

# PUERTO RICO RISE(ing) Workshop Summary



**Resiliency through Innovation in Sustainable Energy (RISE)  
2018 Convergence Workshop:**

*Projects, Priorities, and Partners Informing  
an Action-based research Network*



## Isidoro García Stadium Mayagüez, Puerto Rico

June 21-24, 2018

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## An Introduction to RISE

Following the September 2017 landfall of Hurricane Maria, millions of Americans awoke to an island devastated by wind and water - an altered landscape of fallen trees, toppled transmission lines, and broken shelters. In the months that followed, most were left stranded without power, communication, or adequate support. Today, almost a year after the impact, many communities are still suffering from the effects of the neglected infrastructural systems that Maria exposed.

How might the collective neglect of Puerto Rican communities post-Hurricane be remedied in the future? How can Puerto Rico arise from devastation to be stronger and more resilient than ever? Can Puerto Rico's resilient recovery, rooted in sustainable energy innovation and empowered communities, be an example and an inspiration beyond the island? What can vulnerable yet innovative communities inside and outside Puerto Rico teach each other? How can universities and community members share knowledge and join together to find sustainable, resilient solutions?

Out of these questions the Resiliency through Innovation in Sustainable Energy (RISE) platform was born. This platform seeks to re-envision how universities interact with communities, NGOs, private sector partners, and local governments and how to match the knowledge and capacities of an extended partner network with community needs. RISE goes beyond a humanitarian aid approach in the aftermath of disasters to build a collaborative platform for enhancing resilience and fostering convergence among disciplines and sectors.

A community of interest around RISE concepts evolved in the year following the devastating 2017 hurricane season, involving more than twenty mainland universities, the University of Puerto Rico, and multiple community groups across the island. In June 2018, the first Puerto Rico-based RISE workshop brought together over ninety representatives from twenty-six universities, from both Puerto Rico and the mainland, fourteen from local and federal governments as well as community based organizations, and several private sector participants. The workshop developed work groups on issues such as the relationships between universities and communities, the macro political, economic and cultural context of resilience, the relationship between resilience and the built environment, and students' experiences in disasters. The intent of this convergence was to 1) articulate our collaborative vision; 2) explore our collaborative capacity; 3) define critical research questions and project interventions, and 4) establish project task teams to move the collective effort of shaping a more resilient Puerto Rico forward.

The workshop activities created a common vision of collaboration and framework convergent collaboration that will direct the emerging RISE platform and enhance the resilience of ALL participants' communities, localities, and organizations that participate within its growing partner network.

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# Puerto Rico RISE(ing)

Projects, Priorities, and Partners Informing an Action-based Research Network

## Summary

Following the September 2017 landfall of Hurricane Maria, millions of Americans awoke to an island devastated by wind and water - an altered landscape, downed and toppled transmission lines, and broken shelters. In the months that followed, most were left stranded without power, communication, or adequate support. Today, many communities are still suffering from the effects of the neglected infrastructural systems that Maria exposed.

This workshop will bring together collaborators from the National Institute for Island Ecosystem Sustainability (INESI), University of Puerto Rico affiliates, local organizational leaders, and island stakeholders to 1) articulate our collaborative capacity, 2) define critical research questions and project interventions, and 3) establish project task teams to move the collective effort of shaping a more resilient Puerto Rico forward. These activities will create a common vision of collaboration and convergence strategies to direct the emerging RISE platform and enhance the resilience of ALL participants' communities, localities, and organizations.

## Schedule

Thursday, June 21<sup>st</sup>, 9:00 - 5:00  
*Making Priorities through GeoDesign  
Vision-Formation*

Friday, June 22<sup>nd</sup>, 9:00 - 5:00  
*Pathways & Methods: downloading  
visions into community-driven projects*

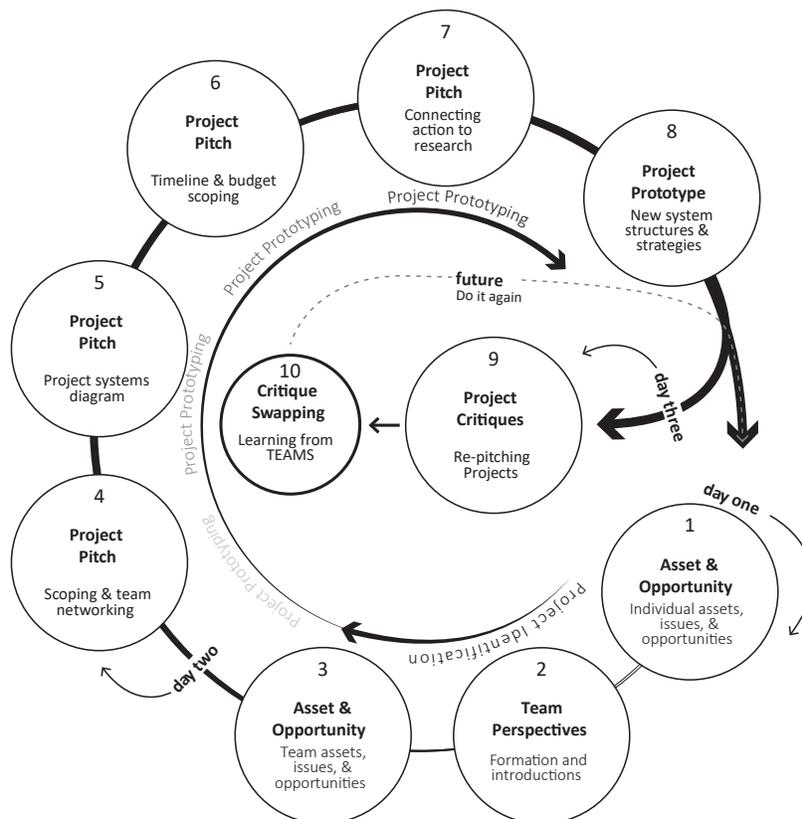
Saturday, June 23<sup>rd</sup>, 10:00 - 4:00  
*Convergence Conversations: connecting  
communities and partners*

## INTRODUCTION



# Puerto Rico RISE(ing)

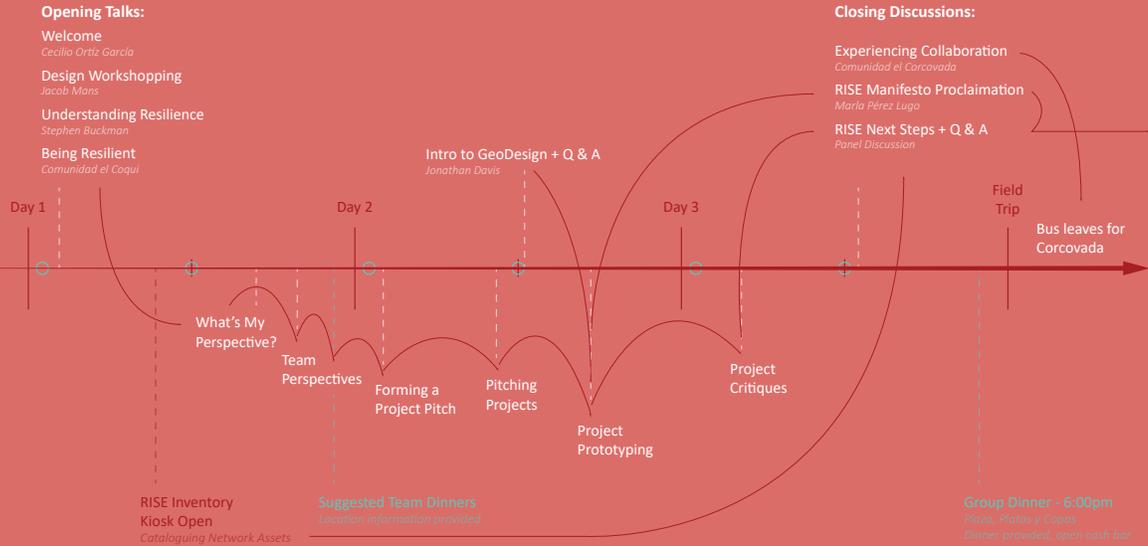
This workshop was designed to facilitate a different kind of conversation - one focused primarily on constructing long-term relationships built on the multi-directional flow of knowledge, resources, and capacity between universities and communities. Some of the conversations that developed throughout the week “went as planned”, i.e. they followed the workshop methodology and resulted in a set of speculative project interventions that allowed the broader participation of the workshop to (re)think what RISE would need to be in order to build the kinds of relationships that could facilitate these kinds of projects. Other conversations evolved along a trajectory that explored long running ideas about what RISE could or should be, how RISE could or would operate, and who RISE served. These conversations were equally important as they explored how these ideas aligned (or misaligned) with the developing idea of RISE that emerged out of the workshop. All of these conversations, independent of their particular tune, filtered toward the shared vision of RISE as operating independent of a particular university or geographic affiliation; a platform broad enough to take on the complexity of issues now facing Puerto Rico but nimble enough to respond to issues that emerge for any of its members. The following sections summarize many of these conversations and clarify the next steps agreed upon to move forward at the workshop.



