Resistance and Resilience: Responses to the climate crisis from Cuba and Puerto Rico

5-Part Conference Series September 2021-June 2022
Proceedings Report

CAI CARIBBEAN AGROECOLOGY INSTITUTE

FUNDACIÓN ANTONIO NÚÑEZ JIMÉNEZ DE LA NATURALEZA Y EL HOMBRE

Yale SCHOOL OF THE ENVIRONMENT

¡ADELANTE UNIDOS! Junta For Progressive Action FORWARD TOGETHER!

RESISTANCE & RESILIENCE: RESPONSES TO THE CLIMATE CRISIS FROM CUBA & PUERTO RICO

SESSION 1: EXPLORING RESILIENCE

Cuba and Puerto Rico are acutely feeling the impacts of the climate crisis and are responding in a diversity of ways. In this inaugural panel, we will explore what resilience means with perspectives from the islands and the diaspora:

- Arturo Massol-Deyá, *Casa Pueblo, Puerto Rico*
- Roberto Pérez Rivero, *Fundación Antonio Núñez Jiménez, Cuba*
- Leidy Casimiro, *Universidad de Santi Spiritus & Finca del Medio, Cuba*
- Cecilio Ortiz García, Macalester College & *RISE Network, Puerto Rico*
- Bruni Pizarro, *Junta for Progressive Action, United States*

Moderated by Reinaldo Funes Monzote, Fundación Antonio Núñez Jiménez & Universidad de La Habana

Interpreted in English y Español

Join us for the first session of this virtual conference series.

For information & to register:
www.caribbeanagroecology.org
3:00-5:00 pm ET
September 23, 2020

Yale School of the Environment
Yale MacMillan Center
Council on Latin American & Iberian Studies

RESISTANCE & RESILIENCE: RESPONSES TO THE CLIMATE CRISIS FROM CUBA & PUERTO RICO

SESSION 2: ENVIRONMENTAL HISTORY

The environmental crisis in the Caribbean has deep roots in colonial patterns of exploitation of human labor and nature. Exploring environmental history allows us to delve into that past as part of the struggle for a "Culture of Nature":

- Tania López Marrero, *Universidad de Puerto Rico, Mayagüez*
- Juan Giusti Cordero, *Universidad de Puerto Rico, Río Piedras*
- Claudia Martínez Herrera, *Universidad de La Habana, Cuba*
- Jorge Nieves Rivera, *Universidad Ana G. Méndez, Gurabo, Puerto Rico*
- Reinaldo Funes Monzote, *Fundación Antonio Núñez Jiménez y Universidad de La Habana, Cuba*

Moderated by Margarita Fernández, Caribbean Agroecology Institute & Cuba-US Agroecology Network.

In Spanish, with English interpretation

For information & to register:
www.caribbeanagroecology.org
3:00-4:30 pm ET
October 29, 2020

Yale School of the Environment
Yale MacMillan Center
Council on Latin American & Iberian Studies

RESISTANCE & RESILIENCE: RESPONSES TO THE CLIMATE CRISIS FROM CUBA & PUERTO RICO

SESSION 3: AGRIFOOD SYSTEMS

Industrial agrifood systems are a key driver of the climate crisis and require systemic transformation. We will hear how farmers, communities, researchers, and governments are building local, just and resilient agriculture and food systems through social processes, on farm innovations, and policies that support agroecology and food sovereignty:

- Giraldo Martín Martín, *Pasture & Forage Experimental Station Indio Hatuey, Cuba*
- Sonia Alvarez Pineda & Luis Vasquez, *Cuban Association of Agronomists & Foresters (ACTAF), Cuba*
- Ana Elisa Pérez-Quintero, *La Colmena Cimmarona, Vieques, Puerto Rico*
- Georges Felix, *Center for Agroecology, Water, & Resilience, Coventry University, Puerto Rico*

Moderated by Margarita Fernández, Caribbean Agroecology Institute & Cuba-US Agroecology Network.

In Spanish, with English interpretation

For information & to register:
www.caribbeanagroecology.org
3:00-5:00 pm ET
December 17, 2020

Yale School of the Environment
Yale MacMillan Center
Council on Latin American & Iberian Studies

RESISTENCIA & RESILIENCIA: RESPUESTAS A LA CRISIS CLIMÁTICA DESDE CUBA & PUERTO RICO

SESIÓN 4: TRANSFORMACIONES ENERGÉTICAS

Históricamente, Cuba y Puerto Rico han dependido de la importación de combustibles fósiles para sus necesidades energéticas. En años recientes ha habido una mayor conciencia en desarrollar soluciones con fuentes renovables. En esta sesión escucharemos de voces de la sociedad civil sobre como las comunidades están innovando en sistemas limpios y descentralizados, y el rol que tiene el sector gubernamental.

- Ruth Santiago, *Abogada de grupos comunitarios y ambientales, Puerto Rico*
- Arturo A. Massol-Deyá, *Casa Pueblo, Puerto Rico*
- Madelaine Vazquez, *Cubasolar, Cuba*
- Alois Arencibia, *Cubasolar, Cuba*

Moderado por Agustín F. Carbó, Environmental Defense Fund.

En español, con interpretación al inglés

Para información y registrarse:
www.caribbeanagroecology.org
3:00-5:00 pm ET del
11 de marzo de 2021

Yale School of the Environment
Yale MacMillan Center
Council on Latin American & Iberian Studies

RESISTANCE & RESILIENCE: RESPONSES TO THE CLIMATE CRISIS FROM CUBA & PUERTO RICO

SESSION 5: SOCIO-ECOLOGICAL COASTAL RESILIENCE

In Cuba and Puerto Rico, building social and ecological resilience in coastal areas is essential to confront the climate crisis. In this session, we will hear how communities, researchers, and governments are implementing innovative plans to ensure the health and well-being of people and the ecosystems we depend on.

- Ruperto Chaparro, *Puerto Rico Sea Grant, Puerto Rico*
- Brenda Torres Barreto, *Programa del Estuario de la Bahía de San Juan, Puerto Rico*
- Orlando Rey, *Ministerio de Ciencia Tecnología y Medio Ambiente, Cuba*
- Marta Rosa Muñoz Campos, *Universidad de La Habana, Cuba*

Moderated by Reinaldo Funes Monzote, Fundación Antonio Núñez Jiménez, and Margarita Fernández Pérez, Caribbean Agroecology Institute.

In Spanish, with English interpretation

For information & to register:
www.caribbeanagroecology.org
3:00-5:00 pm ET
June 30, 2021

Yale School of the Environment
Yale MacMillan Center
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Introduction

The Caribbean region is ground zero for the impacts of the global climate crisis: temperatures are increasing, sea levels are rising, coral reefs are bleaching, droughts are becoming longer and more severe, and hurricanes are increasingly more intense and more frequent. For a region with many island that are already plagued by the negative ecological, economic, social, and political impacts of colonialism, imperialism, and extractive economies, tackling the impacts of the climate crisis is a major challenge. However, it has created the space and opportunity for deep change led from below, forming pathways for just transitions towards new social, solidarity economies, sustainable food systems based on agroecology and food sovereignty, low carbon energy systems, and more resilient and sovereign communities.

