow of the Institute of Marine Engineering, Science and Technology (IMarEST), and a member of several professional societies.

Abstract: There is growing recognition of the problem described as Climate Change or Global Warming. In fact it may be better to think of climate change as a category, with as many as five individual problems, each requiring quite different approaches or solutions:

- 1) Greenhouse Gas emissions, particularly CO₂, causing global warming
- 2) Human Health Effects, directly related to heat and disease
- 3) Ecosystem and Ocean Effects, e.g. agriculture, insects, ocean acidification, coral reefs, etc
- 4) Weather Disasters and new norms: abnormal storms and rainfall
- 5) Rising Sea Level, primarily from melting ice sheets and glaciers



Hon. Larry Seilhamer Rodríguez

Vice-President of the PR Senate

Author of the Law 133 of 2019 – Law of Mitigation, Adaptation, and Resiliency to Climate Change of Puerto Rico.

Bio: Lawrence N. Seilhamer Rodríguez, better known as Larry, was born in New York City. He earned a bachelor's degree in civil engineering with a Cum Laude distinction from New Haven University in Connecticut. Later, he continued his studies at the UPR Mayagüez, obtaining a second bachelor's degree in science with a concentration in pre-medical science in 1979. Then, in 1983, he entered the College of Engineers and Surveyors of Puerto Rico as a licensed engineer. On November 4, 2008, Larry was elected Senator by the District of Ponce. By September 2011, he was selected as a majority spokesman in the Senate and is appointed chairman of the Rules and Calendar Committee. On November 8, 2016, was elected for a third term as a senator by accumulation and Vice-President of the Senate. He is also the chairman of the Internal Affairs and the Joint Committee for Private-Public Partnerships, Chairman of the Committee on Joint Commission on Mitigation, Adaptation, and Resilience to Climate Change, Ex officio member of the Environmental Health and Natural Resources committee and Author of Puerto Rico Climate Change Mitigation, Adaptation and Resilience Law (Law No. 33 of May 22, 2019).

<https://www.scribd.com/document/432413406/Act-33-2019-Climate-Change>



Dr. Elvira Cuevas

Professor and Director, Center for Applied Tropical Ecology and Conservation, University of Puerto Rico, Río Piedras

Bio: Full Professor, Department of Biology and Director of the Center for Applied Tropical Ecology and Conservation (CATEC), University of Puerto Rico, Río Piedras. She received her B.S. and M.S in Biology at UPR, Río Piedras, and her Ph.D. at Instituto Venezolano de Investigaciones Científicas (IVIC) in Venezuela, with post-doctoral training at the USDA Forest Service, International Institute of Tropical Forestry. Her research areas are the dynamics of organic matter production and nutrient mineralization in tropical ecosystems and climate change and ecosystem functioning in mangrove ecosystems. Participant in IGBP - International Geosphere Biosphere Program GCTE - Global Change Terrestrial Ecology - Focus 1: Ecosystem Physiology and Focus 4: Global Change and Biodiversity, Inter-American Institute for Climate Change Research and Tropical Soil Biology and Fertility Program. She is a Member of the PR Climate Change Council and was awarded the John Simon Guggenheim Foundation Fellowship in 2001 and became a member of the Latin American Academy of Sciences in 2018.



Fernando Lloveras San Miguel Esq.

President, Para La Naturaleza

Talk: Reforestation: Para la Naturaleza's nature solution for mitigating the climate crisis

Bio: Fernando Lloveras San Miguel, Esq. is Executive Director of the Conservation Trust of Puerto Rico, the leading nature conservation and historic preservation organization in Puerto Rico, and President of its recently created unit, Para la Naturaleza. Under his leadership, the Conservation Trust received the Seal of the Land Trust Accreditation Commission and became the first and only organization from Puerto Rico to be accepted in the International Union for the Conservation of Nature (IUCN). His work has focused on increasing awareness about Puerto Rico's nature conservation needs among key decision makers and the public in general, through interpretive experiences, scientific research, strategic alliances, and volunteer engagement. Mr. Lloveras is also co-founder and Chairman of the Board of Microjuris.com, Inc., the leading Internet provider of legal and legislative information in Latin America. Mr. Lloveras holds a Magna Cum Laude Juris Doctor from the University of Puerto Rico, a Master's degree in Public Policy from Harvard University, and a Bachelor of Arts from Dartmouth College, where he was a Senior Fellow.

Abstract: Climate changes are part of the evolution of the natural world in which we live. However, changes in temperatures, sea level, precipitation cycles, among others, have accelerated in recent years. Can we adapt to these changes and those that are to come? The future is uncertain. However, trees seem to be our best allies in that mission. They provide food, shelter, and protection to many species including human beings. They also provide oxygen, regulate the water cycle and the carbon levels in our atmosphere, and help reduce temperatures. Their root systems also help control soil erosion and enable the percolation of rainwater, thus avoiding flooding and ensuring the adequate functioning of watersheds. Therefore, reforestation is an urgent task for Para la Naturaleza, a nonprofit organization that protects ecosystems and has strengthened its reforestation program to plant 750,000 native and endemic trees in the next seven years.

Symposium Organizing Committee



Thrity (3t) Jal Vakil, FLS

LS – Director, Tropic Ventures Sustainable Forestry & Rainforest Enrichment Project, Patillas, PR www.eyeontherainfores.org,
Director, Institute of Ecotechnics in Santa Fe, NM, USA
www.ecotechnics.org President, Puerto Rico Hardwoods
www.prhardwoods.com

Bio: 3t serves as Director of the Tropic Ventures Sustainable Forestry & Rainforest Enrichment Project, a 1,000-acre reforestation and timber project in the mountains of Patillas, southeastern Puerto Rico, founded by The Institute of Ecotechnics in 1983. 3t also directs Endangered Species Conservation & Recovery within the Tropic Ventures forest, as well as habitat enhancement projects that benefit rare or endangered fauna. 3t has worked with 60 International Earthwatch research teams in the rainforest since 2001, and has been a Principal Investigator in these teams since 2007. 3t has measured, monitored, and planted thousands of trees, collected seedlings, created nurseries, and has overseen herpetological, avian, vine, and fungi surveys on the land. In 2017, the project was a recipient of the National Energy Globe Award.