# 2018 RISE Convergence Workshop:

*Projects, Priorities,  
and Partners Informing  
an Action-based  
Research Network*

## Workshop Schedule



## Activity Details

Day 1 - Thursday June 21st - 9:00am to 5:00pm  
Making Priorities through GeoDesign

**What's My perspective?**  
*Mapping and defining scales of resilience  
Individual asset, issue, and opportunity mapping*

**Team Perspectives**  
*Formation and introductions  
Lead by project facilitator*

**What's Our perspective? - Building a team understanding**  
*Defining a shared understanding of resilience  
Team asset, issue, and opportunity mapping*

Day 2 - Friday June 22nd - 9:00am to 5:00pm  
Pathways Charrettes - Project Teams

**Defining Design**  
**Forming a Project Pitch**  
*Scoping and team network mapping  
"Client" profiles  
Project systems diagramming  
Timeline and budget scoping  
Connecting actions to research*

**Project Prototyping**  
*Designing new systems structures and strategies*

Day 3 - Saturday June 23rd - 9:00am to 5:00pm  
Convergence Conversations

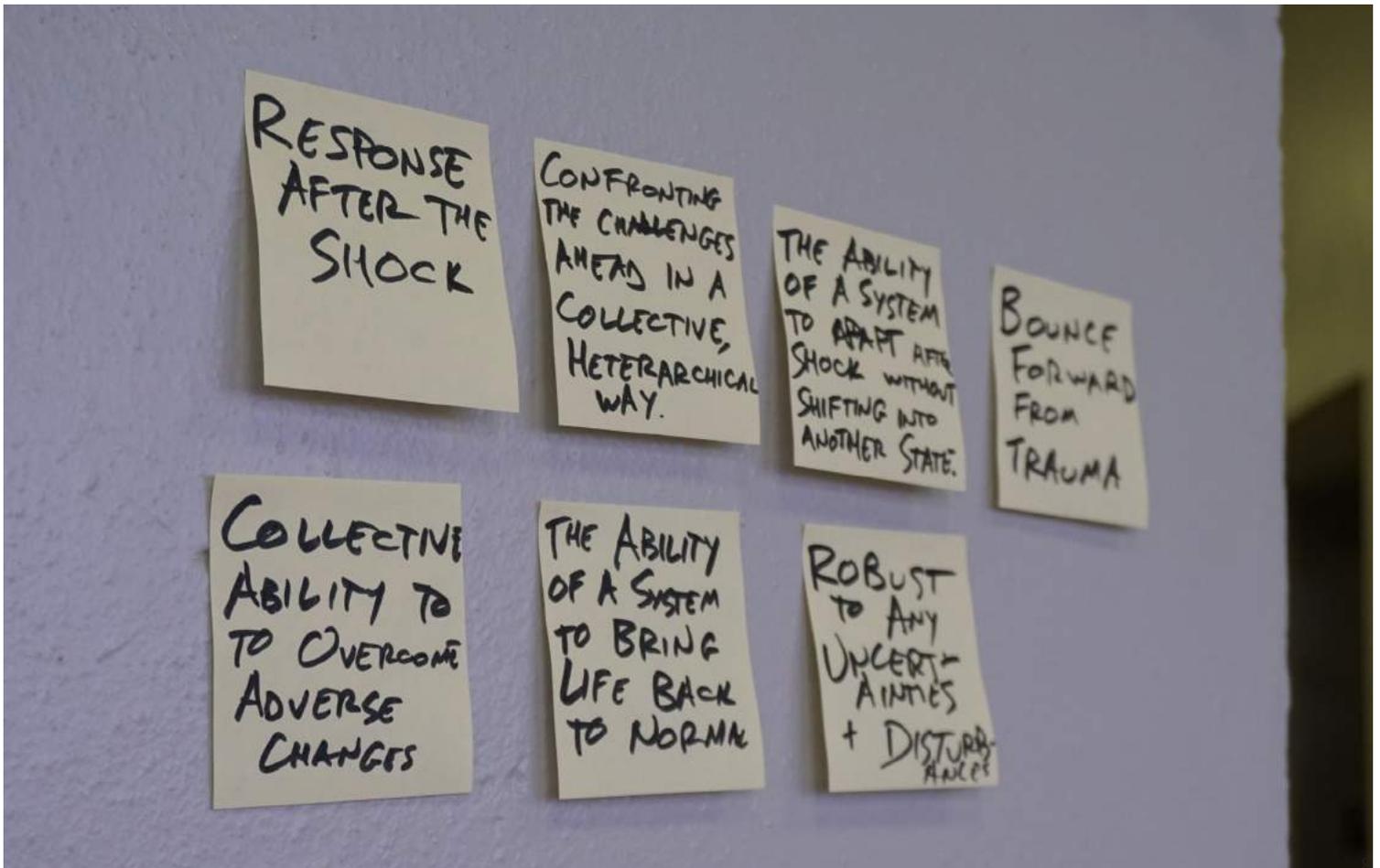
**Project Critiques**  
*Re-pitching projects  
Critique swapping*

**Closing Discussions**  
*Stories of Success - Corcovada  
RISE Manifesto Proclamation  
Next steps panel discussion  
Q & A*

## Meals

A light breakfast of coffee and bread and a buffet lunch will be provided every day at the venue.

Thursday and Friday dinner will not be provided. Saturday dinner will be provided.



## OPENING REMARKS

Cecilio Ortiz-García:

The National Institute of Energy and Island Sustainability (INESI) formed three years ago as a multidisciplinary and multi-campus institute. INESI itself was a concept that arose from the university having to reorganize in our current context and the wicked problems we must resolve. This included INESI analyzing its own resiliency and ability to learn from the literal and metaphorical Marias that have hit the island in the past years. The goal is to adapt innovatively not only to survive but also to contribute to the wellbeing of the local citizens in neighboring communities across the archipelago. It is in that kind of framework that INESI developed a platform to interconnect the resources that UPR already has on its 11 campuses. INESI formed, on an issue-based effort looking for interdisciplinary ways to make impacts. Its vision was to become a collaborative convergence platform, that not only focused on grant writing, but also worked with communities and local surroundings to create a space where the university could unite and collaborate, on the society's current wicked problems.

Jacob Mans:

One of the most important things that we, as partners committed to the RISE concept, can do is develop a new standard designed relationship that is more equitable and longer lasting. Key to this is rethinking the direction that knowledge and information flows when working with institutions from places like Puerto Rico who are struggling to recover from events like Hurricane Maria. Puerto Rico also has something to offer all of us who come to the archipelago to share our expertise and to work with its communities. Interdisciplinary stakeholders can work together to learn how to build resilient communities and identify shared assets and issues, and to become more resilient together, as a whole, through this process.

A goal of the workshop is to think critically about how different projects evolve and to develop projects that are embedded with reciprocal relationships. Reciprocal relationships are multidirectional. Everyone engaged has something at stake and thus an interest in achieving some benefits by incorporating their knowledge and experiences into the process. This workshop was designed to construct a set of projects like this -- to help us determine what those projects look like and how RISE needs to function for those kinds of projects to be implemented.

RISE stands for Resiliency through Innovation in Sustainable Energy; it is a concept that we need to work together to define. What is RISE? How does RISE work? What does RISE do? What data does RISE collect? How does RISE communicate and exchange information with its partners? We are all here because of our shared interest in this concept, and we now must converge on a shared understanding of what RISE should be.