Puerto Rico and Cuba are responding in a variety of ways to address vulnerabilities and build resilience. These islands have shared cultures, geographies, and histories shaped first by the Taino people and then by Spanish and U.S. colonization. Their economic, social, and political paths have in certain ways diverged in the past century, due in part to their distinct relationships with the United States. For these reasons we seek to draw knowledge and comparisons from the two countries, while amplifying the actions that Cubans and Puerto Ricans - on the islands and in the diaspora - are taking to strengthen their communities in response to climatic instability, despite the challenges and confines of colonization and the blockade.

Through a series of 5 virtual roundtables, we convened academics, farmers, activists, citizens, and government officials to engage in discussion on resilience, environmental history and justice, agroecology and food systems, coastal resilience, and energy. The 5 series were well attended, with an average of 80 participants in each. The videos are housed on the Caribbean Agroecology Institute's Facebook page and have been viewed more than 6000 times.

The overall conference series was organized by: Fundación Antonio Núñez Jiménez de la Naturaleza y el Hombre, Caribbean Agroecology Institute, and Yale School of the Environment. Special thanks to Junta for Progressive Action for collaboration in Session 1 and Environmental Defense Fund for collaboration in Session 4. We are grateful for support from the Yale MacMillan Center Council on Latin American & Iberian Studies, Yale School of the Environment, and the Ford Foundation.

This report is a summary of the discussions that took place at each of the five sessions, highlighting some of the key messages.

Session 1: Exploring resilience

In this inaugural session, we brought together activists and scientists from the two archipelagos to discuss the concept and practice of resilience and thus frame the entire conference. Participants in this session included:

- **Arturo Massol-Deyá**, Casa Pueblo, Puerto Rico
- **Roberto Pérez Rivero**, Antonio Núñez Jiménez Foundation, Cuba
- **Leidy Casimiro**, University of Sancti Spíritus & Finca del Medio, Cuba
- **Cecilio Ortiz García**, Macalester College & RISE Network, Puerto Rico
- **Bruni Pizarro**, Board for Progressive Action, United States

Moderated by Reinaldo Funes Monzote

1. What does resilience mean?

"How do we [create] a general dialogue?" Reinaldo Funes Monzote asked at the conclusion of the round of responses from the speakers on how they define resilience. Each definition was connected to the speakers' backgrounds, and there was consensus that resilience--multidimensional and ambiguous at times--must be contextualized to the social, political, and environmental characteristics at each locale.

Resilience is a concept that, depending on the object of study, can mutate into an explanation of how to strengthen a system's ability, or an individual's ability, to manage and respond to impacts. Leidy Casimiro commented that a socioecological approach can help to understand how external attributes of systems, and the characteristics that make them vulnerable, influence resilience levels. According to Roberto Pérez Rivero, resilience is an intrinsic property that is accumulated and lost through the interaction of its own and external characteristics. Both speakers highlighted the role of individual and collective community decisions in how resilience is structured, defined, and measured.

Notably, resilience should not be used as a shield to resist transformations aimed at bringing about change in governance. The speakers from Puerto Rico, Arturo Massol Deyá, Bruni Pizarro, and Cecilio Ortiz García, agreed that the concept of resilience has been exploited by governments to eliminate their responsibility to communities. Resilience, then, cannot be used to "push back" or "return to previous conditions", since such conditions are the ones that lead to the suffering that arises from an impact.

Based on the responses to Funes Monzote's question, we conclude that understanding resilience as a set of individual and collective capacities, contextualized to socio-ecological characteristics, can keep systems that are vulnerable to climate impacts from being perpetuated.

2. Socio-environmental challenges facing the Caribbean and its diasporas

Caribbean island states share a history of colonization and exploitation, as well as environmental challenges due to their geography and vulnerability. The speakers agreed that the region will face stronger and very familiar climatic shocks due to climate change. One of the major challenges in facing these impacts is the region's historical fragmentation.

Roberto Pérez Rivero commented that the Caribbean often looks outward for answers, support, or ways to address socio-environmental challenges. The lack of ties among the Caribbean islands, and sometimes the links that these islands have with former or current global powers, hinders the exchange of knowledge and resources that would strengthen the region. Ortiz García added that the lack of ties stems from an inability to "communicate trans-disciplinarily", i.e., so that community sectors, academics, and others can communicate in a way that does not hamper the integration of traditional and academic knowledge.

Bruni Pizarro, Arturo Massol Deyá, and Leidy Casimiro highlighted examples of ways that connections between sectors can be forged to build resilience when such impacts occur. These include, respectively, solidarity among the Puerto Rican diaspora in Connecticut after Hurricane María, community-based projects in rural Puerto Rico to achieve energy independence, and Cuban agroecology as an approach to maintain social memory and land in producers' hands. The speakers emphasized that spaces must be built in which a cross-cutting dialogue can take place to reimagine our systems.

3. Resilience in pandemic times

Covid-19, like so many other disasters, has revealed "the [other] pandemics we have been living with," said Cecilio Ortiz García. One impact after another has made it clear that institutional weakness, geopolitical barriers, such as the U.S. blockade of Cuba, and the lack of regional integration undermine our capacity to respond to these shocks.

Leidy Casimiro underscored how the pandemic demonstrated that the lack of alternatives to externally dependent activities, such as tourism or food imports, increases the vulnerability of both countries. Roberto Pérez Rivero emphasized how Cubans' contact with the diaspora has been weakened, which has hindered intra-family assistance.

Such intra-family and community ties have been severed by a poor response to the pandemic in Puerto Rico. Massol Deyá noted the importance of talking about physical rather than social distancing, given that the "social fabric" is crucial to building

resilience: It was organized communities that responded to hurricanes and earthquakes in Puerto Rico, while demanding that the governor resign.

Yet not everything is negative. The speakers highlighted how the pandemic has brought to light internal strengths in both countries: questioning obsolete institutions, using the capacity of communities to develop resilient systems, and implementing small-scale family farming to strengthen livelihoods and nutrition. For example, Leidy Casimiro pointed out that the 30% of Cuban land cultivated by rural families produces 70% of the country's food. The speakers stressed that in order to achieve resilience during a pandemic without forgetting the climate crisis, social transformations must be undertaken to achieve regional integration, community participation, and a reassessment of socio-environmental relations.

4. Targeted actions to build and strengthen resilience and resistance in both countries.

When asked about where Cuba and Puerto Rico can cooperate to further mutual learning, Massol Deyá recognized that the Caribbean faces similar challenges, but they cannot be addressed in a one-size-fits-all manner. The panelists again emphasized that the historical, geographic, and political barriers their countries face in building bridges of friendship inhibit the exchange of resources and knowledge. "We are missing a leg," said Pérez Rivero in reference to the Dominican Republic's absence at the dialogue, while emphasizing the need to encourage regional integration. Unfortunately, the current geopolitical differences in the Caribbean make cooperation between Cuba and Puerto Rico difficult.

However, the panelists mentioned this conference and other examples of how such obstacles can be circumvented to increase the potential for cooperation between the two countries. Casimiro discussed the example of how agroecology encourages knowledge exchanges that can be contextualized to account for both islands' particularities and the importance of including participatory and community-based practices in these exchanges. Similarly, Cecilio Ortiz García stressed the importance of revisiting the connection between humans and the natural world in order to develop relationships that encourage sectorial integration within their countries.

