

Toa Baja Puerto Rico

Building Physical, Economic, and Social Resilience

A ULI Advisory Services Panel Report

December 2–7, 2018



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Urban Land Institute
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About the Urban Land Institute

THE URBAN LAND INSTITUTE is a global, member-driven organization comprising more than 44,000 real estate and urban development professionals dedicated to advancing the Institute's mission of providing leadership in the responsible use of land and in creating and sustaining thriving communities worldwide.

ULI's interdisciplinary membership represents all aspects of the industry, including developers, property owners, investors, architects, urban planners, public officials, real estate brokers, appraisers, attorneys, engineers, financiers, and academics. Established in 1936, the Institute has a presence in the Americas, Europe, and Asia Pacific region, with members in 81 countries.

ULI's extraordinary impact on land use decision making is based on its members' sharing expertise on a variety of factors affecting the built environment, including urbanization, demographic and population changes, new economic drivers, technology advancements, and environmental concerns.

Peer-to-peer learning is achieved through the knowledge shared by members at thousands of convenings each year that reinforce ULI's position as a global authority on land use and real estate. In 2018 alone, more than 2,200 events were held in about 330 cities around the world.

Drawing on the work of its members, the Institute recognizes and shares best practices in urban design and development for the benefit of communities around the globe.

More information is available at uli.org. Follow ULI on Twitter, Facebook, LinkedIn, and Instagram.

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About ULI Advisory Services

THE GOAL OF THE ULI ADVISORY SERVICES program is to bring the finest expertise in the real estate field to bear on complex land use planning and development projects, programs, and policies.

Since 1947, this program has assembled well over 700 ULI-member teams to help sponsors find creative, practical solutions for issues such as downtown redevelopment, land management strategies, evaluation of development potential, growth management, community revitalization, brownfield redevelopment, military base reuse, provision of low-cost and affordable housing, and asset management strategies, among other matters. A wide variety of public, private, and nonprofit organizations have contracted for ULI's advisory services.

Each panel team is composed of highly qualified professionals who volunteer their time to ULI. They are chosen for their knowledge of the panel topic and screened to ensure their objectivity. ULI's interdisciplinary panel teams provide a holistic look at development problems. A respected ULI member who has previous panel experience chairs each panel.

The agenda for a five-day panel assignment is intensive. It includes an in-depth briefing day composed of a tour of the site and meetings with sponsor representatives; a day of hour-long interviews of typically 50 to 100 key community representatives; and two days of formulating recommendations. Long nights of discussion precede the panel's conclusions. On the final day on site, the panel makes an oral presentation of its findings and conclusions to the sponsor. A written report is prepared and published.

Because the sponsoring entities are responsible for significant preparation before the panel's visit, including sending extensive briefing materials to each member and arranging for the panel to meet with key local community members and stakeholders in the project under consideration, participants in ULI's five-day panel assignments are able to make accurate assessments of a sponsor's issues to provide recommendations in a compressed amount of time.

A major strength of the program is ULI's unique ability to draw on the knowledge and expertise of its members, including land developers and owners, public officials, academics, representatives of financial institutions, and others. In fulfillment of the mission of the Urban Land

Institute, this Advisory Services panel report is intended to provide objective advice that will promote the responsible use of land to enhance the environment.

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A special thank you goes to Alcalde Bernardo “Betito” Márquez García, Ricardo Alvarez-Diaz, Desiree Pearlman, Carla Joan Gonzalez, and Edgar F. Gomez Cintro for their support in coordinating with local stakeholders and putting together the panel’s briefing materials.

In addition, thank you to the Kresge Foundation and to ULI Southeast Florida/Caribbean for their contribution to fund the project.

The panel would like to thank the local residents, officials, and stakeholders who shared their perspectives, experiences, and insights with the panel over the week.



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Introduction

“Puerto Rico, within the span of two weeks, received two Category 4–5 hurricanes. That has never happened anywhere. The devastation has been enormous.” —Governor Ricardo Rosselló

IN SEPTEMBER 2017, PUERTO RICO WAS DEVASTATED by Hurricane Maria. The storm raked across the island with winds up to 147 miles per hour—so fierce they destroyed scientific monitoring equipment. Torrential rains poured 16 to 18 inches of water across much of the island in just three days. The human suffering that both storms Irma and Maria left in their wake cannot be overstated.

In fact, the storms more clearly exposed Puerto Rico’s environmental, economic, and social vulnerabilities. The commonwealth’s desire to increase its resilience to these vulnerabilities in the face of similar future events is at the heart of this Advisory Services panel assignment.

Located in the heart of the Caribbean, Puerto Rico is vulnerable to many physical climatic threats, including earthquakes, hurricanes, and other extreme weather. Analyses indicate that climate-related events are likely to grow more severe and frequent as the earth continues to warm. The aftermath of extreme environmental events such as Maria and Irma have long-lasting repercussions to the island’s infrastructure and the population. Following Hurricane Maria, 3.2 million

residents (almost 100 percent of residents) on the island of Puerto Rico were left without power—and most without water and communications. In addition to the devastating physical damage, nearly 3,000 deaths occurred in the six-month period after Hurricane Maria hit the U.S. territory due to infrastructure failures and lack of services, according to a report by George Washington University. The island’s population was also left with the mental trauma of severe flooding during the storm.

Puerto Rico’s chronic fiscal irregularities have handicapped the government’s ability to regain public trust and tackle economic vulnerabilities. The recession that affected the U.S. mainland starting in 2008 began affecting Puerto Rico two years earlier, in 2006, and has continued to the present. Further complicating

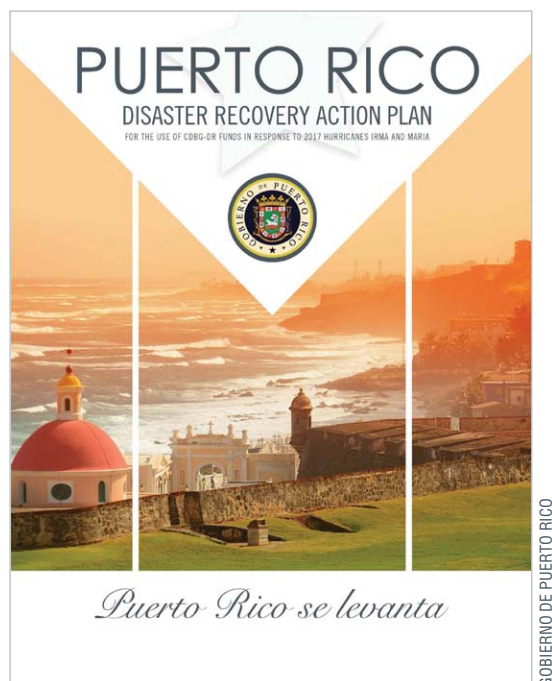
matters, the government of the commonwealth of Puerto Rico entered chapter 3 bankruptcy proceedings in spring 2017. With about \$70 billion in outstanding debt (the actual number varies with market conditions, but it was about \$74 billion in May 2017, according to the *New York Times*), the island is now subject to a federally controlled Fiscal Review Board, enacted by the Puerto Rico Oversight, Management and Economic Stability Act, or PROMESA. PROMESA maintains budgetary control over the commonwealth government. The Fiscal Review Board imposes limitations on all levels of the Puerto Rican government and severely affects funding for basic services of all kinds, from police to schools. The commonwealth's fiscal status causes great concern and means oversight measures over the administration of federal funding, particularly over the management of disaster recovery funds.