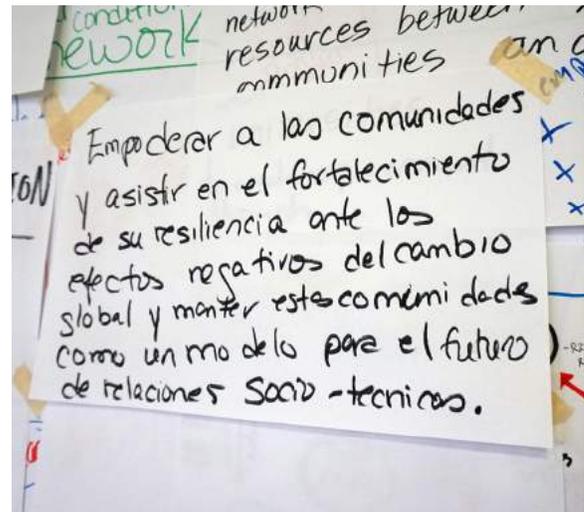
# PRESENTATIONS



## Being Resilient

### Members of Comunidad El Coqui

Roberto Thomas is working with a group that spans the three municipalities Salinas, Guayama, and Arroyo. These regions are in the south of the island and share commonalities in their histories, geographies and economics. Part of the socioeconomic history includes colonialism, and there is inequality in the distribution of social justice and power, and local people lack a voice. Throughout the region's history, policies were made based upon the local industry that fueled the economy. In this case, the local economy was based upon two fossil fuel based power plants. These are a coal powered plant operated by Applied Energy Services (AES) and a petrochemical complex run by Phillips Petroleum Company. The plants burn coal, diesel, and bunker C, a dense viscous fuel oil made by blending heavy residual oil with lighter oils. Bunker C is the material left after more valuable cuts of crude oil have been boiled off and may contain various undesirable impurities. Combined coal, diesel, and bunker C produce pollution and residuals that contaminate the local environment. Furthermore, the electricity generated is diverted away from the local community and sent to wealthier, more powerful metro areas, like San Juan. The irony is that local people must fight the very industry that supports their regional economy, but this industry also pollutes their local environment through the production of resources that are then exported and consumed by other more powerful communities. Out of these imbalanced



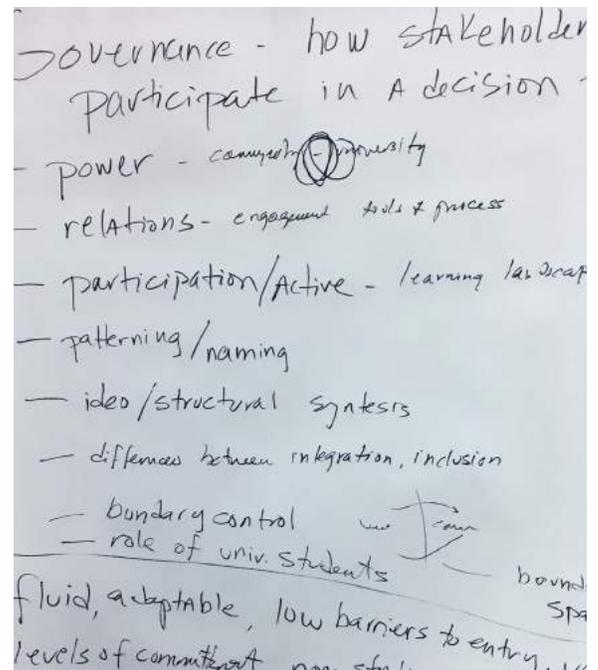
industrial power structures rose the community solar organization, El Coqui Solar, directed by Roberto Thomas, to resist them. Roberto argues that resistance is a form of resiliency. His solution is to create energy autonomy. El Coqui solar members now manage their own energy production, its transmission, and its consumption. These efforts should not be all about bringing in capital, but also about creating possibilities for the community and collective resilience. Roberto's organization wants to reorganize and reshape electricity generation so all people have electrical power, political power and a voice in energy generation on the island. El Coqui solar believes in capacity building in the community, creating alliances that do not continue or promote colonialism, and they want to get access to structures and resources to take the next step in the process.

## Experiencing Collaboration

### Steering Committee of Comunidad Corcovada

The Corcovada steering committee gave us insight into their history of developing a resilient, sustainable community. Corcovada Arriba is a rural community, located in one of the highest mountains in Añasco, Puerto Rico, composed of around 160 households. Corcovada Arriba has been organized and managed by a local steering committee for over 50 years, centered around the management of their aqueduct. The development of the physical main street, aqueduct, houses and social steering committee infrastructure in this community began with governmental aid and Christian missionaries in the early 1960s. The government provided materials and experts in construction and technical knowledge, and the members of the community acted as contractors to complete construction projects. The committee incorporated as a nonprofit in 1990 as Comité Comunal de Corcovada, Inc. Currently, the aqueduct has two wells that fill their 23 gallon tank and a new (as of 2018) solar panel array that supplies electrical power for one well pump. They also administer two community centers, a recreational area, and a previously abandoned school that is now a multi-use center with a computer lab, where they offer computer courses for the elderly, and a gym for the community. Corcovada serves as an example of collaborative convergence between the government, private entities,

and the community members that has resulted in a sustainable and resilient outcome. A testimony to their resilience is the community's response to Hurricane María. They were capable of providing regular water service the day after the hurricane while regulating their own consumption in response to the emergency situation. The aqueduct also provided water to people outside the community because the main governmental provider had not yet reestablished the service.



Governance - how stakeholders participate in a decision

- power - community
- relations - engagement tools & process
- participation/Active - learning landscape
- patterning/naming
- idea/structural synthesis
- differences between integration, inclusion
- boundary control
- role of univ. students

fluid, adaptable, low barriers to entry, levels of commitment

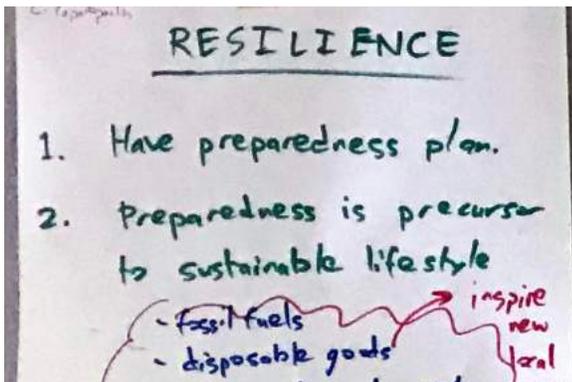
bound. SPA

# Understanding Resilience

Professor Stephen Buckman, Clemson University

Stephen Buckman is an Urban Geographer that writes on resiliency in scenario planning. Buckman believes community resilience is a relevant new model for urbanization that deals with greater issues of uncertainty. Community resiliency methods influence the way we understand and manage urban hazards and stresses, as well as the planning process in general. Planners may think they can plan for certainty, but the reality they must plan for uncertainty. Scenario planning can help deal with this uncertainty. The strength of scenario planning in the public sector is its ability to create multiple narratives that aid decision makers and the community in implementing planning ideals for an uncertain world.

A resilient city is one that has developed the systems and capacities that can absorb shocks and stresses, and maintain essentially the same functioning, structure, systems, and identity, while also implementing strategies to mitigate future shocks and disturbances.



This is accomplished through four resiliency pillars: economic, environmental, social capital and good governance.

*1. Economic:*

*How do you create these environments where economies can work with hard shocks? We look at better ways of creating economic strength that absorb shocks and adapt.*

*2. Social Capital:*

*People are generally very good at creating temporary social capital after a shock, but resiliency is not about building these networks after a shock. It is about already having them in place before the shock and maintaining them.*

*3. Environmental Capital:*

*Strong ecosystems can play an important role in preventing or mitigating serious shocks and disturbances. For example, this could be accomplished by healthy mangroves, sea walls and buffer zones around the coast.*

*4. Adaptive Governance and Collaborative Planning:*

*Multiple stakeholders transparently participating in learning and developing a shared set of goals, objectives, and management decisions.*

When building a resilient system there are four major questions:

*1. To what: What does the system need to be resilient?*

*2. Of what: What system are we making resilient?*

*3. By what means: How do we create structures that deal with the resiliency issue of interest?*

*4. With what outcome: What outcome do we want for our project or resilient system?*

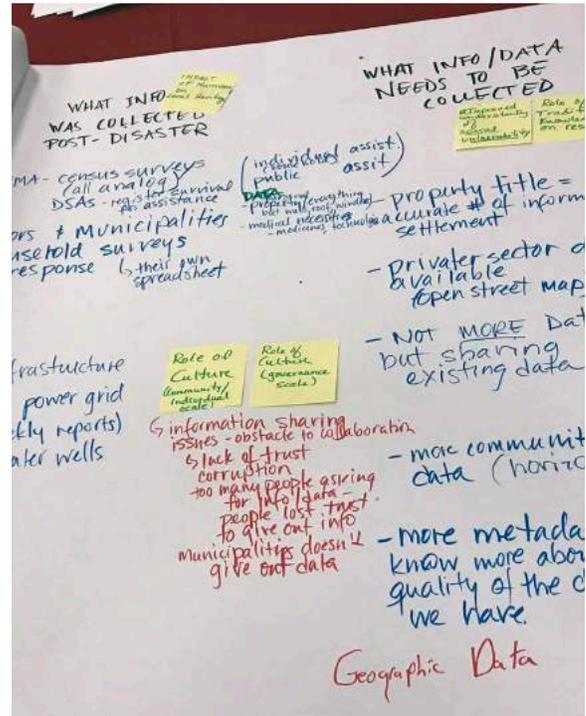
To deal with uncertainty, scenario planning is a resiliency tool. Scenario planning is a form of putting resiliency into community action.