HIGHLIGHTS:

- Resilience must be contextualized according to the socio-environmental realities of each country or territory and understood in a multidimensional way, i.e., as a set of skills that reduces vulnerability.
- Caution should be exercised when applying the concept of resilience, as it can be used to perpetuate institutions, practices, and habits that heighten vulnerability and place the responsibility entirely on the individual, downplaying the fact that people are part of a system.

- The Caribbean needs to unite. Even though we face similar socio-environmental challenges, the Caribbean islands look outward for answers to their needs. We must extend bridges of friendship and cooperation to validate our strengths.

Session 2: Environmental history

The Caribbean environmental crisis is rooted in colonial patterns of exploitation of humans and nature. Exploring environmental history allows us to delve into that past as part of the struggle for a “Culture of Nature”.

In general terms, following John McNeill’s definition, environmental history deals with the study of the mutual relationships between humans and the rest of nature. In addition to its interdisciplinary nature as a bridge between social science and natural science, it has also been highlighted by authors such as Manuel González de Molina as applied history in areas such as the shaping of sustainable agrarian systems that are nourished by the agroecological practices of traditional producer communities.

The Caribbean islands have an important background that can broaden the knowledge of their environmental history, and the two countries that concern us in this series, Puerto Rico and Cuba, are no exception. Long before the term arose, naturalists, geographers, and historians studied the environmental variable. From the colonial period, Agustín Íñigo Abbad y Lasierra in Puerto Rico and Ramón de la Sagra in Cuba are leading figures. In the 20th century, numerous intellectuals who were influenced by the field of human geography can be added to the list, such as the geographers Rafael Picó, Levi Marrero, Salvador Massip, Sarah Ysalgue, and Antonio Núñez Jiménez.

The latter intellectual gave us the concept of “culture of nature”, which he articulated in February 1980 as part of a campaign to encourage Cubans to broaden their knowledge of nature, to awaken love for its landscapes and its flora and fauna, while advocating for an appreciation of, and better relationship with, nature. Similarly, other academics have inspired us to find lessons in our history for collective construction as we transition to resilient socio-ecological systems. As part of the “culture of nature” advocated by Núñez Jiménez, environmental history can be a tool to promote the urgent environmental awareness we need to face the climate and socio-environmental crisis.

Our speakers for this session were:

- Tania Lopez Marrero, University of Puerto Rico, Mayagüez

- Juan Giusti Cordero, University of Puerto Rico, Río Piedras
- Claudia Martínez Herrera, University of Havana, Cuba
- Jorge Nieves Rivera, Ana G. Méndez University, Gurabo, Puerto Rico
- Reinaldo Funes Monzote, Antonio Núñez Jiménez Foundation and the University of Havana, Cuba

Moderated by Margarita Fernández Pérez, Caribbean Agroecology Institute & Cuba-US Agroecology Network.

1. Lighting up the present and the future with environmental history

An important contribution of environmental history lies in its preservation of "biocultural memory," the sum total of experiences, knowledge, practices, and traditions throughout history that are lessons for informed decisions as we look to the future. The panelists discussed various projects they are undertaking or have implemented to build biocultural memory. Historiography, they said, is an interdisciplinary tool that contributes to social memory by gathering and disseminating information in a contextualized and culturally-relevant manner.

Tania López Marrero discussed some of the projects she has carried out to achieve this goal. *Project 1867: Disasters and Social Memory in Puerto Rico* details the hurricanes and tropical storms that directly and indirectly impacted Puerto Rico in a period spanning 150 years. The project assembles historical data on the biophysical characteristics of significant events and the damage they caused. This compilation has been a source of information for communities and researchers interested in understanding the history of natural disasters. Likewise, such information has been shared in different ways to reach diverse audiences. Along these lines, López Marrero, also director of the Interdisciplinary Center for Coastal Studies, commented on the preparation of the *Environmental Atlas of Puerto Rico*, published in 2006, together with Nancy Villanueva Colón. The book explains the socio-environmental changes experienced in Puerto Rico, taking into account how demographic, political, and technological factors, among others, influenced this change.

The panelists said that environmental history provides a framework for understanding how these changes occur and why. Claudia Martínez Herrera discussed her project focusing on the port of Havana in the 19th century and also talked about her work on environmental history at the National Archive of Cuba, which focuses on the colonial period. She shared her interest in studying the socio-environmental change in Havana during the sugar boom concentrating on the plantations that depended on enslaved people's labor. Her research details the transformations that occurred in the

city related to the management of water, solid waste, and garbage, in addition to the history of the keys in proximity to the city between the late 18th and early 20th centuries. The lack of quantitative and historical data on these events was a catalyst for the University of Havana historian to delve into these issues.

Further contributing to Cuban environmental historiography, Reinaldo Funes shared details of his recent book, *Nuestro viaje a la luna* [Our Journey to the Moon]. The book delves into the transformations in nature during the Cold War in Cuba. It also takes a critical look at the idea of development in Latin America and the Caribbean. In particular, it harnesses a multidimensional analysis to understand how development evolved in Cuba from a capitalist model to a socialist model. Like the panelists' projects, Funes's book explores how social and political issues influence decisions related to environmental conservation. These studies make visible the role of landscape transformations in different human spheres and, as Juan Giusti commented, "(...) [they] can help us to rethink historiographical issues, to reinterpret history.

2. 1898: Catalyst for socio-environmental transformations in Cuba and Puerto Rico

The U.S. intervention in 1898, in the so-called Spanish-Cuban-American War and the occupation of Puerto Rico and Cuba, was the precursor of several socio-environmental transformations in both islands in the first half of the 20th century, as part of the so-called "American Sugar Kingdom" in the Caribbean, as defined by Puerto Rican historian César Ayala. The panelists, using a historiographic perspective, discussed several of these changes and their similarities and differences in both countries. One point of consensus was the role of sugar at that time. Both islands became major exporters of sugar to the United States, which generated several landscape transformations.

Jorge Nieves Rivera noted that the forests were the great losers during these events. Large swaths of land were deforested to make way for monoculture. In Puerto Rico, Nieves Rivera noted that the intensification of mountain-grown coffee and sugar on the coasts led to the establishment of infrastructure that affected the environment. For example, given the dry conditions in the south of the big island, the aquifers in the area came under pressure from agricultural expansion. To counteract the loss of water, irrigation systems were built to deliver water to the area. That water came typically from reservoirs, most of which were built throughout Puerto Rico between 1913-1950. These changes linked to sugar, coffee, and cattle ranching also occurred in Cuba.

Reinaldo Funes and Juan Giusti highlighted how U.S. control reinforced the role of big cities on both islands. Havana and San Juan played important roles in achieving an easy exchange between the United States and both islands. However, Giusti notes a difference in that, before 1898, control of sugar in Puerto Rico was polycentric, unlike Cuba, where Havana was the dominant entity. The consolidation of San Juan as a metropolis caused other Puerto Rican cities, such as Ponce, to lose power. Discussion

between the panelists brought to light that Puerto Rico and Cuba underwent similar changes in the landscape at the beginning of the 19th century. As Reinaldo Funes points out, from the 1950s on, Cuba focused on industrial agricultural development, while in Puerto Rico industrialization was more classical (i.e., involving factories). Recognizing this divergence in history helps us to understand how transformations are also related to different Caribbean socio-political contexts.