Puerto Rico's vulnerability is also based in social issues. Since the beginning of the Puerto Rican recession in 2006, an exodus of young adults, skilled workers, and general members of the population (ages 0–44) has taken place to the mainland United States. The exodus was further exacerbated by the 2017 hurricane season, leaving the residents with fewer resources and nowhere to go because of fewer economic opportunities. Poverty levels are high in Puerto Rico compared with other portions of the United States. According to the U.S. Census, 44.4 percent of Puerto Ricans live in poverty, a figure that is more than twice that of California, which has the highest poverty level of any state. The rise of severe social inequities has major impacts on the finances of Puerto Rico.

Commonwealth CDBG-DR Funding

The U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant (CDBG) program provides grants to states and localities to provide “decent housing and a suitable living environment” and to expand economic opportunities, principally for low- and moderate-income persons, according to the HUD.gov website. The CDBG Disaster Recovery (CDBG-DR) Program provides flexible grants to help cities, counties, and states recover from presidentially declared disasters, especially in low-income areas.

In July 2018, HUD approved the Puerto Rico Disaster Recovery Action Plan, which outlines the impact of the 2017 hurricanes and commits funds to rebuilding better and stronger to support resilience against future hazards. Although HUD has approved \$20 billion in funds, stringent oversight has delayed the implementation of strategies with the potential for lasting impact on a Puerto Rico that is struggling to recover. According



The HUD-approved Action Plan outlines uses for about \$1.5 billion in CDBG-DR funding made available by Congress in early 2019. Congress made an additional \$18.5 billion available in recovery funds for Puerto Rico in spring 2018.

to HUD records, as of March 1, 2019, less than \$14,000 of the \$20 billion approved by Congress has been spent on postdisaster reconstruction activities in Puerto Rico.

The designated CDBG-DR funds are crucial in starting Puerto Rico's recovery process. These funds are viewed as a long-term investment in reducing Puerto Rico's environmental vulnerabilities through application of risk mitigation and resilience strategies because they may fund a broad range of recovery activities. Overall, the funds are viewed as a long-term investment and catalyst in boosting Puerto Rico's economic stability.

The commonwealth of Puerto Rico is composed of 78 municipalities (*municipios*), which are most comparable in terms of jurisdiction and role to counties in the U.S. mainland. Although *municipios* control their own budgets, the majority of *municipios* do not control core land use functions, such as permitting and planning, which is done at the commonwealth level. Currently, only 20 of the 78 *municipios* in Puerto Rico are authorized to grant permits; Toa Baja is not currently among these. *Municipios* are the level of government closest to the Puerto Rican people, and in the case of Hurricanes Irma and Maria, *municipios* served as centers for rescue and recovery efforts.

The panel recognizes that many of the forces affecting Puerto Rican *municipios*' ability to provide services are beyond any individual *municipio*'s control. The panel believes, however, that the island's *municipios* can take multiple steps to prepare themselves for a more secure and resilient future, particularly as the island awaits the distribution of \$19.9 billion in CDBG-DR funding allocated to Puerto Rico in response to Hurricanes Irma and Maria.