# Introduction to Geodesign

Jonathan Davis, Arizona State University

Jonathan Davis has worked as a GIS specialist for five years at the Intertribal Council of Arizona, a nonprofit created by the 22 American Indian communities in the state. The intertribal council works together to advocate to congress initiatives that promote sovereignty and self-sufficiency for their local communities. Davis's role is to provide support, technical assistance and training to build up sovereignty and self-sufficiency of tribal communities based on the needs and projects they identify. Davis uses Geodesign as a rigorous western planning framework mobilized underneath American Indian community values to build plans from the bottom up for local communities.

Geodesign is a collaborative approach that uses various concepts, methods, and data integration to engage all stakeholders in developing optimal solutions for spatial challenges in the built and natural environment. It commonly draws upon work from geographic information science (GIS), computer aided design, landscape architecture and environmental design fields. The various stages of Geodesign include project conceptualization, analysis, design specification, stakeholder participation and collaboration, design creation, simulation, and evaluation. Davis promoted resiliency for sustainable communities and sustainable futures. He mentioned four types of resiliency – stability, recovery, transformation, and adaptation --



but believes adaptation is most critical in the Native American communities and in Puerto Rico. Davis described it as asking whether, when something happens, you are working to bounce back to where you were before the event or bouncing back to a stronger and more resilient condition after your recovery. This could take the form of economic resilience, environmental resilience, resilience within the social values of the community and/or whatever methods are chosen to strengthen the system to inhibit a shock from destabilizing the system.

## America Free of Carbon

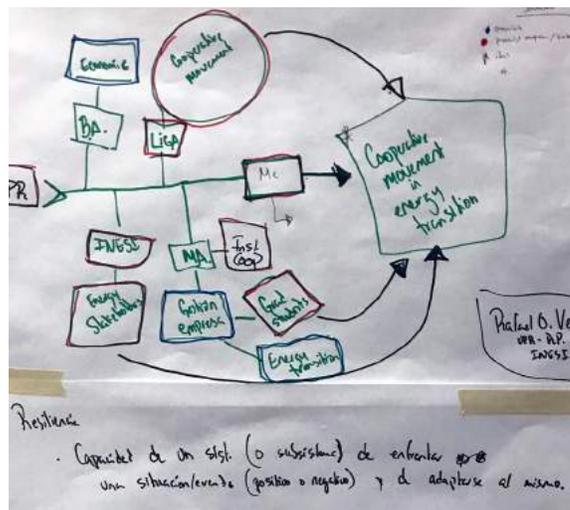
Ruth Santiago, Comité Dialogo Ambiental, Inc.

Ruth Santiago's presentation discussed the social and environmental injustices present in economically marginalized regions in Puerto Rico where fossil fuels plants are located. She urged the transition to a carbon free Puerto Rico and America.

As a result of Puerto Rico's heavy dependence on fossil fuels, certain low-income communities located near fossil fuel powered plants have issues with environmental justice. For example, the poorer communities in the Guayama region of Puerto Rico suffer disproportionate environmental impacts from the coal combustion and oil burning power plants located there.

There are two fossil fuel burning plants in the region. The plants burn coal, bunker C and diesel which produce their own pollution, but there are also residuals (coal ash waste) produced from burning coal. The coal ash is dumped in disposal sites, which are often unlined or poorly monitored. The concentration of the coal ash disposal sites in the southeast of Puerto Rico is at unsafe levels. Coal ash is laced with heavy metals and radioactive materials, and it is contaminating the local land, air, aquifer, bay and marine species in Guayama.

A groundwater monitoring study was performed on a coal ash mountain at the AES coal power plant in the Guayama region. The results showed unsafe levels of radioactivity and contaminants penetrating into the land and aquifer underneath. The groundwater is now contaminated with Radium 226 and 228,



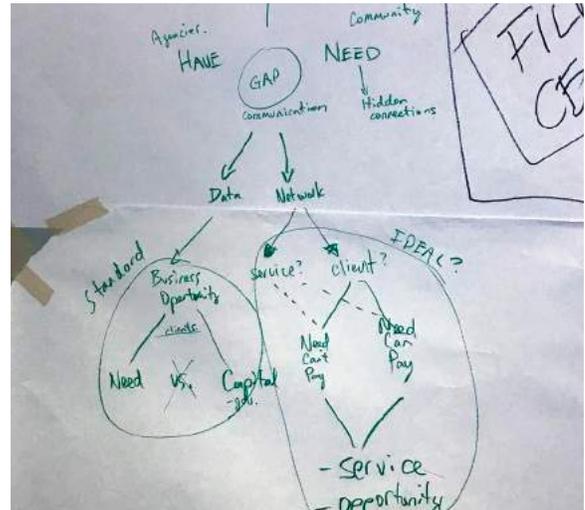
Selenium, Molybdenum, Boron, Chromium, and Lithium. The University of Puerto Rico School of Public Health conducted an epidemiological and medical study and found that the incidence of certain types of diseases were higher in the Guayama region than the control communities in northwestern or northeastern Puerto Rico. The study found 1 in 3 people in Guayama has been diagnosed with a respiratory illness; 1 in 4 people has been diagnosed with cardiovascular disease; pediatric asthma is approximately 5 times greater; severe asthma in children is 6 times higher; the prevalence of urticaria is 7 times higher; the prevalence of spontaneous abortions is 6 times higher; the possibility of suffering chronic bronchitis in the population over 45 years is 9 times higher. Dr. Gerson Jimenez, Medical Director of Hospital Guayama, reported that after the establishment of the AES coal power plant, new cases of cancer rose from 103 to 169 annually.

# Puerto Rico Electricity Cooperative

C.P. Smith, Unidos por Utuado

CP Smith founded the NGO Unidos por Utuado after Hurricane Maria to assist with post-Maria disaster relief in the community. Unidos was the first organization to deliver aid, which included the distribution of hundreds of water filters and sanitary education on the effects of poor water quality that had led to cases of the bacterial disease Leptospirosis in the community. Following this effort, the organization raised funds for portable solar panels, which could power small devices and USB light bulbs. Based on his experiences in relief efforts in Utuado, Smith came up with a potential long-term resilient solution for Utuado: a hydroelectric cooperative. This initiative comes on the heels of a recent resolution, case number CEPR-MI-2018-0008, passed on May 16th, 2018, creating a legal framework for electric cooperatives in Puerto Rico for the first time.

The resolution required PREPA to develop proposed rules for the connection of microgrids. It enabled the customer to have control and choice of their electric service and aimed to foster system resiliency, energy efficiency and environmentally sustainable initiatives creating economic growth and an emerging market for the microgrid. CP Smith's idea would be to generate funds from third parties to purchase the assets of the WWII era Dos Bocas Hydroelectric Plant.