3. Vulnerabilities

The panelists' compiled historical data reflect how these transformations are related to social, geographic, and political factors, which affect the vulnerability of societies. López Marrero emphasized that disasters are not natural, since much of the damage and suffering after a serious event reflects the human component in that disaster. He pointed out that through historiography "[w]e see (...) that many of the factors that influence vulnerability are still important elements." An example is Hurricane María in Puerto Rico. Project 1867 found that many elements that made María a disaster were the same as in other past disasters: lack of resources, government inefficiency, disparity in the availability of resources, militarization of aid distribution, poor distribution in general, the role of the diaspora in channeling aid, among others.

Just as Hurricane María is an important event in Puerto Rico's environmental history, Cuba's Special Period also occupies a similar role. Reinaldo Funes stressed that it is important to study crises because they show how different components of our societies interact and produce vulnerability. The Special Period in Cuba led to a transformation of the agricultural sector, which turned to ecological production to reduce dependence on external inputs. It unleashed a series of revolutions in thinking and policy that led to a new approach in the use of energy and other natural resources. Reinaldo Funes mentioned that to stimulate mutual understanding between both countries, we need to create spaces in which to study crises and exchange information between both countries. To develop these spaces, the panelists discussed initiatives to encourage younger historians to join the current conversations and share their input. Jorge Nieves Rivera and Claudia Martínez Herrera belong to a generation of young environmental historians.

4. Specific actions to advance environmental history between the two countries.

Environmental historiography helps to combine the social and natural sciences. The panelists concluded that creating open, knowledge-sharing spaces is essential to strengthen both countries' environmental history. These spaces can be used to share successes, failures, and lessons learned. The region's environmental history tells us that actions that foster disunity and loss of resilience continue to be repeated. Therefore, we must find ways to take advantage of sharing spaces to understand the dynamics and causes of vulnerability, so that multidimensional resilience can be strengthened.

HIGHLIGHTS

- Recognizing and studying our environmental history provides us with tools to understand how transformations in the landscape are linked to political, economic, social, cultural, and geographic factors.
- The creation of spaces to exchange historical knowledge helps each country to learn from the successes and failures of the other, since both share a similar history of a colonial past with Spain and the current political ups and downs with the United States.
- The development of innovative ways to create environmental history (i.e., electronic archives) and share it with diverse audiences (for example, through poetry) promotes greater access to information.

Session 3: Agroecology and Agri-Food Systems

In this third session, we discuss how producers, communities, researchers, and governments are building local, just, and resilient agri-food systems through social processes, on-farm innovations, and policies that support agroecology and food sovereignty.

Today we live in simultaneous crises - climate, biodiversity loss, poverty, inequality, among others - that require thorough structural and systemic transformations. The great challenge is how to improve our societies' standard of living and quality of life and, at the same time, conserve our natural resource base on which our existence depends. To overcome these challenges we must urgently transform our agri-food systems. We know that the current corporate and consolidated agro-industrial system does not work. It is poisoning our natural resource base and harming human beings. According to the latest IPCC report, the agro-industrial sector contributes up to 37% of greenhouse gases. The problem of hunger in the world is not one of scarcity, but of distribution, poverty, lack of access, lack of power, inequity, and waste. One third of the food produced worldwide is wasted along the value chain. Relocating agri-food systems helps to address these systemic problems. Technological fixes will not solve them. We need innovations in governance, stakeholder articulation, policy, economic models, changes in diets, and cultural changes. A transformation of the system is needed in order to fulfill the goals of the Paris Agreement and to establish fair and resilient economic, ecological, and social systems. We know that the health of our planet and that of our human species are inextricably linked, and much depends on how we produce, distribute, and eat. The good news is that there are many examples around the world that are accomplishing this transformation, driven by producers, social

movements, progressive governments, international cooperation, and academics working in a transdisciplinary and participatory way to solve problems.

In this session, we had the opportunity to learn in greater detail about some of these inspiring examples. In Cuba, following the collapse of the socialist bloc in the early 1990s, which caused a crisis such that Cubans did not have the inputs for their agro-industrial system, they had to transform their agri-food system out of necessity. After 30 years of building agroecological systems, Cuba has many of the key elements to create resilient systems. In Puerto Rico, despite decades of public policies such as “hands on,” implemented with the intention of disappearing small producers, a crisis of neoliberalism, abandonment of the countryside, and climate disasters aggravated by the country’s colonial status, a resilient, largely youth-led movement is defending ecological agriculture as an option for building authentic sovereignty.

Speakers for this session included:

- Giraldo Martín Martín, Estación Experimental de Pastos y Forrajes Indio Hatuey, Cuba Sonia Álvarez Pineda, Asociación Cubana de Técnicos Agrícolas y Forestales (ACTAF), Cuba
- Luis Vasquez, Asociación Cubana de Técnicos Agrícolas y Forestales (ACTAF), Cuba
- Ana Elisa Pérez-Quintero, La Colmena Cimmarona, Vieques, Puerto Rico
- Georges Felix, Center for Agroecology, Water, & Resilience, Coventry University, Puerto Rico

Moderated by Margarita Fernandez, Caribbean Agroecology Institute, Cuba-US Agroecology Network

1. Agroecological principles in action

Each country’s agri-food systems are vital to human life. Beyond generating the food that sustains us, they provide spaces for livelihoods and environmental protection. Our panelists agreed that an agroecological approach, which integrates ecological, agricultural, and traditional knowledge, enables agri-food systems to resist, absorb, and adapt to the effects of climate change. In addition, such an approach helps people from different backgrounds to interact in the dynamics that sustain the system. Thus, resilience and resistance require collectives that are capable of dealing with the uncertainty of these times. Panel participants, from farms to universities, gave examples of how they have integrated agroecological principles in their work within the agri-food systems of Cuba and Puerto Rico.

Ana Elisa Pérez, co-manager of La Colmena Cimarrona, a collective working to achieve food sovereignty in Vieques, Puerto Rico, talked about her experience with Hurricanes Irma and María in 2017. Vieques, an island municipality, was heavily

damaged by both storms, increasing the obstacles Vieques residents face in accessing healthy food. After the hurricanes, La Colmena, following agroecological principles, was able to offer food, while supporting and creating other projects for similar purposes. Ana Elisa commented that they were able to grow vegetables rapidly after María, because before it hit the island, they implemented several agroecological practices including preparation of seed banks adapted to the Vieques climate, ditches for water storage, contour planting, and seed dispersal.

Georges Felix, a Puerto Rican scientist and member of the Boricua Organization of Ecological Agriculture, expressed interest in the practices mentioned by his colleague Ana Elisa. Felix said that María (beyond exposing well-known problems) taught us the different ways in which farmers can strengthen their resilience and resistance using agroecological principles. Although María's winds and rains were catastrophic, Félix related how the complex and more diverse systems, such as those mentioned by Ana Elisa, led to rapid restoration (an important aspect of resilience).

Cuban agronomist Luis Vázquez emphasized that this ecological complexity, combining agroecological principles and traditional knowledge, is vital for the greater innovation that spurs continuous transformation. He also mentioned the importance of distinguishing agri-food systems. He and his teams have studied both rural and urban agricultural systems in Cuba, which has led to the development of contextualized tools that give producers formidable skills to self-evaluate their systems and make decisions in moments of uncertainty. This capacity is a good gauge of resilience, Vázquez said, because being able to innovate and make sudden changes to adjust to different shocks is an indicator of different capacities.