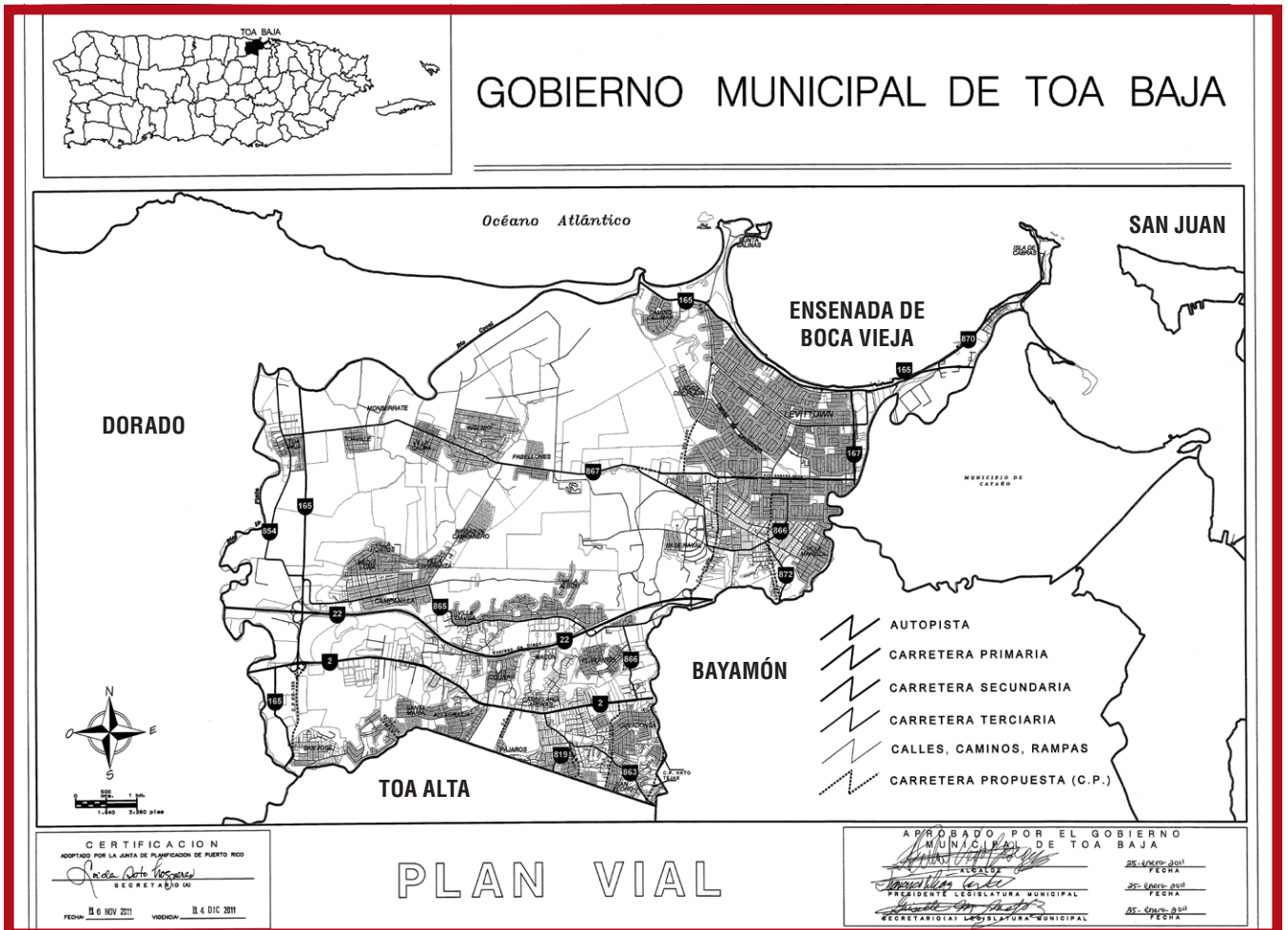
The Panel's Assignment

The ULI Advisory Services panel's technical assistance focused on the *municipio* of Toa Baja. Like many *municipios* in Puerto Rico, Toa Baja's economy suffered greatly from the 2017 hurricane season. In particular, Toa Baja's loss of economic activity and infrastructural damages amount to more than \$1.3 billion, including over \$400 million in damages to personal residential units and other assets. Toa Baja shares the island's overall vulnerability to climate risks and economic conditions

and was selected as the site for the Advisory Services panel because it provides the opportunity to showcase a community that represents a microcosm of the challenges and a strategy of recovery for the island of Puerto Rico.

Toa Baja municipality is on the northern coast of Puerto Rico, only 25 miles (15 minutes by car) from the capital city of San Juan and considered to be part of its metropolitan area. Toa Baja's population as of 2016 was 83,645 people, a decline that is 6,000 less than the population reported by the 2010 census. More than half the population lives in the Sabana Seca ward.

Toa Baja residents have a higher educational attainment (50 percent of residents age 25 years and older) than the average for commonwealth residents who have had at least some college education. Although Toa Baja is not home to any universities, several public and private universities are nearby in San Juan, Bayamón, Arecibo, and Carolina.



This map of Toa Baja illustrates the location of the municipio within the commonwealth of Puerto Rico, neighboring municipios, and major roadways.



Throughout Toa Baja are signs indicating where CDBG-DR community meetings are being held.

According to the census, as of 2016 residents of Toa Baja are primarily employed by the administration and support and waste management services (20 percent), wholesale trade (15.4 percent), and educational services (11.6 percent). The principal employers of residents are Walmart, Pepsi Cola, Holsum, Martin Brower, Trigo Hermanos, and Master Paints. According to Department of Labor data, the unemployment rate of the municipality of Toa Baja for March 2019 was 6.1 percent. This is the fifth lowest in Puerto Rico and about 3.1 percent lower than the average for Puerto Rico. It is the lowest unemployment rate in the history of Toa Baja. By way of comparison, in 2010 the unemployment rate was 12.7 percent, more than double today's rate. In 2010 4,300 people were without work, 2.5 times more than today. A total of 36.9 percent of Toa Baja residents are considered to be in poverty.

In addition, according to the 2016 census, of 35,592 housing units in Toa Baja, more than 6,000 were vacant. The vacancy rate is increasing in the municipality, which saw a 12 percent growth in vacant housing units in only six years. Most of the housing units are owner occupied (72 percent), but the rental market is growing at 3.5 percent annually. On average 80.4 percent of residents live in single-unit attached or detached housing. Nearly half (48 percent) of the residential units in Toa Baja were built in the 1960s and 1970s. Since 2010, only 103 units have been built, and since 2014, no housing units have been built, owing to the economic downturn and flooding frequency, further exacerbating an immediate need for housing after the 2017 hurricane season.

Toa Baja has a vision for its future as a cooperative, cohesive, democratic, fair, sustainable, inclusive, healthy, and resilient place—a place whose inhabitants are called *orgullosos llaneros* (those who take pride in being residents of Puerto Rico's coastal plain).

To help Toa Baja achieve this vision, the Advisory Services panel was asked to help improve the municipality's resilience and economic development by considering a series of questions. These questions centered on Toa Baja's competitive advantages and economic drivers, specific resilience strategies for managing extreme weather, social and economic equity, and land development processes, while considering the availability of pending federal funds. In summary, the questions focused on the following themes:

- *Resilience*: Determine how Toa Baja can be more prepared for extreme weather events and enhance resilience through investments, partnerships, and land development processes; and
- *Economic development*: Identify how Toa Baja can leverage competitive advantages and economic drivers at regional, commonwealth, and national levels.

Recommendation Framework

The panel reviewed the preexisting mission for Toa Baja, the vision of *orgullo llanero*, and took the perspective that storms will come again, and Toa Baja and its residents must be prepared. Therefore, the panel's discussions were rooted in anchoring Toa Baja in resilience best practices.

In response to the resilience and economic development challenges ahead, the ULI panel believes that its recommendations will aid in the following ways:

- By demonstrating its readiness to change through its thoughtful and methodological approach to bringing about impactful redevelopment, Toa Baja can develop the credibility necessary to garner resources required to execute their plans. Credibility in the eyes of the commonwealth government, in the eyes of its citizens, and in the eyes of investors from outside will be critical to its success.
- By thinking more broadly, beyond the scope of disaster relief, Toa Baja will be positioned with short-, medium-, and long-term strategies that will enable it to attract funding that will foster catalytic future development that can not only meet existing critical demand but also position it for sustainable future growth.
- By engaging the community through a municipal organizational structure that responds to its citizen's needs and acts as a responsible liaison with the commonwealth and with the sources of funding, Toa Baja will be able to best meet the needs of its community.

- By identifying and putting forth innovative projects that are well studied and economically viable Toa Baja can move to the front of the line to receive earmarked funds that are available to address redevelopment from outside sources.
- By creating a reimagined municipality that is at the forefront of these matters, Toa Baja will be a model for resilience for other municipalities to replicate, across the commonwealth.

The following sections of the report outline the panel's recommendations to improve Toa Baja's resilience for future extreme weather events while addressing Toa Baja's critical social, physical, and economic vulnerabilities.



Implement Physical Resilience

TOA BAJA IS HIGHLY VULNERABLE to climate-related risks. Throughout the municipality, physical infrastructure, including roads and electrical systems, was damaged during the 2017 hurricane season and other events. These environmental and physical challenges need to be addressed during what is a period of financial constraint for Toa Baja.