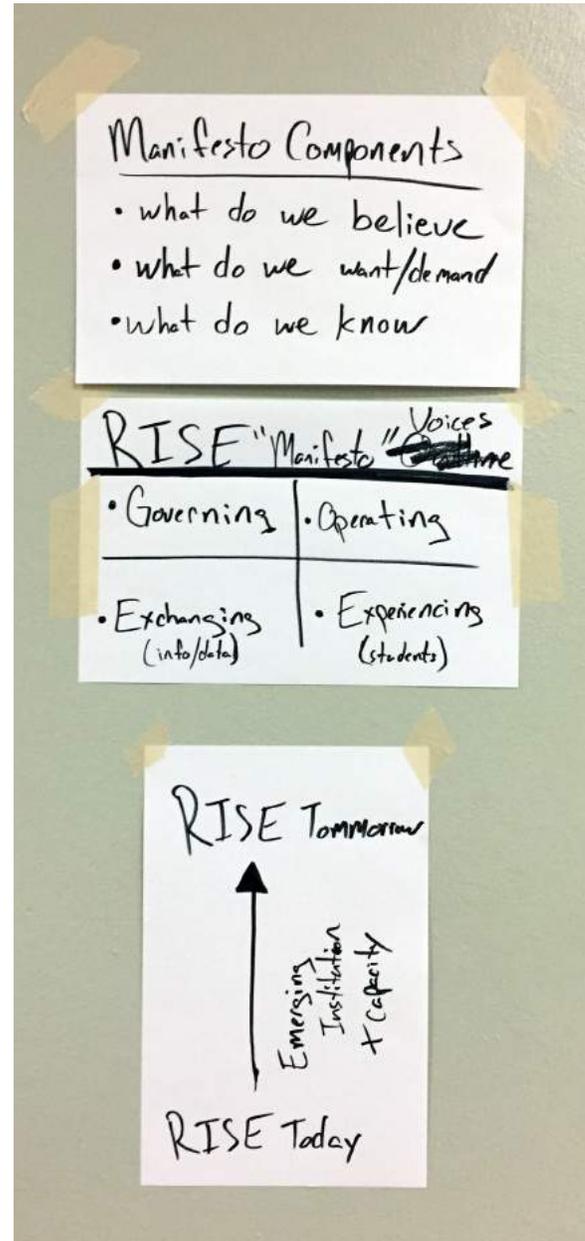
According to Smith, now is a critical moment because PREPA, the bankrupt public electric utility, is in the process of being privatized. Following the purchase of the assets, a committee would be formed from local community members to manage the infrastructure. This would restore local autonomy to power generation in turn making the distribution more equitable. Other plans for the project include installing 26.5 MW of floating solar on the reservoir and dredging the lake to improve the capacity of the dam. In sum, the project would accomplish several goals: 1) restore power generating resources to the community; 2) reduce the cost of electricity; 3) reduce consumption of fossil fuels and 4) improve water quality.

## Three Popular Myths of Reconstruction

Cecilio García-Ortiz, University of Puerto Rico Mayagüez

Professor Garcia-Ortiz identified three popular myths which have defined the post-Hurricane Maria media narrative in Puerto Rico: (1) Puerto Rico is a blank canvas; (2) Puerto Rico is a living laboratory; and (3) Puerto Rico is open for business. He argued that these myths have created a narrative that reinforces the colonial dynamic between the United States and Puerto Rico and reduces agency for communities and, in turn, primes the archipelago for another round of disaster capitalism.

Professor Ortiz proposes a counter narrative outlining that communities should not be thought of merely as recipients of aid and that Universities should not be thought of as static repositories of knowledge. This narrative is critical to the development of RISE as it reimagines the university-community relationship as one based on the exchange of trust and knowledge.



# Rebuilding of Barrio La Salud

Orlando Serrano

Orlando Serrano is the president of the community organization of Barrio La Salud. The community organized itself to clean up the debris after hurricane Maria prior to help arriving from local, state, and/or federal governments. Orlando and his community organization focus their efforts on locals who do not have property titles or live in homes that might not be up to FEMA code. Those without titles or whose homes do not meet code do not qualify for FEMA assistance. Serrano discussed an example project of a woman's latrine that was reconstructed by volunteers. Maria also blew the roof off this woman's home. The plumbing, floor, bathroom and roof was rebuilt by Orlando and his community organization. He described the capacity of his community organization and their desire, strength and ability to rebuild their community when given the materials and resources to do so.



## Resiliency vs Vulnerability

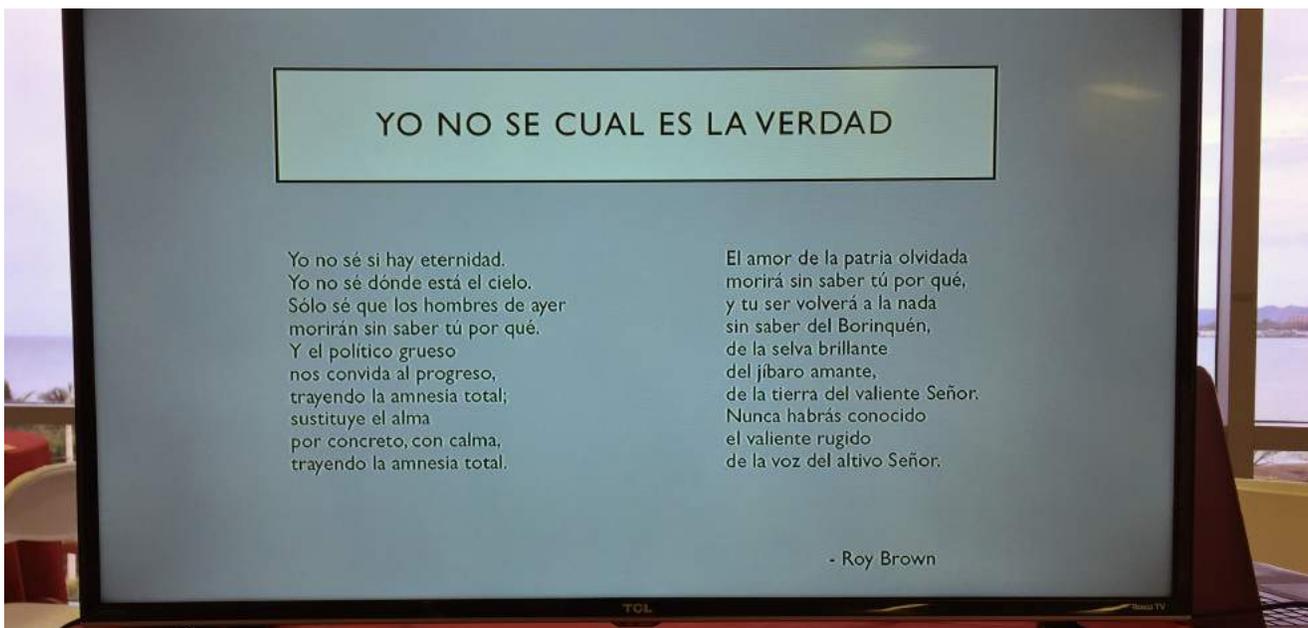
Professor Isabel Rivera-Collazo, University of California-San Diego

Professor Rivera-Collazo's presentation centered on the role of resilience and vulnerability in communities in Puerto Rico. She discussed how academic culture occasionally clashes with communities, producing negative local outcomes in the residential communities despite good university intentions. She distinguished between resilience and vulnerability, two terms that are often conflated. Resiliency, she argued, is the dynamic quality of an adaptive system. It is neither a goal nor an objective, but rather a quality. Vulnerability, on the other hand, is the degree to which a system is able or unable to cope with change.

There is no "blanket" level of general social vulnerability; rather, there are differential vulnerabilities in different people, communities and locations. This means

within the context of Puerto Rico, every post-disaster project will have its own unique variables as each depends on a historical and cultural background with different vulnerabilities.