Giraldo Martín, member of the national committee developing Cuba's Food Sovereignty and Nutritional Education Plan, mentioned that a capacity such as achieving energy sovereignty is intertwined with various other capacities. He mentioned several projects that have helped Cuban producers generate their own energy. Some supply 70% of their farms' energy needs using biogas. He also introduced the concept of the circular economy. For example, rice husks are treated in rice processing plants to replace diesel. Given Cuba's energy shortage, constant recycling or innovation to produce biogas and other energy inputs has been a success. Martín added that the concept of the circular economy has helped to produce better resilience indicators.

2. Social processes for resilience and resistance

The social component is crucial for resilience, whether this be support networks or participatory ways of generating action. Sonia Álvarez, a lawyer and activist within the Cuban agroecology movement, shared her experiences as director of the Networks for Resilient Agriculture Project (RedAr), which seeks to connect networks of producers and communities that harness science for their benefit. RedAr works with 17 cooperatives co-creating agro-meteorological systems so that producers have useful information to make decisions about adapting to climate change. Based on participatory

data generation, growers are able to identify the status of their farms and propose adjustments. She also seconded what Luis Vázquez mentioned, i.e., having contextualized and relevant information spurs innovation. Giraldo Martin added that it is important to assemble contextualized data, as not all farms are the same and growers have different criteria. Forming support networks that facilitate the exchange of knowledge and experiences helps to have effective tools to assess resilience.

Ana Elisa echoed the importance of social support networks. La Colmena Cimarrona has worked on four projects that involve community outreach, the creation of solidarity spaces, such as social kitchens, and activities that support women. For example, the women-led El Panal project that emerged after María seeks to integrate communities through health promoters. Using the campesino-to-campesino methodology, they disseminate and share information and resources to favor producers in Vieques. Thus, they have been able to create a Vieques support network that has facilitated access to healthy food and strengthened the resilience of the local agri-food system. Georges Felix praised the projects mentioned by Ana Elisa and emphasized that Hurricane María was a catalyst for self-management throughout Puerto Rico. Since Puerto Rican agroecology tends to be community-based, María led to rethinking the productivity of unconventional and abandoned spaces, as well as community participation in supporting local farms. Both Puerto Rican panelists emphasized that many of these spaces seek to generate public policy at the local level, since the state often hinders or does not allow agroecological expansion.

3. Public policy and agri-food systems

Governments can play an important role in facilitating resources and creating spaces that enable access to opportunities to achieve resilience. This idea was upheld by Giraldo Martín, who commented on the Food Sovereignty and National Education Plan, which uses agroecology to develop socio-technological support for Cuban agriculture. He remarked that the plan involves 20 ministries, in addition to mobilizing and involving local governments. Sonia Álvarez added that the plan creates multisectoral platforms that allow the confluence of different actors. Both emphasized that these platforms bring together the different elements that make up the agri-food system. Luis Vázquez joined the conversation, highlighting governments' role in encouraging the training of agronomists who are knowledgeable about agroecology. Thus, by integrating actors and institutions at different levels, it is possible to develop effective regulatory frameworks that enable organization and structural changes.

This is not the case in Puerto Rico, where no domestic project has emerged to address the needs of the Puerto Rican agri-food system. Georges Felix stressed that, at times, the Puerto Rican and U.S. regulatory frameworks do not coincide. For example, the Puerto Rico Department of Agriculture provides incentives for intensively planting coffee under the sun, while the same department at the federal level provides access to

conservation programs that encourage shade-grown coffee. This creates difficulties for growers who find themselves at regulatory cross-purposes that hinder their work. Felix also emphasized the role of paradigms in the creation of public policy and academic training spaces. Many of the interests or objectives of the Puerto Rico Department of Agriculture and his University are not aligned with agroecological principles. Ana Elisa Pérez agreed with Félix and added that in Puerto Rico many non-governmental organizations do work that is the state's responsibility. Institutional support is crucial to achieve change, they said.

4. Specific actions in favor of the agri-food systems of both countries.

Caribbean agri-food systems share historical and environmental similarities and face similar environmental and climatic challenges. The panelists stressed the importance of creating opportunities and spaces for knowledge sharing. The dialogue that took place in this session highlighted the need to facilitate spaces for exchange at the regional level. Sharing experiences allows for contextualized and active learning so that people can access resources and knowledge to increase their resilience.

The conversation also illustrated that complex agri-food systems, where a participatory agroecological approach is applied, allow their actors to maneuver within climatic uncertainty and other social or ecological shocks and stressors. It also allows the promotion of social and support networks, where tools and knowledge are accessible and co-innovation is generated.

HIGHLIGHTS

- The socio-ecological complexity of agri-food systems -involving the integration of traditional and academic knowledge and ecological diversification- supports resilience and resistance, as well as recovery and transformation after impacts.
- The development of sustainable agricultural systems is also a social process. The social, political, cultural, and support network components cannot be overlooked.
- Government institutions should facilitate spaces where diverse actors can obtain and share resources for the development of sustainable agri-food systems. The development of agricultural public policies should be participatory and inclusive to achieve timely and effective changes in favor of health and the environment.

Session 4: Energy transformations

Historically, Cuba and Puerto Rico have depended on imported fossil fuels for their energy needs. In recent years, there has been growing awareness of the need to develop renewable energy solutions. In this session we will hear from civil society about how communities are innovating clean and decentralized systems, and the role of the government in such efforts.

In past decades, many countries have relied heavily on thermal generation using fossil fuels. The planning of these energy resources has focused on centralized generation, resulting in long-term problems to the extent that they are affected by supernatural events, such as hurricanes in the Caribbean. This situation is aggravated in that our islands have extensive mountainous regions, often making it difficult to install infrastructure for power transmission. In such cases, natural events such as tropical storms or earthquakes can affect the complex generation and transmission system, delaying post-disaster recovery.

The use of fossil fuels to generate electricity creates negative externalities, ranging from public health problems, environmental pollution, to high energy costs. Burning fossil fuels is responsible for more than 80% of greenhouse gas emissions and environmental pollution. In addition to these harmful gases being one main actor in the climate crisis, other resources are affected, such as water, which is used for cooling thermoelectric plants. In addition, many power plants are vulnerable since they are located in coastal areas that are threatened by rising sea levels. Finally, these negative externalities increase the frequency and intensity of natural events, such as hurricanes. This represents a greater risk to existing infrastructure, thus hindering the maintenance of energy resilience.

Citizens of both islands have suffered from extended periods without electricity, reliability, and resilience, and in response civil-society groups have been incentivized to develop grassroots clean energy projects, such as solar communities, in order to solve not only the problem of energy resilience, but also improve the quality of the environment and health outcomes. These community-based transformations have brought about significant changes in our countries' public energy policies. The active participation of community groups in regulating the energy sector has catalyzed a paradigm shift therein. In Cuba, the notion of an environmentally responsible country has underpinned visualizing holistic solutions to the energy problem, thus addressing the issue from a climate, sustainability, and food security approach. This approach deserves greater attention in Puerto Rico and would encourage greater positive impacts on the island's sustainability.

In session 4, the panelists shared the different perspectives that their organizations implement to address the energy problem. Their success stories are replicable models for our planet. We heard about the challenges they have faced in moving their countries toward decentralized systems in order to guarantee energy security and independence, the role that communities play in planning and developing renewable energy systems, and the intersection of climate mitigation and sustainability with energy transformation.