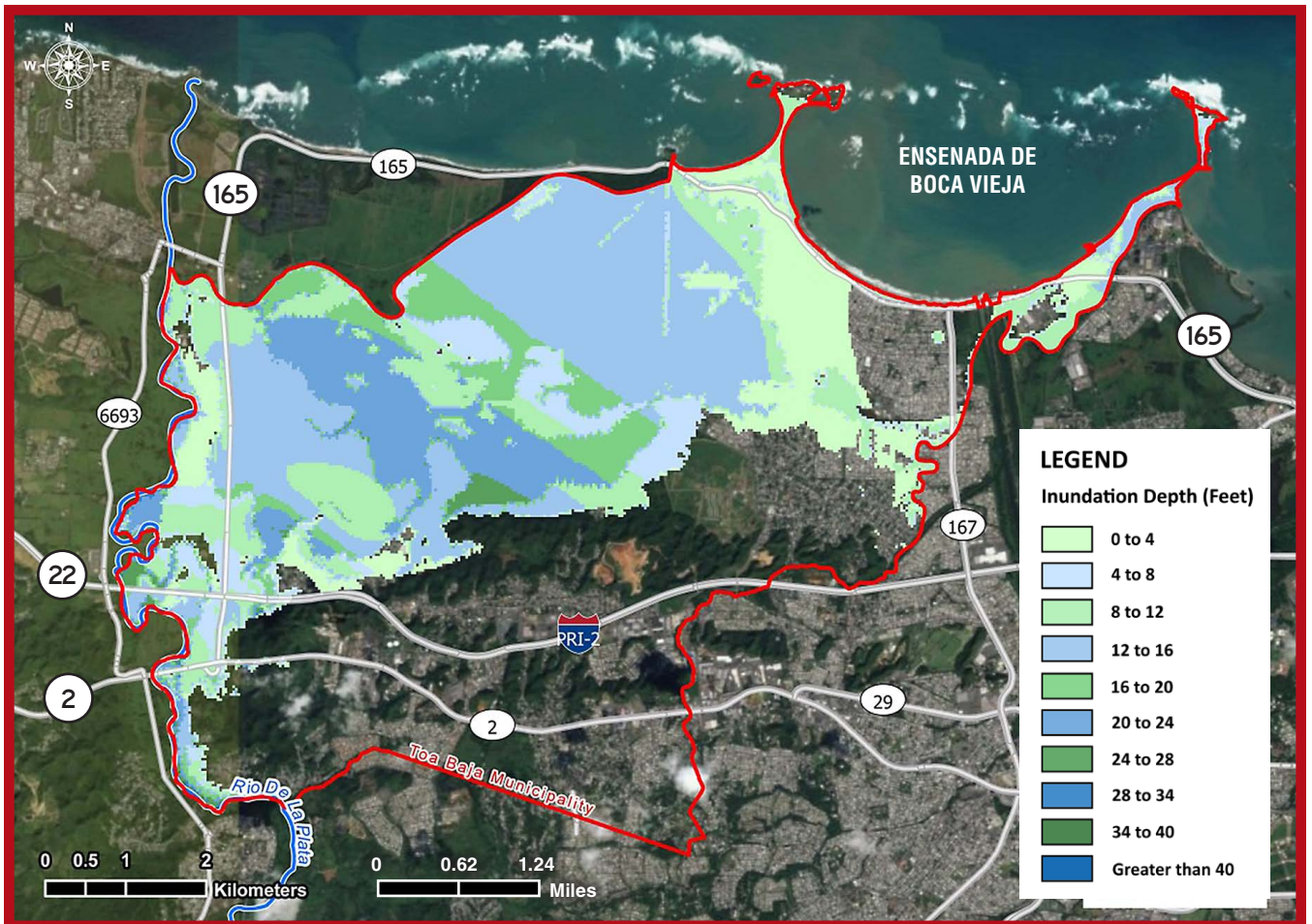
Among the environmentally related risks to Toa Baja, hurricanes, flooding, and sea-level rise pose a prominent threat because of the *municipio's* location at the mouth of the Río de la Plata and its low elevation. In the last three decades, the municipality has suffered from repeated extreme flooding.

The western side of Toa Baja, near the historic center known as Toa Baja pueblo, is bordered by the Río de la Plata, the longest river in Puerto Rico. The Río de la Plata has flooded an average of every six years over the past 30 years. More than 63 miles long, the river drains the largest watershed on the island of Puerto Rico with an area of 241 square miles. Because of the large land area draining to the mouth of the Río de la Plata, the 100-year rain event of 11.8 inches in 24 hours (which has a 1 percent chance of occurring each year) will deliver over 5,116

cubic meters per second, which equates to a flow of more than two Olympic-sized swimming pools every second, according to the U.S. Geological Survey. The size of the watershed and the low land along the river in Toa Baja mean that when the river floods to this degree nearly 40 percent of the *municipio* becomes inundated to depths ranging from zero to over 20 feet of water.

During the panel's stakeholder interviews, one Toa Baja pueblo resident noted that "*Luchamos con nuestro vecino, el rio*" (We fight with our neighbor, the river).

In addition, the Río Hondo and the Río Bayamón both pose flood risks for the eastern edge of the municipality.



This figure illustrates the depth of water that will inundate the municipality of Toa Baja as a result of 11.9 inches of rain falling in 24 hours before the construction of the U.S. Army Corps of Engineers Río de la Plata Flood Risk Reduction Project. This so-called 100-year event has a 1 percent chance of occurring each year. The map was created by subtracting the ground surface elevations, obtained from 2015 data published by the U.S. Geological Survey, from the 100-year floodwater surface elevations published in 2018 by the Puerto Rico Planning Board.

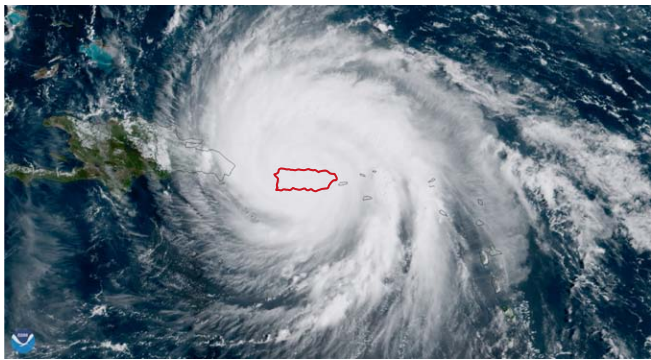
NOTABLE WEATHER EVENTS

The following storms and flooding events demonstrate consistent infrastructure and economic activity impacts as well as community stress and psychological damage:

- Hurricane David, 1979;
- Tropical Storm Federico, 1979;
- Hurricane Hugo, 1989 (the first hurricane to hit Puerto Rico directly since 1956);
- Floods on Three Kings Day, 1992;
- Hurricane Georges, 1998;
- Hurricane Irene, 2011;
- Hurricane Irma, 2017; and
- Hurricane Maria, 2017.