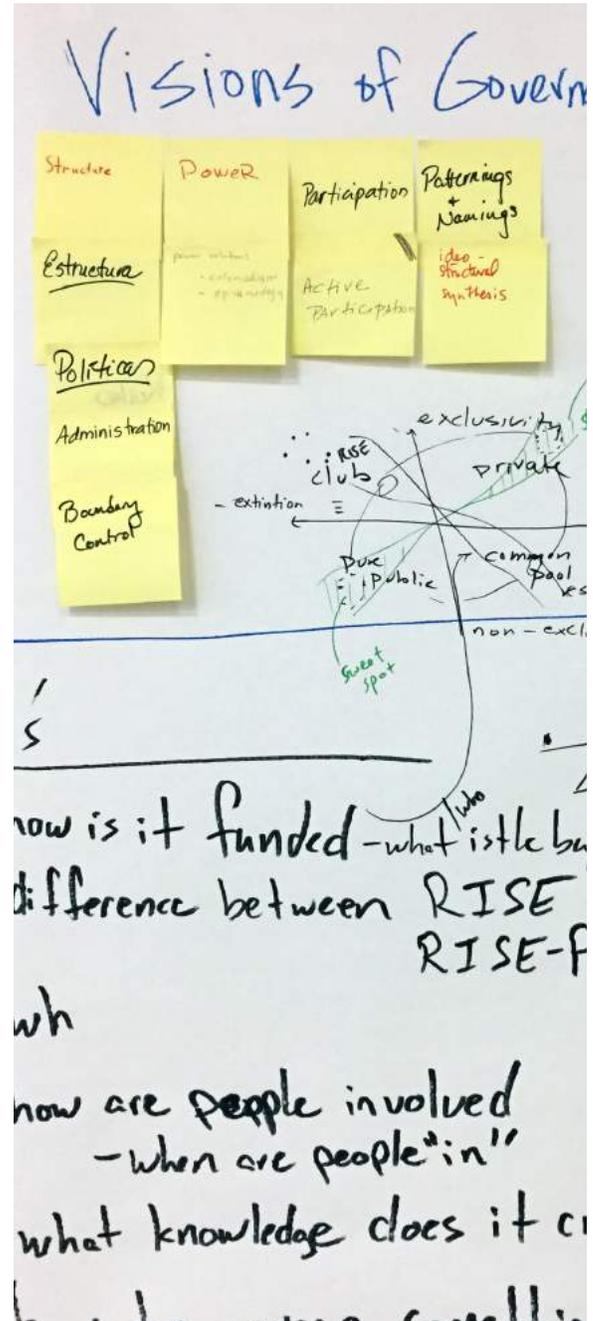
The need for a new code of ethics attached to the kinds of relationships that RISE hopes to foster and a standard process that partners can follow to engage in culturally sensitive ways with one another developed from this conversation. It is critical that we keep in mind the dynamic nature of social vulnerability when developing any resiliency-enhancing project. Good intentions are not good enough.



# FEMA and Community Engagement

Jehyra M Asencio Yace, FEMA

Jehyra, through her work for the Federal Emergency Management Agency (FEMA), was able to give us some perspective on the ongoing recovery efforts on the island and the disaster management agency's long-term goals. She informed us that the building where the workshop was held would soon be converted into a FEMA community recovery center, one among a planned 44 on the island. These centers are places where groups can hold events of this type, host preparedness activities and serve as spaces where communities come to have a one-stop shop for the services they still need. Survivors can receive different types of aid for the reconstruction of their houses. Part of the agency's efforts will be channeled through voluntary agency liaison work, the goal of which is to work with survivors, non-profits, philanthropists, and other institutions such as universities. There is a division in FEMA called capacity and community building, staffed by planners, designers and architects that universities could take advantage of in the future to shape long-term rebuilding projects. FEMA also has a data management and information division that works with GIS and mapping that could collaborate with universities in the distribution of assets. While there is much secrecy and control of information from different sectors, Jehyra sees RISE as a means to leverage the collective strength of many universities to gain access to greater resources such as those offered by FEMA.



# WORKING GROUPS





## ORGANIZING RISE

*What are the current organizational structures of universities and how do they impact their relationship with communities?*

*How could we structure “RISE” to facilitate a different relationship between communities and universities?*

The Organizing RISE group discussed how the current organizational structure of universities impacts their relationship with communities. To assess options for structuring RISE in such a way as to facilitate an improved relationship between communities and universities, the group developed a framework that outlined some of the structural and cultural challenges which inhibit the ability of communities and universities to engage effectively. These challenges included, for instance, their respective organizational timelines. Universities are more focused on short-term project goals and academic cycles while communities are more driven by a natural cycle and long-term problem-solving focus. This discrepancy has many consequences for the planning and scope of a project.

Universities also often intervene in ways that yield measurable, specific results while communities are often focused on needs that are variable, multi-dimensional, and possibly hard to measure. The group identified several different ways that universities could improve their relationship with communities. (1) There is a need for active faculty leaders that can identify people, programs and funds within the university to respond to very specific problems. (2) Universities need to offer research internships and exchange opportunities for local students to participate on specific projects to provide community continuity. (3) Universities need to develop long-term relationships that involve community NGOs and leaders to maintain traction on evolving community projects.



## GUIDING RISE

*How do university governance structures impact the way in which they engage with communities following catastrophic events?*

*How can “RISE” facilitate a more just engagement between universities and communities?*

The Guiding RISE group was tasked with investigating how University governance structures impact their engagement with communities post-disaster and how RISE can facilitate more equitable engagement between communities and universities. They listed some of the assets of the university governance structure, such as its ability to leverage “high level” access, provide seed funding, and build internal and external networks. A central theme of improving the relationship between universities and communities was recognizing the need for more bi-directional exchange of knowledge. Communities have already developed innovative resiliency strategies, and universities should be aware and sensitive to these local solutions and knowledge when participating in interventions. The group suggested that there should be a code of ethics that would help guide the kinds of patterns and projects that RISE attract and could inform the interactions between universities communities when collaborating on interventions. The group also brainstormed several roles that the

RISE platform could perform: (1) serving as a clearinghouse for data collection and distribution; (2) providing networking or matchmaking services between communities and Universities; (3) educating volunteer efforts on ethical community interventions; and (4) educating universities about community-driven projects.

Participants acknowledged the realities that universities are not designed to be rapid response organizations and that most project funding available to universities does not necessarily support long-term relationships with communities. Communities may not know the constraints of universities or, conversely, the resources and help that could be available. Universities seeking to become more engaged in their communities don’t always know who to work with or the resource that communities can bring to the table. Focusing on specific problems of mutual interest helps clarify the roles and forms of RISE that could be most useful and feasible.



## LOCAL ECONOMY

*How has global economic development impacted resiliency within communities?*

*How will RISE negotiate the demand for economic development in communities experiencing the impact of a catastrophic event?*

The Local Economy Group discussed how global economic development has impacted resiliency within communities. They sought to envision how RISE would negotiate the demand for economic development in communities experiencing the impact of a catastrophic event. They began by identifying the different ways that groups conceive of the term “local,” meaning the feeling as well as physical space of community, and “economy” meaning the wealth and resources of a locality which sustain an equitable society. Local economy is therefore a conflict between the local needs and the regional capacities including universities. Unfortunately, the prevailing model has mostly entailed local universities providing aid, which removes local autonomy instead of facilitating economic development support.

Furthermore, students often leave communities to seek education and never return to where they were raised leading to a tremendous loss of intellectual resources. Rather than students bringing their talents to the market or remaining in academia, the group suggested seeding intellectuals back into the community which would reinvigorate the communities with fresh development ideas while remaining sensitive to the local context.



## STUDENT EXPERIENCE

*How do university students interact with catastrophic events (both in place and across the country)?*

*How can these experiences inform universities' decision-making processes during disasters?  
How can university students help each other negotiate and learn from these experiences?*

The Student Experience Group was tasked with envisioning the role of university students - both those directly affected by and those seeking to alleviate - in future disaster response scenarios. They began by identifying their assets, including what unique capabilities each of their universities had in terms of research, administrative and logistical support then honed in on certain challenges universities commonly face when attempting to respond to disasters. These included: (1) university students' participation from outside the island usually consists of ad hoc responses to catastrophes which are generally not suitable because students are not usually trained as first responders; (2) communication and logistics from a local perspective makes coordination of aid and safe physical spaces for students difficult to obtain; and, (3) inadequate

administrative transparency of grant funding and monetary allocation at the local level can be a barrier to student-led projects. Grant and laboratory funded research by students would be initially guaranteed, only to have funds disappear without explanation before study completion. This would act as a setback, as graduate level research foci would shift with loss or changes in funding. The group then pitched some potential projects university students could be engaged with. These included: (1) creating local chapters of RISE at universities; (2) initiating study abroad programs among partnering RISE universities; and (3) creating a platform for inter-university research and support on resiliency issues.



## BUILT ENVIRONMENT

*How does the existing built environment impact transitions toward resilient communities?*

*What role does RISE play in transforming the built environment?*

The Built Environment Group investigated the transformation of the built environment toward resiliency and how RISE might facilitate such a transition. They began by developing a collective definition for resiliency: “The capacity of communities or systems to sustainably evolve and thrive through unforeseen events. Communities whose resources are diverse and can flex depending on the scale of the event...” The group then identified a series of questions related to shared concerns in communities in Puerto Rico around four main themes: (1) Urban Center/Aging Populations; (2) Planning; (3) Green Infrastructure and Resilience; and (4) Public Health. The group then met with community members from Corcovada and Barrio La Salud to get feedback on these themes prior to developing potential interventions.