Panelists included:

- **Ruth Santiago**, Community and Environmental Lawyer, Puerto Rico
- **Arturo Massol-Deyá**, Casa Pueblo, Puerto Rico
- **Madelaine Vazquez**, Cubasolar, Cuba
- **Alois Arencibia**, Cubasolar, Cuba

Moderated by Agustín F. Carbó, Environmental Defense Fund

1. Historical background

The energy histories of Cuba and Puerto Rico are quite similar. Both islands began producing their energy from biomass. Then in Puerto Rico there was an early development of hydroelectric plants and in Cuba a greater dependence on imported coal for thermoelectric plants. As their populations grew and the demand for electricity increased, energy was then generated from fossil fuels. Panelists Ruth Santiago, a Puerto Rican lawyer and environmental activist, and Antonia Madelaine Vázquez Gálvez, a Cuban and Cubasolar's Vice President for Public Relations, explained that both countries faced similar challenges in achieving universal access to energy at the beginning of the 20th century.

Like Cuba, Puerto Rico's energy production was controlled by private companies in the early 20th century. Ruth Santiago recalled that in order to achieve energy access throughout Puerto Rico, particularly in rural areas, the Puerto Rico Electric Power Authority was established in the 1940s (first known as the River Sources Authority). Its objective as a public corporation was to achieve universal access to electricity, since it was not cost-effective for private companies to do so. After the 1950s, it built a significant number of combustion plants to generate electricity for an industrializing Puerto Rico. Today the same fossil fuel-dependent model persists, while only 3% of the island's energy needs is generated from renewable sources. The corporation faces several challenges due to the social, political, and economic crisis facing Puerto Rico. Currently, distribution and transmission of energy in Puerto Rico are transitioning to

private owners, which causes concern, since it forebodes a return to the past when access to electricity was not universal.

In contrast, Cuba has emphasized decentralized energy production through biofuels and other renewable sources. However, Madeleine Vázquez explained that obstacles persist because of the current heavy dependence on fossil fuels. Vázquez, an engineer and technologist, explained that transitioning is costly and sometimes slow due to the lack of materials and mechanisms to build new infrastructure. Similar to Puerto Rico, Cuba achieved universal access through the nationalization of energy. By 1992, the country boasted 95% coverage. However, the 1994 crisis in the electricity system brought to light its fragility and the need to begin its decentralization and gradual transformation. Both panelists agreed that alternative energy systems, as well as community empowerment in energy production, are vital for resilience. While thousands of Puerto Ricans waited months to recover from an electricity blackout following Irma and María's onslaught, Cuba was able to restore service quickly after Irma.

2. Community management and renewable energy

Arturo Massol Deyá, scientist and executive director of Casa Pueblo in Adjuntas, said that María was an awakening for many people in Puerto Rico regarding the precariousness of their electricity system. Through Casa Pueblo, community projects have been supported that not only produce energy locally, they enable people to build sovereignty with endogenous resources. The current energy model in Puerto Rico seeks to generate capital and has lagged in its efforts to facilitate spaces for energy transformation. Massol Deyá emphasized that it is important to promote changes from the bottom up. In Adjuntas, they have implemented several projects that encourage a change of mentality and perception in the population. Community management seeks to promote models that do away with dependency and address important issues such as health, poverty, social justice, among others, in a different way. Puerto Rico has the potential to generate its own energy, but this entails decentralizing and reestablishing priorities in favor of social welfare.

Just as Hurricane María was a catalyst for motivating social movements seeking energy transformation in Puerto Rico, Cuba's Special Period had a similar effect. Madelaine explained that Cubasolar was founded in 1994, during the years of the Special Period, following the fall of the Soviet bloc, which affected Cuba economically, socially, and politically. Like Casa Pueblo, Cubasolar is based on the premise that sustainable development is not possible without energy sovereignty. Cubasolar is committed to the communities and facilitating discussion spaces that generate actions in that regard. Cubasolar heads up training for circles of interest and has also played a role in generating useful information for the development of public policies. For example, they developed an energy-use profile (35% is for consumption and cooking, 23% for refrigeration, among others). Another Cubasolar objective is to promote

bioclimatic architecture, use of waste, electric transport, and other measures to reduce transmission losses and energy efficiency. Both panelists agreed that the role of governments as facilitators of resources is important to achieve energy transformation.

3. Public policy for energy sovereignty

Alois Arencibia Aruca, director of Cubasolar's Havana Solar City Project, commented on the government's role in promoting a positive outlooks regarding renewable energy sources and facilitating resources and spaces to achieve energy goals. The National Energy Commission ceased to function in 1994 when it achieved its goal of bringing electricity to the population but struggled to put renewable energies on the agenda. The commission was an example of an effective public policy, he said. Similarly, he highlighted the importance of including communities and their leaders in developing structural changes and public policies. "You cannot replace the people's leaders," Arencibia said, and added that grassroots organizations should accompany governments to bring about changes at the community level. He also emphasized that energy must be seen holistically; we must look at the system to realize how different components of social welfare are connected to energy.

Similar to Cubasolar, Casa Pueblo in Puerto Rico has led movements that have resulted in public policy changes. Arturo Massol explained that many government policies are contradictory and lack measurable goals or monitoring to validate their effectiveness. Ruth Santiago gave examples of the role of citizens in developing energy plans. Although ambitious and consensual goals are set, they are not always met. That is why influencing public policy through community models that exemplify what could be done on a larger scale is fundamental to catalyze transformations in Puerto Rico. Both panelists provided examples of how the back-and-forth between the U.S. and Puerto Rico governments puts communities and their opportunities at a crossroads in their efforts to cease relying on non-renewable sources.

4. Specific actions to generate energy fairly in both countries.

The panelists agreed that Cuba and Puerto Rico have similar problems in terms of achieving a true energy transformation. Ruth Santiago pointed out that both face a socio-political reality that creates obstacles: For Cuba it is the U.S. blockade, while Puerto Rico is politically subordinated given its colonial status. Santiago sees possibilities for change within the Biden administration, since there is more room to lobby in favor of the two Caribbean countries, which not only share a cultural and political history, but also the same challenges within a globalized world undergoing a climate crisis.

Alois Arencibia stated, "We are Antilleans, we are Caribbean," to emphasize that both countries have more aspects in common than differences. He stressed that it is

important to continue creating participatory spaces for discussion in order to share resources and knowledge. Massol Deyá noted how important it is that these spaces also help create work agendas, beyond informing a wider public. He added that building bridges of cooperation to combat inequality is important if we want to bring about change and transformation. Wrapping up, Madelaine Vázquez mentioned that the democratization of processes facilitates greater viability of transformation, since doing so denotes cultural and social achievements.

HIGHLIGHTS

- Energy sovereignty is crucial for resilience and resistance to climate change. Dependence on fossil fuels and lack of access to electricity in isolated or vulnerable areas perpetuates vulnerability.
- It is important to develop initiatives that provide communities with resources and information, so that they can generate their own energy to the extent possible. For example, solar energy or biofuels.
- We cannot discuss energy transformation without addressing poverty, lack of access to health, and food insecurity. Everything is connected.