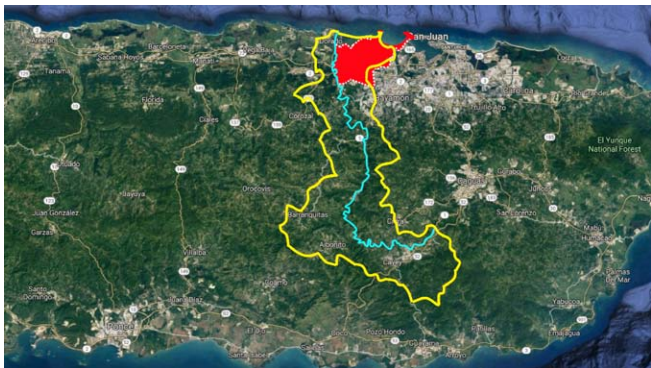
Flooding in Toa Baja was more problematic than wind damage because of the municipio's location relative to the river and the amount of rain received by the river watershed. Many of Toa Baja's roads were flooded, and homes were inundated with water for days after the two hurricanes. Once water receded, the impact of mud on sidewalks and inside residences was substantial.



Category 5 Hurricane Maria over Puerto Rico in 2017.

From 1993 to 2015, scientists have observed sea-level increases of approximately 0.75 inch per decade along the coast of Toa Baja. By 2100, a sea-level rise of between three and four feet is anticipated, posing a threat to the coastal areas of the municipality, according to the *Fourth National Climate Assessment* of the U.S. Global Change Research Program.

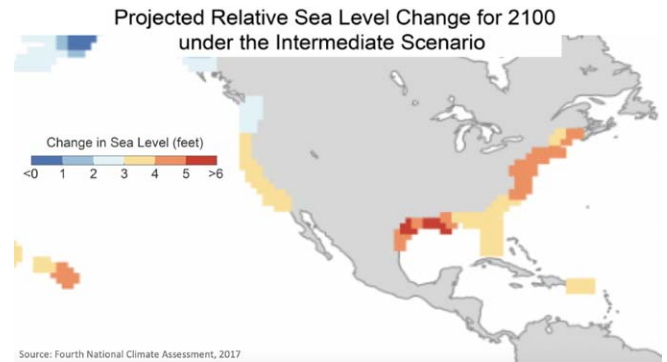
Flood risk exposure depends on relative elevation of the land. Whether considering the risk to a home, a government building, a business, a wastewater treatment plant, or a power distribution substation, the elevation of the occupied space or the critical facility is vital information. The lower the elevation,



Río de la Plata, Puerto Rico's longest river (in blue), flows south to north, ending in Toa Baja (shaded red), creating high flood risks for those within the floodplain (outlined in yellow).



Panelists accompany the mayor of Toa Baja along the Río de la Plata on a study area tour.



Source: Fourth National Climate Assessment, 2017

Projected relative sea-level change for 2100 under the intermediate scenario from the 2017 Fourth National Climate Assessment, indicating that the northern part of Toa Baja would be subject to sea-level rise of three to four feet.

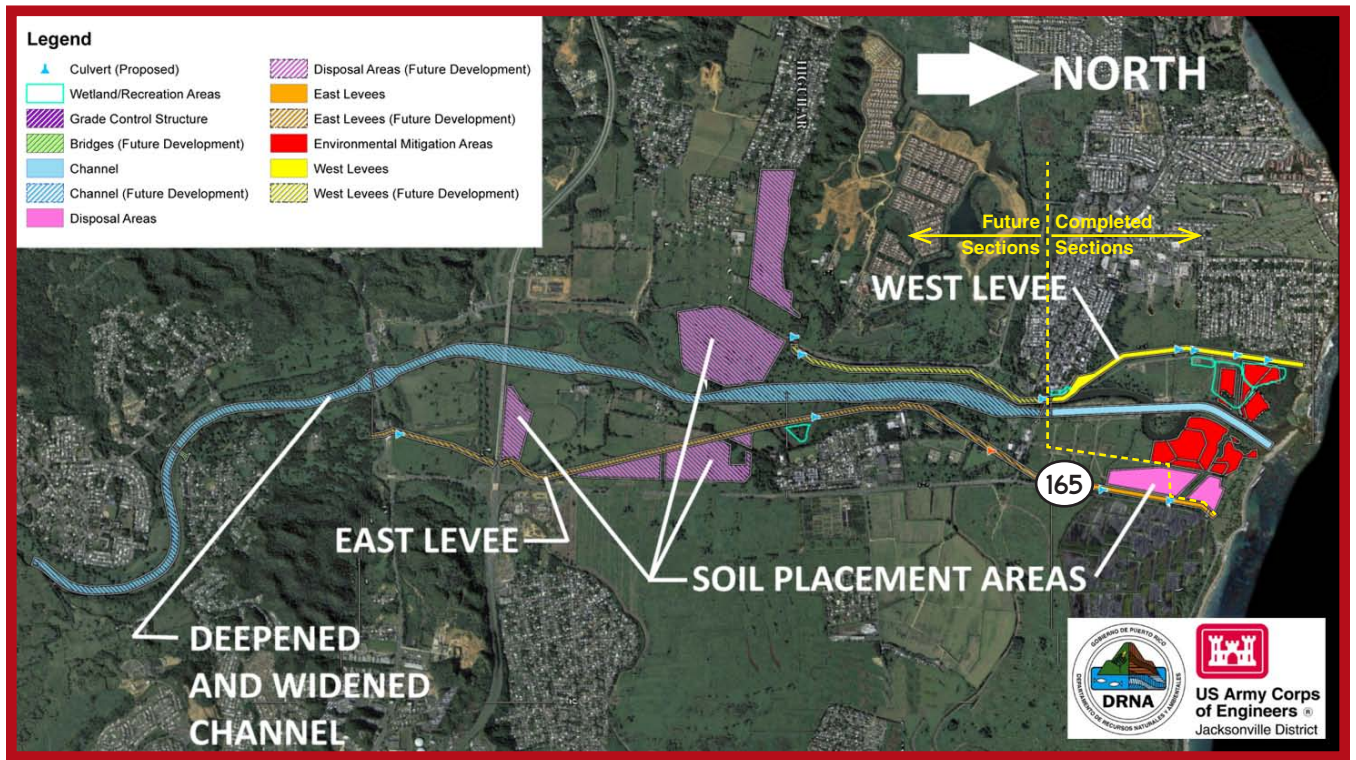
the higher is the risk. The area of inundation is a result of stormwater runoff flowing downriver, overflowing the river's banks, and flooding the surrounding ground.

The need for development in Toa Baja to better manage water is twofold. On the one hand, over time development has intensified runoff through paving and building construction. On the other hand, storm intensity and riverine flooding are increasing in low-lying areas because of climate change and creating ongoing fear among residents about the river overflowing and general flooding. Incorporating natural systems can address both of these factors and as a result will build resilience when implemented in conjunction with holistic land use strategies. Such decisions about floodplain management and land use should be informed by following recommendations and prioritized to be funded by the pending \$20,000 planning assistance grant through CDBG-DR funding to the Toa Baja Department of Housing.