Through this process they developed several tangible ways that RISE could contribute to

resolving each question through the Built Environment lens. Regarding Urban Centers/Aging Populations, RISE can create a network that can connect communities to organizations and Municipalities and facilitate the collaboration to rethink and revitalize Cascos Urbanos. In terms of Green Infrastructure and Resilience, RISE can bring transdisciplinary experts to ask questions with the communities on their local knowledge and use of space to identify the opportunities for increasing the use of green infrastructure by seeing the value of ecological health and hazards. Finally, considering public health concerns, RISE can seek and connect experts in medical fields with ‘mobile’ or alternate medical facilities and help those communities partner with institutions that can help in those efforts.



## INFORMATION COLLECTION AND NETWORK COORDINATION

*What information is collected and used following catastrophic events? How is it collected? How is it used? Where are the gaps?*

*What data could RISE help to collect and how can it partner with ongoing projects in post-disaster environments? How do we communicate this information?*

The Information Collection and Network Coordination group discussed how information is collected and used following catastrophic events. They sought to determine what data RISE could help collect and how it can partner with ongoing projects in post-disaster environments. The group identified the types of data necessary in post-disaster environments such as geographic, ecosystem, social equity, habitat security, local knowledge, infrastructure/governance and communications. They compared this to the data that were gathered by agencies and local institutions after Hurricane Maria. This included census surveys and the status of the power grid and water systems gathered by FEMA and household surveys that were compiled by municipalities as first responders. These methodologies led to confusion and mistrust among communities

as there was little to no coordination between agencies during this data collection process in the post-Maria chaos.

The group made the following recommendations for how RISE could better collect and/or make use of data in post-disaster environments: (1) sharing existing data rather than producing more data; (2) more metadata; improving our knowledge of the quality of the data we have; (3) more community-level data; and (4) leveraging private sector data, such as Open Street Map.



## ENERGY TRANSITIONS

*How do energy transitions impact community resilience?*

*How can universities contribute toward just energy transitions within post-disaster environments?*

The Energy Transitions group discussed the impact of these questions on community resilience. They began by defining the various ways the term “energy transitions” can be interpreted including technology, organizational, scale and impact on land. They agreed that energy transitions in Puerto Rico should seek to move the grid toward renewables and scale up to bring down costs for consumers. The group saw a major opportunity for community-based, renewable energy systems as pilot projects. Another key theme was the socio-political nature of energy transitions which implies changing consumers’ relationship to energy, building energy literacy, empowering communities through energy ownership, influencing energy policy and proving the viability of alternative models.

The group recommended a “Community Needs Assessment” which would contain updated and accurate data on the state of Post-Maria energy infrastructure, energy use, energy demand, and social preference

data from users. They also urged the creation of an “Energy Policy Review” for Puerto Rico that would review the policies and laws governing interconnection, feed-in tariffs, net metering, RPS goals as well as compare and explain the various community ownership models and potential sources of funding. The group recommended a Cost Estimate Study of solar energy options at multiple scales to afford more transparency in the marketplace and enable consumers to make more informed decisions.

In terms of long-term steps, the group recommended pilot projects of alternative energy prototypes such as microgrids, solar and storage systems, pumped hydro storage or others. These would require the matching of (1) communities willing to host a pilot project installation; (2) university partners to advise on system design and study of the system performance; and (3) sponsors to finance the design, installation, and study of the system.

## Field Trips



## June 20th - Utuado and Dos Bocas Hydro-Electric Plant



On June 20th, 2018, a group of workshop attendees visited Utuado and Dos Bocas Hydro-Electric Plant. The event was hosted by CP Smith, the founder of the NGO Unidos por Utuado. The organization was established post Hurricane Maria and initially focused on supplying locals with immediate aid including water filters, sanitary education and post disaster clean up. Smith has expanded toward developing a hydroelectric cooperative that can serve as a long-term solution for the local communities' electricity needs. As background, In spring 2018, a student team in the Harvard Law School Climate Solutions Living Lab course developed the concept of forming an electric cooperative in Utuado (this would be the first electric cooperative in Puerto Rico) that would refurbish local hydroelectric facilities to provide clean, low-cost power to the Utuado region. The concept generated a lot of interest in the community, and community leaders are now working to make it a reality. At the request of Aleyda Villavicencio from the Harvard T.H. Chan School of Public Health, who traveled to Puerto Rico for the RISE-PR workshop, Dr. Cecilio Ortiz García (UPR-Mayagüez), Architect Jacob Mans (University of Minnesota), Lisa Dirks (Arizona State University), and INESI Grad Student Intern Leif Hansen (Tufts University) accompanied Ms. Villavicencio to Utuado.

The day began in Utuado where attendees met Smith in a local fabric shop where Unidos por Utuado hold their local meetings. Smith then moved out to the town square where he provided a bit of history of his work and the demographics in Utuado. The population of the town is 33,149 and the median income is \$13,432. Thus, the majority of people live below the federal poverty line and require government support. Additionally, despite the location of the Dos Bocas Hydro-Electric Plant, the electricity is often diverted away from the local municipalities and sent to wealthier regions of Puerto Rico. To remedy these inequalities the Hydro-Electric Cooperative is envisioned to produce 100% clean energy for the local municipalities of Adjuntas, Jayuya and Utuado and to ensure a local, reliable energy source in the event of a system failure in the future.

CP Smith outlined his project objectives:

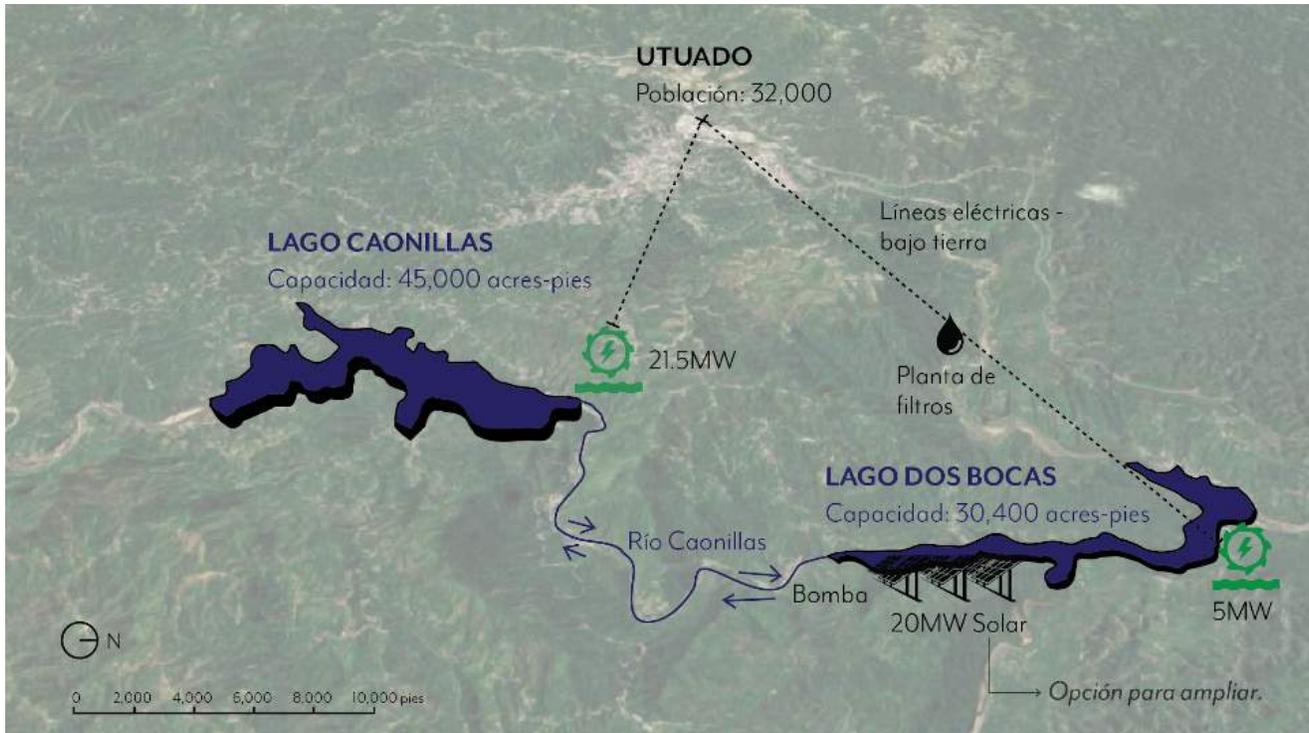
- Ensure that the local population controls the energy production resources.
- Establish a system where the community owns the generation, transmission and distribution of energy.
- Produce benefits for public health by improving the safety of water systems and other critical infrastructure.
- Reduce greenhouse gas emissions by investing in a local, renewable energy source; reduce the consumption of fossil fuels.
- Generate environmental and social benefits for the community.
- Create jobs; reduce electricity costs.