A Director of the Institute of Ecotechnics since the early 1990s, 3t has experience in a range of fields including research, ecology, writing, event-design & management, arts, adventure, expeditions, performance, and theater. In the mid 90's 3t served three years as an all-round crew member, and as Assistant to the Expedition Chief, in remote parts of the Red Sea & Indian Ocean on the Institute of Ecotechnics' Research Vessel Heraclitus, also crossing the Atlantic and Mediterranean Oceans. She participated in demanding scientific coral reef research diving expeditions, studying first-hand some of the most diverse and beautiful marine environments in the world. 3t was born of Zoroastrian parents in Nairobi, Kenya, East Africa, and moved to London at the age of ten. 3t has always been an intrepid explorer of the natural world. Her travels have taken her over much of Europe, India, Nepal, east and north Africa, south and north America. 3t lives in the Puertorican rainforest and maintains a constant link with the Institute of Ecotechnics in the high desert of Santa Fe, New Mexico, at, Synergia Ranch, Center for Innovation, working with the Ranch Organic Fruit Orchard & Farm, the Biosphere 2 archives, Global Ecotechnics Corporation, Theater of All Possibilities, Synergetic Press, with the RV Heraclitus in Spain, and with the transvanguard October Gallery in London, UK.

In 2012, 3t became aware of the widespread practice on the island of cutting down old trees and grinding/chipping them to send to landfills. Thrity co-founded Puerto Rico Hardwoods (PRH) with Andrés Rúa, to raise awareness and to begin salvaging these urban hardwoods as well as harvested trees from Tropic Ventures. PRH began showcasing the hardwoods that grow in Puerto Rico, and won the prestigious 2016 EnterPRize business award for Sustainability, sponsored by Grupo Guayacán, and the Aireko Foundation. Hurricanes Irma and Maria in 2017 motivated PRH to step up to save valuable trees on an unprecedented scale, and a mill was set up in Caguas, to process fallen hardwoods. 3t is a Fellow of the Linnean Society, London, and a Fellow of The World Academy of Art & Science, and an accomplished fine artist. www.3tvakil.com



Cristina Cabrera Barros

Environmental consultant, Dolphin Sanctuary Project, National Aquarium

Ms. Cabrera has a BA from the School of Public Affairs of American University, an MS in Environmental Management from the Metropolitan University (UMET), a Graduate Certificate in Environmental Regulations and Permits from UPR, and a Graduate Certificate in Real Estate from New York University (NYU). While pursuing her graduate degrees from UMET and UPR, Cabrera served as a research assistant on industrial ecosystems for Yale University's School of Forestry and Environmental Studies. Cabrera went on to manage several Puerto Rico real estate corporations while attending NYU, finishing their degree in real estate in 2008. From August 2009 to December 2016, she worked as Special Assistant to several Secretaries of PR DNER working on issues ranging from fisheries, interagency beach board, forestry and a multitude of others delegated by the Secretary. In November of 2011 Cabrera was named State Forester of Puerto Rico, a position she held until December 2016. As State Forester, she successfully headed several program reviews of the State and Private Forestry programs and several revisions to the Puerto Rico Forest Action Plan. She also actively participated in the steering committee for a local wood industry advisory council and coordinated training to DNER forestry technicians by experts in ecosystem services, green infrastructure, GIS, forest health, and i-Tree. Ms. Cabrera won a fellowship from the National Association of State Foresters Foundation and USDA FS to complete training at Harvard University's Kennedy School of Government. Cabrera completed the "Senior Executives in State and Local Government" certification in July of 2015. After leaving DNER, Cabrera pursued courses at the UPR Law School. Cabrera was named the Director of Real Estate and Housing for Epting LLC, a disaster relief service provider in September 2017. Cabrera is currently an environmental consultant to the National Aquarium for their Dolphin Sanctuary Project.



Agro. Christian Torres Santana

Director Parque Doña Inés, Fundación Luis Muñoz Marín

Bio: Christian Torres Santana is the Director of the Doña Inés Park at the Luis Muñoz Marín Foundation. He oversees a 12-acre native plant arboretum and the 4-acre Historical Estates Gardens for education, research, and conservation. He received an MS in Botany from the University of Hawaii, a BSA in Horticulture from UPR Mayagüez, a Nonprofit Management Executive Certificate from Georgetown University, and is currently completing an Executive MBA from the Inter American University of Puerto Rico. Over the past 15 years, Christian's work has specialized in pollination biology, forest health, biodiversity conservation, particularly on rare plant conservation, conservation horticulture, and environmental education. He recently received the Marsh Award for International Plant Conservation from Botanic Gardens Conservation International and the Kittleman Scholar for Aspiring Public Garden Leaders from the American Public Garden Association. He is a certified international Arborist, a Professional Horticulturist, and a Licensed Agronomist in Puerto Rico. Christian is also a co-organizer of this symposium.

Sponsors

Para La Naturaleza

The Nature Conservancy - Puerto Rico

Oxfam America

Puerto Rico Department of Natural and Environmental Resources

Puerto Rico Science, Technology & Research Trust

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University of Puerto Rico at Río Piedras

Puerto Rico Hardwoods

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