USACE Flood Risk Reduction Project

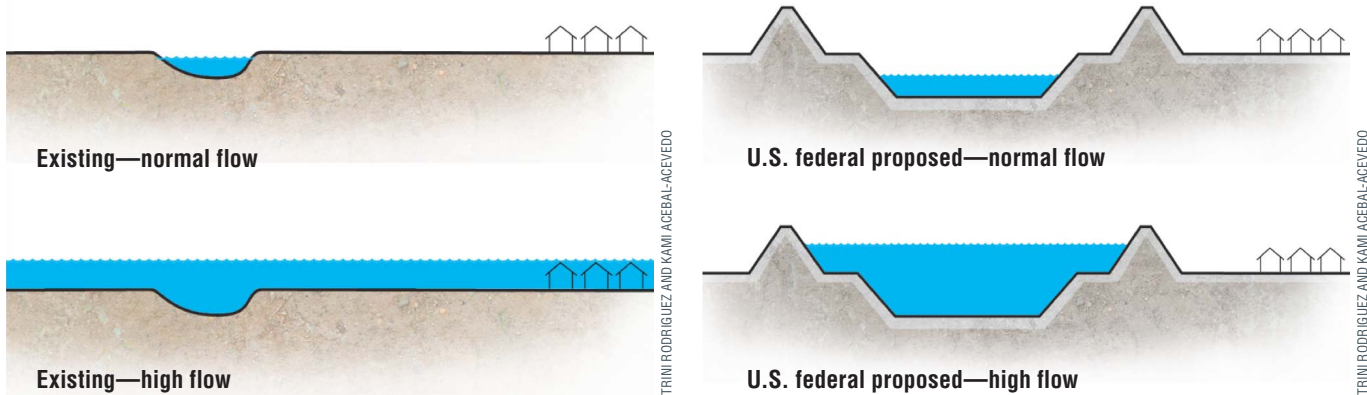
After years of studies authorized by the U.S. Congress beginning in 1966, the U.S. Army Corps of Engineers (USACE) recommended the Río de la Plata Flood Risk Reduction Project (the "Project") in the late 1980s. The U.S. Congress *authorized* the Project in the Water Resources Development Act of 1990, section 101(a)(19), with an estimated total cost of \$58,968,000 (\$35,900,000 federal and \$23,068,000 commonwealth funding); however, this authorization did not include the necessary federal *appropriation* for the Project to proceed. That changed after Hurricanes Maria and Irma.

The Bipartisan Budget Act of 2018, passed in the wake of Hurricane Maria, appropriated 100 percent federal funding



MICHAEL BLOOM, ADAPTED FROM USACE

The originally proposed USACE project with its component phases illustrates construction of the first segment completed in 2015, which included the 1.15 miles of levee to the west of the river and 0.93 miles of channelization of the last portion of the river just before it enters the Atlantic Ocean.



Sections of the current Río de la Plata flood-prone area and the USACE proposed levee design.

of \$500 million for the Project. It directed the USACE to “expeditiously carry out any project for flood risk management or hurricane and storm damage risk reduction authorized” in the commonwealth of Puerto Rico.

The implementation timing of the fully funded Project is in the hands of the Puerto Rico Department of Natural and Environmental Resources (the project sponsor, in Spanish Departamento de Recursos Naturales y Ambientales or DRNA) and the USACE. The panel recommends that Toa Baja

acknowledge and embrace its lack of local control and use that as a rallying cry to motivate citizens, elected leaders, and other stakeholders to lobby and advocate for implementation of the Project. Toa Baja (and other municipalities impacted by the project, including Dorado and Toa Alta) should seek to have a seat at the table when DRNA and USACE meet to discuss the Project’s design and construction. It is vital to the economic health of Toa Baja and for the success of any housing and economic development initiatives for the Project to be completed as soon as possible.

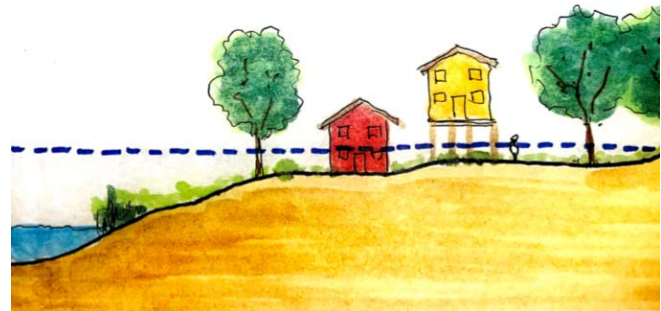
TEN PRINCIPLES FOR BUILDING RESILIENCE

During the panel week, panelists referenced *Ten Principles for Building Resilience* to help ensure recommendations provide comprehensive suggestions for proactively addressing social, economic, and physical vulnerabilities for long-term development and redevelopment while accounting for immediate needs during recovery from the 2017 hurricane season.

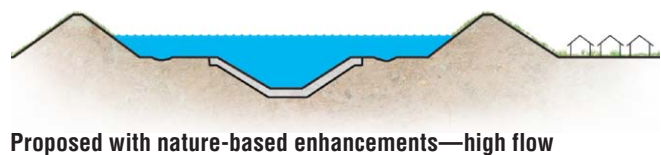
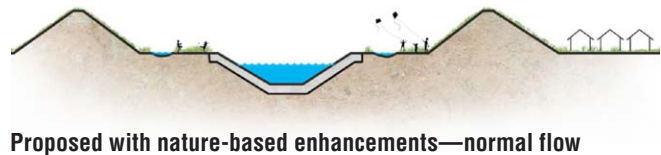
The following principles summarize key themes posited by ULI's resilience work in the years since Hurricane Sandy, with a particular focus on resilience-focused Advisory Services work.

- **Understand Vulnerabilities:** Understanding how shocks and stresses increase risks is the first step toward building resilience.
- **Strengthen Job and Housing Opportunities:** Cities with a diversity of jobs and housing choices are more resilient and better prepared for extreme events and other challenges.
- **Promote Equity:** Pursuing equity means purposefully addressing racial, social, environmental, and economic injustices to build stronger communities and to support the most vulnerable communities in reducing risk.
- **Leverage Community Assets:** Identifying and leveraging existing assets will enable communities to bounce back better.
- **Redefine How and Where to Build:** Building resilience entails identifying and investing in places and infrastructure that are the most likely to endure.
- **Build the Business Case:** Strategies that prepare for and mitigate climate-related risks can create value and provide a strong return on investment.
- **Accurately Price the Cost of Inaction:** Recent extreme weather events suggest that the costs of not investing in resilience and risk reduction are dramatically increasing.
- **Design with Natural Systems:** Designing resilience relies upon an understanding of the function and geography of natural systems and how they can help strengthen manmade systems and communities.
- **Maximize Co-Benefits:** Risk reduction initiatives and infrastructure can help include elements that enhance quality of life and economic development potential.
- **Harness Innovation and Technology:** Innovation related to infrastructure, mobility, data, and information tracking can improve responses to crises and strengthen resilience for the long term.