Session 5: Coastal social-ecological resilience

In the first four sessions, we touched on resilience, environmental history, agroecology, and energy. This last session regarding coastal areas brings together these topics. Coastal areas are of utmost importance to Caribbean islands since they protect and buffer the impacts of the climate crisis. Here we delve into the various strategies implemented in Cuba and Puerto Rico regarding issues of governance, science, and the important role of civil society and local communities in building resilience in social and ecological terms. These efforts are needed both to meet the challenges of the climate crisis and create societies that will forge the good life in harmony with the planet.

Panelists:

- Ruperto Chaparro, Puerto Rico Sea Grant, Puerto Rico
- Brenda Torres Barreto, San Juan Bay Estuary Program, Puerto Rico
- Orlando Rey, Ministry of Science, Technology, and Environment, Cuba
- Marta Rosa Muñoz Campos, University of Havana, Cuba

Moderated by Reinaldo Funes Monzote, Fundación Antonio Núñez Jiménez de la Naturaleza y el Hombre, and Margarita Fernández Pérez, Caribbean Agroecology Institute.

1. Climate change and its impacts on coastal communities.

The effects of the 2017 Atlantic hurricane season are still reverberating, mostly due to Hurricanes Irma and María, whose winds and rains wreaked havoc across the Caribbean islands. Panelists from Cuba and Puerto Rico agreed that these major weather events reflect the reality of the current climate crisis. They also lay bare the vulnerability faced by the islands of the region, since most of their populations live in coastal areas and depend socioeconomically on the activities that occur there, such as fishing, tourism, and much industry.

"[Hurricane] Irma is evidence of a tendency that we insist is worsening," said Orlando Rey, an advisor to Cuba's Ministry of Science, Technology, and Environment. Ruperto Chaparro, director of Sea Grant at the University of Puerto Rico, added that this hurricane season vindicated what his organization and so many others have asserted for years in Puerto Rico. Therefore, adaptation to climate change and its effects, particularly those that affect the coasts of both islands, is crucial if we want to see decreasing vulnerability of the communities in the area.

Marta Rosa Muñoz, director of the Latin American Faculty of Social Sciences of the University of Havana, stressed the importance of understanding the socio-demographic characteristics of coastal communities. The degree of vulnerability cannot be measured solely by biophysical components or climatic events. She emphasized that a cross-sectional view is important to appreciate how different social and ecological aspects are linked. Brenda Torres Barreto, director of the San Juan Bay Estuary Program, added that any process of adaptation to, or mitigation of, climate change must include communities' essential voice. She also commented that Hurricanes Irma and María exposed the risks related to climate change along the coasts.

2. Public policy for the sustainability of coastal areas.

The panelists agreed that increasing visibility of the current climate crisis has spurred development of public policies and discussion in favor of sustainable development of the coasts. Orlando Rey spoke about the development of "Life Task" (Tarea Vida) in Cuba, the State Plan for Confronting Climate Change. This is a macro project that arose from scientific reports on climate change that were presented to various ministries. Given the climate crisis, Life Task developed a set of strategic indicators on how to reduce the vulnerability of coastal areas. One of the project's achievements has been to change public perception regarding climate change and its effects, which has catalyzed public participation.

The reality in Puerto Rico is quite different, since the social and political context makes the development of public policies complex and sometimes inconsistent. Ruperto Chaparro and Brenda Torres agreed that the fact that U.S. and Puerto Rican federal laws are at odds with each other is a reflection of Puerto Rico's political status. For example, some federal regulations, such as the Jones Act or even supporting projects, are developed without taking into account that Puerto Rico is an island. Also, many federal laws subordinate local initiatives. Both panelists from Puerto Rico indicated that some development projects, including post-disaster recovery, do not take into account coastal realities and climate change. However, emerging grassroots movements and participatory projects have made significant inroads in safeguarding the coasts and their communities.

3. Community involvement to achieve sustainable development.

Public interaction is one of the main components of Life Task. Marta Rosa Muñoz, who has also participated in the "My Coast" (Mi Costa) project, spoke of the importance of ensuring that people can "be part of and take part in" adaptation and mitigation projects. As a social scientist, she emphasized how important it is to implement approaches that validate communities' diverse contexts and social dynamics. Torres Toro agreed and added that it is important to accommodate adaptations to the local culture. She indicated that the San Juan Bay Estuary Program, the only urban estuary in Puerto Rico and within the network of estuaries in the United States, involves the communities through cultural and non-formal education activities so they can find a space to acquire and share knowledge and skills, as well as the tools to safeguard the estuary and its communities.

A successful project that emerged from the aftermath of Hurricane María in Puerto Rico supports community centers that function as resilience centers. Brenda Torres Toro explained that the Program equips the centers and trains the community on how to use the tools and resources available therein. This led to increased visibility of the estuary's conservation efforts and the development of citizen scientists who have become involved in these efforts. Marta Rosa Muñoz added that these training activities help to "form trainers", as it empowers people to take part and share knowledge. Along these lines, Chaparro commented that Sea Grant, in addition to its scientific work, does community outreach work. Creating common spaces where diverse voices, institutions, and traditional knowledge can coincide makes strengthening resilience more feasible.

4. Specific actions for coastal resilience in both countries.

The coastal communities of Cuba and Puerto Rico face similar challenges. At the end of this event, panelists had the opportunity to exchange views on possible cooperation and exchanges. There is clearly a need for spaces where both countries

can learn from each other. Beyond reporting on local initiatives, activists should carry out in-depth studies of public policy and grassroots initiatives that are occurring in both countries to get a better picture of similarities and differences. Marta Rosa Muñoz and Brenda Torres Toro discussed the community capacity-building efforts they have led and the role of community centers as focal points for cooperation and resilience. Orlando Rey and Ruperto Chaparro emphasized that drought is a major player in the climate transition occurring in both countries. Cuban and Puerto Rican institutions should work jointly on studies and projects to better understand this phenomenon, its possible repercussions, and ways to mitigate them.

HIGHLIGHTS

- Projects and public policies aimed at protecting coastal resources and establishing parameters to mitigate the impacts of climate change must take into account local communities and their diverse knowledge.
- One impact after another has shown that both countries are already suffering the effects of climate change. Coastal erosion and sea intrusion into communities and aquifers is already evident.
- Social sciences should be welcomed into research and public policy development initiatives, since they provide tools to include different voices and approaches that take into account the human factor in the resilience equation.

Annex 1: List of speakers/panelists

Arturo A. Massol-Deyá is from the mountainous area of Puerto Rico in the municipality of Adjuntas where his parents Alexis Massol and Tinti Deyá founded the community-based organization Casa Pueblo. Massol-Deyá grew up within the project and has chaired its board of directors since 2007. A graduate of the public school system (1986) and the University of Puerto Rico (1990), he obtained his doctoral degree from the Center for Microbial Ecology at Michigan State University in 1994. Since then, he has been a faculty member at the Department of Biology of the University of Puerto Rico Mayagüez Campus where he established the Tropical Microbial Ecology Lab. He has been a mentor to numerous students and a principal investigator of microbial-ecology projects, with an emphasis on biological processes aimed at restoring contaminated environments.

Cecilio Ortiz Garcia is Professor of Political Sciences at the University of Puerto Rico-Mayagüez, and currently Hubert H. Humphrey Distinguished Visiting Professor at Macalester College School of Environmental Studies. He is a founding member of the

National Institute of Energy and Island Sustainability and originator of the RISE Network, an Inter-University Collaborative Convergence Platform for Community Resilience.