The group proceeded to Dos Bocas Hydro-Electric Plant, located at Lagos Dos Bocas. It was here that CP Smith envisioned the location for the Hydroelectric Co-op. The facility was running on one of three original turbines and using equipment and infrastructure built in the 1940s.

There are two lakes in Utuado. Lago Dos Bocas has one active generator out of a total of three, and there are two generators in Lago Caonillas. However, Lago Caonillas is no longer generating power. One turbine went out in 1998 with hurricane George, and the other recently became inoperative mostly due to sedimentation. Early assessments made by the Army Corps of Engineers estimated the lifespan of the lakes to be about 165 years, but that capacity was reduced by hurricanes that channel dirt and debris into the lake and increase sedimentation. There has been no significant maintenance since construction in the 1940s, and over time the capacity of Lago Dos Bocas has been reduced considerably.

CP Smith believes, by rehabilitating the Dos Bocas and Caonillas Hydroelectric Plants, the cooperative could restore generating capacity to 26.5 MW. In addition, he proposes a floating solar installation on the lake, which he estimates could add another 20 MW. Smith calculates that the municipalities of Utuado and Adjuntas could operate on 3MW and 2MW respectively. Thus, there would be significant amounts of surplus power, making the area a net energy generator that could contribute to the grid -- hopefully making his plan attractive to investors.





CP Smith estimates that the Hydroelectric Cooperative could reduce local electricity costs by roughly 61%. Currently, the average residential rate in Puerto Rico is 20.47 ¢/kWh, but he believes he can reduce the cost to 8.0 ¢/kWh. Such a cost savings would be critical in impoverished regions where the cost of electricity is high. By comparison, the U.S. average cost per kilowatt hour is 13.19 ¢/kWh.

The total cost estimated for Smith’s hydro, solar and buried transmission line project is \$157 million U.S. dollars. Financially, he sees this as a 65% loan-to-value ratio with a 15-year loan, and a \$55 million capital investment. The Net Present Value is \$116 million over its 25-year duration.

The Hydroelectric cooperative also presents significant potential ecological and societal benefits. In addition to CO<sub>2</sub> reduction, it is expected that this project can avoid producing significant pollutants (annually), including:

- 280 tons of SO<sub>2</sub>
- 270 tons of NO<sub>x</sub>
- 35 tons of carbon monoxide

- 2 tons of ammonia
- 1 ton of black carbon
- 0.5 tons of organic carbon

Smith, estimated these pollutants generate a social cost of \$ 35.7M - \$ 36.9M each year, which would be avoided once the project begins operating. Benefits include reducing the levels of air pollution in homes, creating jobs, improving community support, and strengthening the health of residents -- and other form of resiliency.



## June 24th - Community of Corcovada



Following the workshop plenary session, a group of attendees visited the Community of Corcovada, which has been active for over 50 years. Their mission is to improve and preserve the facilities of the community and community aqueduct; the integration of the family and community; promote the development of the socio-economic and cultural moral; and promote important factors for the individual and collective to achieve a better quality of life.

The community leaders graciously provided a tour and discussion, which explained the work they presented at the workshop. The tour began in the community center, where the local leaders were preparing a traditional Puerto Rican meal for guests. Steps away from the community center was a recreational center that housed a playground, basketball court, and baseball stadium.





A short walk down the road, solar panels were built to power the aquaduct water pump. However, the unit had been damaged, was in need of repair and was no longer providing power for the community. Details about how and why the solar system had failed and what this means for other communities considering solar remain a concern. Community leaders shared their goal of widely adopting residential rooftop solar, but noted that the existing regulatory environment posed a barrier.



The water pump, aqueduct and control center were found at the base of the hill at end of the road. The Corcovada community produces and distributes water for 160 families. They have two wells and are at a working capacity of 40 gallons per minute, providing enough water for every family.

A short drive away was a water storage facility where Louis demonstrated how it was maintained and operated.



Corcovada also built a multi-use center that previously was an abandoned school. They acquired this school building for a 20-year period. They made the school into the multi-use center where they offer computer courses, English courses and have a local gym. The gym was funded by a local church that donated \$19,000. They also built a convention center. One of the rooms has a capacity for about 300 people. The Corcovada committee also has an annual assembly for the local community where they inform the community of all the work being done in the community.

The Corcovada community vision is to be a model community that preserves its values, culture, and customs and focuses on having a pathway of constant improvement of new ideas, while motivating local youth to continue their legacy.





## Concluding Summary



Puerto Rico RISE(ing) brought together over ninety representatives from twenty-six universities, from both Puerto Rico and the mainland, and fourteen representatives from local and federal governments as well as community-based organizations. Over the course of the three days, participants working on different focus areas helped develop project ideas and potential relationships that RISE could facilitate. Three of the six groups looked specifically at (1) how RISE could help students engage more effectively; (2) how post disaster event spaces like Puerto Rico deal with energy transitions; and (3) how to create new relationships to better take on socio-economic challenges that engage the built environment. The other three groups focused on the conceptual structure of RISE looking to clarify what RISE is, how RISE is organized, and what RISE does.

The workshop format allowed for different visions of resilience to come together in a dialogue space that nurtured each of the different groups involved. Academics, students, NGO's, agencies, private sector representantes and more importantly community.

We found consensus on various issues, but not one more important than the fact that universities need to consider how the process of rebuilding lives and communities in post-disaster environments can be a positive opportunity for change. This opportunity can be facilitated in two ways: firstly, by having a clear understanding of how disaster survivors are not victims but agents for change, and secondly, by providing the tools and techniques to facilitate the change process. The multiple presentations demonstrated how disaster-affected communities have



rebuilt not only their homes, but also their livelihoods, demonstrating a side to community resilience that seldom is highlighted.

The workshop also allowed for in vivo experimentation with convergence processes. Convergence rests in the effective merging of issue based discussions and trans disciplinary approaches. The three day exercise delivered, in allowing members of different disciplinary fields, sectors of society and levels of governance to concentrate on particular issues and reach minimal consensus to move the discussions forward. Qualitatively richer discussions were reached incrementally as the different knowledges converged into innovatively divergent ideas.



At the end of the workshop, these conversations fed into a unified discussion on the governance structure of RISE as an inter-university collaborative platform that could connect local issues to universities and, through the university network, generate transferable conversations about global resiliency. We are hoping to use this platform to set an ethical agenda for university, private sector, and government engagement with communities and to provide a knowledge/asset management system to match those in need with those who have resources to give. In working toward this goal, the workshop concluded by focusing on the following tasks and questions as “next steps:”

1. Draft a “manifesto” to clarify what RISE. Building from vision statements already in place (eg., on the RISE website and in founding documents), this manifesto should include a concise statement of intent and a code of ethics that our network would adhere to.

2. Develop a survey to send to universities and other workshop participants to continue to capture interests/expectations/needs and map existing assets, capacities and projects. Clarify RISE partner roles. How do communities, local governments, NGOs, private sector partners, and universities participate in or engage with RISE? What do they give (monetarily, experientially, or in-kind)? What value does RISE provide?

3. Begin development of a website (or improve existing website) and database to communicate what RISE is, guide projects that RISE creates or connects, and match our collective assets to those in need.

4. Produce a workshop summary and plan a follow up RISE workshop.

5. Spread the conceptual idea of RISE and invite others to join in creating a collaborative convergence platform.

Several of these focus items are well underway, and more engagement by interested partners will lead to more significant progress. We will continue to share updates and progress. Precisely who will do that updating, how and where are organizational questions to be clarified as part of these next steps.