The full ULI report is available at uli.org/tenprinciplesresilience.



TRINI RODRIGUEZ AND KAMI ACEBAL-ACEVEDO



TRINI RODRIGUEZ AND KAMI ACEBAL-ACEVEDO



TRINI RODRIGUEZ AND KAMI ACEBAL-ACEVEDO

ULI panelists took the opportunity to reimagine the levee flood risk reduction project with a nature-based approach that would incorporate opportunities for recreation along the Río de la Plata and allow the river to flow in a more natural pattern.

Nature-Based Design and Recreation Opportunities

Although the original Río de la Plata project was devised as a single-purpose project for flood risk reduction, the panel took this opportunity to reimagine the design of the project with nature-based design systems and recreational opportunities to create a public amenity and reduce flood risk for surrounding areas.

Designing Natural Drainage Systems

Toa Baja should advocate for the Puerto Rico Planning Board, Department of Housing, and other CDBG-DR implementation agencies to encourage the use of natural drainage systems (also called “green stormwater infrastructure” or “low-impact development”) in redevelopment and for new developments. This will help reduce the volume of runoff affecting the public drainage system, improve aesthetics and quality of place, and potentially add value to real estate investments.

Traditionally, most developers use concrete parking areas, concrete streets, and precast concrete storm sewer systems to convey rainwater quickly and efficiently to “end-of-pipe” detention basins. From there, the collected rainwater is discharged into nearby streams at a restricted rate to avoid downstream flooding. An alternative exists, however: natural drainage systems.

Using green infrastructure techniques or developing with a natural systems approach can use CDBG-DR funding and provide more much-needed housing at a lower overall cost.

Natural drainage systems simulate the natural flow of water across the landscape and can be used to manage water during every day and peak storm events. The use of natural drainage can complement or replace the use of concrete storm sewers, and because the water runs off the site more slowly, the system requires less detention. This allows the development site to accommodate a higher number of homes or commercial buildings, reduces drainage system costs, and provides for an open-space amenity, such as parks or trails.



Curb cuts allow water to flow from impervious concrete on the sidewalk into a rain garden.

EXAMPLES OF NATURAL DRAINAGE SYSTEMS AND LOW-IMPACT DEVELOPMENT

Natural drainage systems have been implemented at district-scale projects with varying approaches and design schemes because of their ability to infiltrate large quantities of water, as in the following examples:

- High Point is a HOPE VI redevelopment, currently the Seattle Housing Authority’s largest residential project at 1,700 affordable and market-rate homes, with an extensive natural drainage system featuring bioswales and constructed wetlands. On a site that was formerly 65 percent impervious, High Point’s natural drainage system infiltrates 75 to 80 percent of stormwater runoff.
- Stonebrook Estates is a 51.4-acre, single-family residential, low-impact development located north of Houston in Harris County, Texas. In addition to adding green amenities to the community, the investment in low-impact development has avoided losses by effectively handling the Tax Day and Memorial Day floods of 2016 and Hurricane Harvey in 2018.

More information about these examples and more case studies can be found in ULI’s 2017 report *Harvesting the Value of Water*, which provides an overview of how cities are revising stormwater management regulations in response to flood frequency and aging or insufficient infrastructure to encourage the use of green infrastructure, which creates implications and opportunities for private-sector real estate developers.



Bioretention swales, like this one at High Point, improve water quality, protect wildlife, and, most important, collect stormwater.



A key feature of Stonebrook Estates’ low-impact design approach is a bioswale, which creates a welcoming green space at the entrance to the development.

Natural drainage systems can also be a marketing differentiator for developments. They capitalize on the market demand for natural and environmentally-friendly neighborhoods and can be leveraged to support placemaking and tourism industry goals. They can serve as a framework for trail systems, which are ranked among the highest of consumer-requested amenities. They can provide a polished and manicured look along entryways and community front doors, while maintaining a wild and rustic look along paths and leading away from back doors.

Natural drainage systems offer the following benefits:

- Reduce volume of detention required to comply with floodplain regulations;
- Increase lot yield;
- Reduce drainage infrastructure cost;
- Provide an open space and natural amenity;
- Capitalize on the market demand for environmentally-friendly and natural communities; and
- Differentiate the development from all the rest.

Rather than constructing drainage systems that accelerate runoff across impermeable surfaces and through concrete pipes, natural drainage systems keep runoff flowing slowly. This reduces the cost of conveyance systems, reduces the size and cost of detention basins, and can lower the overall cost of infrastructure and housing.

Creating Recreational Areas

The ULI panel recommends that Toa Baja engage with both USACE and DRNA to advocate for an engineered Río de la Plata project that provides the same level of flood-risk reduction but that also provides recreational opportunities, natural areas, and parklike areas that are more compatible with the natural meanders and floodplain features of the existing river corridor.

The panel imagines the river corridor serving both as flood-risk reduction and as a recreational corridor. During low-flow periods, this design may allow river access, thereby advancing recreation and wellness needs. The recommended approach should reduce risk, encourage development and investment in nearby areas, stimulate recreational activities, reduce fear of the river, and overall connect people to the river.

To help link people to this new community asset and encourage a “living with water” mentality, the panel recommends that streets and mobility corridors incorporate green stormwater infrastructure and leverage the conceptual framework of

TEN PRINCIPLES FOR BUILDING HEALTHY PLACES

Toa Baja should advocate for the use of the Ten Principles for Building Healthy Places by authorities and private investors building new or replacement housing and infrastructure. The key checklist items are as follows:

- **Put People First:** Individuals are more likely to be active in a community designed around their needs.
- **Recognize the Economic Value:** Healthy places can create enhanced economic value for both the private and public sectors.
- **Empower Champions for Health:** Every movement needs its champions.
- **Energize Shared Spaces:** Public gathering places have a direct, positive impact on human health.
- **Make Healthy Choices Easy:** Communities should make the healthy choice the one that is SAFE—safe, accessible, fun, and easy.
- **Ensure Equitable Access:** Many segments of the population would benefit from better access to services, amenities, and opportunities.
- **Mix It Up:** A variety of land uses, building types, and public spaces can be used to improve physical and social activity.
- **Embrace Unique Character:** Places that are different, unusual, or unique can be helpful in promoting physical activity.
- **Promote Access to Healthy Food:** Because diet affects human health, access to healthy food should be considered as part of any development proposal.
- **Make It Active:** Urban design can be used to create an active community.

ULI's full *Ten Principles for Building Healthy Places* report is available at uli.org/resilience/tenprinciplesreport.