Robert Pérez Rivero was born in Havana, Cuba, in 1970. He is an environmentalist, sustainability activist and educator. He holds a BSc in Biological Sciences, University of Havana, 1993, postgraduate Studies in Community Based Resource Management, at Caribbean Natural Resources Institute St Lucia, 1999, and SFX University in Nova Scotia, Canada, 2004. Member of original group of Permaculture pioneers in Cuba. He is the Nature and Community Program Coordinator at Antonio Núñez Jiménez Foundation. He has 25 years of experience implementing international cooperation programs on environmental education, community-based forestry, sustainable agriculture, permaculture, community development, and biodiversity conservation in several countries. Robert has lectured, trained, and visited in more than 25 countries and has been involved in IUCN work since 2004 and in biodiversity, climate change, and other UN work with NGOs. He has worked extensively in communities of protected areas, rescuing traditional knowledge on bio-cultural diversity, and promoting sustainable practices in watershed, coastal and marine ecosystems, small island sustainable development, sustainable fisheries, species conservation, and climate resiliency. He is the editor, director, and currently a contributor of the editorial council of *Se Puede*, a quarterly Cuban grassroots environmental magazine.

Leidy Casimiro
Professor at the Universidad de Sancti Spíritus, Cuba, with more than fifteen years of experience in research and practice in the field of agroecology and permaculture. Graduated as an economist in 2004 at the Universidad Central de las Villas, and a lawyer in 2012 from the Universidad de Sancti Spíritus, Cuba. She received a PhD in Agroecology from the Universidad de Antioquia, Colombia, in 2016. Professor of master's and doctorate students at the Universidad de Matanzas and the Universidad Agraria de La Habana. Specialist and coordinator within the international Project BIOMAS Cuba and BIOENERGIA, at the Agronomic Experimental Station Indio Hatuey in Matanzas, Cuba. Active member of the National Group of Facilitators of Permaculture in Cuba and the Slow Food International movement. She created a methodology to evaluate the resiliency of family farms, used by the FAO and Slow Food International. Author of many articles in national and international scientific journals, book chapters, and a book, she also has attended several international and national conferences. Member of the Casimiro farming family at Finca del Medio, a world reference on agroecology and permaculture.

Tania del Mar López Marrero holds a PhD in Geography and is an Associate Professor in the Department of Social Sciences and a researcher at the Interdisciplinary Center for Coastal Studies, both at the University of Puerto Rico, Mayagüez campus. She teaches and conducts research on topics that explore the relationship between humans, society, and the environment, including the study of land-use change (particularly in coastal areas in Puerto Rico), exposure and vulnerability to natural hazards, and the benefits of forests and drivers of environmental change. She is the coordinator of three research and creative work projects: Project 1867: Disasters and Memory in Puerto Rico (www.proyecto1867.com), Puerto Rico Georeferenced: A Mosaic of the Coast (www.prgeoref.org/), and Puerto Rico Industrial Mission: 40 Years of Environmental Struggle (www.misionpr.weebly.com/). To learn more about her work, visit: www.tlopezopmarrero.com/.

Dr. Reinaldo Funes-Monzote: Director of Geo-Historical Research Program at the Antonio Núñez Jiménez Foundation (Cuba), and history professor at the University of Havana. Author of “From Rainforest to Cane Field. A Cuban Environmental History since 1492”, UNC Press, 2008 (Elinor Melville Prize granted by the Conference on Latin American History). Recipient of the Casa de las Americas Award 2019 for his “Nuestro viaje a la luna [Our Journey to the Moon]: The transformation of ideas about nature in Cuba during the Cold War. Funes-Monzote’s research focuses mainly on Cuban, Caribbean, and Latin America environmental history, as well as the history of science and technology in Cuba. Visiting professor at the Council on Latin American & Iberian Studies, MacMillan Center for International & Area Studies at Yale, 2015-2020.

Jorge Nieves Rivera is a Puerto Rican teacher and historian. From the University of Puerto Rico, Río Piedras campus, he holds a bachelor of arts degree in education, with a concentration in teaching social studies at the secondary level. In the summer of 2014, he earned a Master of Arts degree with a concentration in history from the Interamerican University of Puerto Rico, Metro campus. In May 2015, he published his first study, “Agricultura, Rebelión y Devoción: tres microhistorias del sureste de Puerto Rico” [Agriculture, Rebellion and Devotion: Three microhistories of southeastern Puerto Rico]. He has published articles in local academic journals and in print and digital media. In 2019, he obtained a scholarship to participate in the IV Graduate School of the Society for Latin American and Caribbean Environmental History (SOLCHA) held at Stanford University. He is currently a doctoral student in the program in History and Contemporary Studies at the University of Jaume I, in Spain.

Juan Giusti Cordero is a retired professor of the Department of History, UPR-Rio Piedras Campus. He holds a Ph.D. in sociology from SUNY-Binghamton and a law degree from the UPR. He is co-editor of “Sugarlandia Revisited: Sugar and Colonialism in Asia and the Americas, 1800-1940” (2007), “Sociedad y cultura contemporánea: Introducción a las Ciencias Sociales” [Contemporary Society and Culture: An

Introduction to the Social Sciences] (2016), and “Race and Rurality in the Global Economy” (2018). His areas of research are race and class, agrarian social relations, and Caribbean social and environmental history. He has been an advisor to community groups in Puerto Rico, in Piñones (Loíza), and Vieques. He is working on a book about the historical region of Loíza in northeastern Puerto Rico, with emphasis on the community of Piñones.

Giraldo Martín Martín, Estación Experimental de Pastos y Forrajes Indio Hatuey, Cuba

Sonia Álvarez Pineda

Luis Vazquez, Cuban Association of Agricultural and Forestry Technicians (ACTAF), Cuba

Ana Elisa Pérez-Quintero, La Colmena Cimmarona, Vieques, Puerto Rico

Georges Felix, Center for Agroecology, Water, & Resilience, Coventry University, Puerto Rico

Ruth Santiago is a resident of the municipality of Salinas in southeastern Puerto Rico where she has worked with community and environmental groups, fisher-people’s associations, and other organizations for over thirty years on projects ranging from a community newspaper, children’s services, a community school, ecotourism projects to a rooftop solar energy pilot project. Ruth has been involved in the establishment of broad alliances to prevent water pollution from landfills, powerplant emissions and discharges, and coal-combustion residual waste. She is part of a civil-society initiative to promote solar communities and energy democracy called We Want Sun (queremossolpr.com). In addition to litigation in courts and administrative agencies, Ruth has co-organized environmental education projects, advised the Jobos Bay National Estuarine Research Reserve on watershed protection and land-use issues. Most recently, Ruth has worked on cases related to energy projects and integrated resource plans. Ms. Santiago earned degrees from Lehigh University and Columbia Law School and has published articles on energy issues in Puerto Rico.

Madelaine Vazquez, CubaSolar. CV

Alois Arencibia, CubaSolar, CV

Ruperto Chaparro, Puerto Rico Sea Grant, Puerto Rico

Brenda Torres Barreto, San Juan Bay Estuary Program, Puerto Rico
Orlando Rey, Ministry of Science, Technology, and Environment, Cuba
Marta Rosa Muñoz Campos, University of Havana, Cuba