“complete streets” to provide access and mobility for all users: pedestrians, bicyclists, motorists, transit riders, and people of all abilities and ages. The adaptation of older streets as complete streets could be undertaken as part of the plan for using CDBG-DR infrastructure-designated funds and developed in conjunction with the previously recommended green stormwater infrastructure investments.

Improved health outcomes can be a co-benefit of this approach. People without access to trails and amenities that encourage activity and movement can have diminished health outcomes. By providing recreational and nature-based amenities along the

river corridor and along access corridors to and from the river, Toa Baja can encourage more citizen activity and movement and thus enhance both health outcomes and economic activity.

Land Use and Floodplain Regulation

Resilient development and land use policies should identify ways to build from natural systems, whether at the site, block, neighborhood, city, or regional scale.

The panel acknowledges that before completion of the Project, *at-grade* rehabilitation of damaged housing, redevelopments, and new developments is not likely to be feasible in most of the western and northern portions of the *municipio*, because of the 1 percent annual chance of water inundation depths in those areas. To avoid inundation and to comply with building codes, pre-Project building and critical facility construction would have to be elevated, in some areas more than 20 feet, which in many areas of Toa Baja may not be feasible. Post-Project construction could be accomplished at *existing* grades but would be subject to some residual risk of flooding from larger rain events that cause the river to overtop the planned levee or if the levee were to fail.

The panel recommends Toa Baja advocate that the commonwealth implementation agencies move forward with existing policies and rules that require all new development or redevelopment in the floodplain (areas with greater than a 1 percent annual chance of inundation) to be elevated so the floor of occupied or critical mechanical system spaces is at least 12 inches above the 1 percent annual chance inundation level.

Toa Baja should also advocate for additional commonwealth resources for land development permitting enforcement, including plan review capacity staff and field inspectors. Toa Baja should advocate that the commonwealth implements *no adverse impact* (NAI) rules that conform to guidance by the Association of State Floodplain Managers.

Building Codes

Estimates indicate that more than 50 percent of housing in Puerto Rico is informal. Panel members touring the *municipio* areas inside the regulatory floodplain observed many homes and structures with finished floors at or near the existing ground, which suggests that the majority of the homes inside the regulatory floodplain are informal.

For the purposes of this report, *informal housing* is considered housing that was built on land without legal documentation of ownership (deed records), housing that is on deeded

property that belongs to another person, or housing that does not comply with building codes or regulations, whether it is properly deeded or not. Informal housing is particularly vulnerable because it is often located in areas with a greater than 1 percent annual chance of flooding and without proper floor elevations or has substandard construction that is susceptible to damage from storm events, or both. Occupants of informal homes that could not prove legal ownership were not eligible for Federal Emergency Management Agency (FEMA) funding and have been the most severely affected in the post-Maria environment.

On September 27, 2018, Puerto Rico adopted the 2018 International Building Code, which includes minimum requirements for the structural design of residential buildings so they can handle anticipated wind, rain, earthquake, and flood loadings.

Although the panel discourages further development in areas of high-risk flooding, it recognizes the possibility of such development as long as special measures are taken to make sure the building structures are resilient to catastrophic flooding.

The minimum elevations for habitable spaces determined by the latest FEMA flood base map should be respected. Below this elevation minimum, structures should be free of obstruction except for structural columns or sheer walls where necessary, or any approved nonsupporting break-away walls, approved open lattice work, or approved architectural insect screening.

STREAMLINED PERMIT PROCESS

Governor Ricardo Rosselló Nevares announced the adoption of the Joint Regulation for the evaluation and issuance of permits related to the development and use of land, and business operation. Its primary objective is to create a system for the evaluation and processing of permits for the integrated and uniform development throughout the island. The new regulation allows streamlined permitting procedures so that developers will no longer need to deal with different planning rules or requirements depending on the municipality in which the project is located. It came into force immediately once the governor signed it on May 8, 2019. This regulation gives priority to compliance with the new construction codes. The president of the Planning Board, María del C. Gordillo, said “this new regulation is a planning tool that helps guide Puerto Rico towards an orderly, integrated planning that encourages investment. In addition, it is part of the public policy of this administration to facilitate and expedite socioeconomic development.”

Resident safety is jeopardized by this substandard housing. The lack of code enforcement by government officials allows this problem to be perpetuated. Actions must be taken to protect the safety of the vulnerable by providing ways to access funds to renovate, elevate when appropriate, or relocate to safely constructed existing homes or new homes built to current codes.

The panel recommends more intensive code enforcement to ensure all new construction is code compliant. The panel also recommends creating a program to update existing structures to make them code compliant where critical. More specifically, the panel suggests allocating funds to hire more qualified code-enforcement inspectors. This would include training new officers, partnering with community organizations, promoting cross-agency coordination, and implementing a penalty for noncompliance that is enough to incentivize compliance. Communities need to take code enforcement seriously to protect lives and property value. Code enforcement supports and enhances property value and safety through enforcement of an established property standard.

Management Strategies for Utilities

As evident from the 2017 hurricane season, natural events expose the vulnerabilities of the commonwealth's utility networks. Earthquakes are another key challenge that places the utility networks at risk. The island of Puerto Rico sits on the border between the Caribbean and North Atlantic plates. Because the Caribbean Plate is essentially stationary, and the North Atlantic Plate is moving west at a rate of about one inch per year, the region is subject to frequent earthquakes.

The panel recommends Toa Baja and Puerto Rico use CDBG-DR funding to support a strategy to harden critical utility facilities that provide power, water, sanitation, and communications.

Power Supply

Electrical infrastructure is vulnerable to extreme weather events that may cause the loss of electrical services by interrupting the generation or transmission and distribution systems. Strengthening electrical infrastructure is critical in Toa Baja, because interruptions in electrical services lasted several months in Puerto Rico after Hurricane Maria. Loss of power is a significant problem for citizens, businesses, and maybe more importantly for emergency response management, especially if the provision of basic services (access to food, water, health, and shelter) needs to be coordinated. The lack of these services after the hurricane had deadly consequences in Puerto Rico.

Electrical Infrastructure Hardening. Toa Baja, as did most of the island, had power outages caused by Hurricane Maria but was able to progressively regain electricity supply in a relatively short time, mainly due to existing underground distribution lines.

The panel recommends Toa Baja advocate that the Puerto Rico Electric Power Authority (PREPA) use its pending \$2 billion in congressionally authorized funding to implement system-hardening measures such as the following:

- Replacing aerial distribution lines with underground lines;
- Strengthening transmission towers and pillars as well as distribution poles to withstand elevated wind speeds caused by climate events such as hurricanes; and
- Adopting and enforcing new standards for installation of new transmission and distribution lines.

These three measures are already in the list of projects prepared by PREPA, with a specific list of retrofits already in place. A concrete plan is being prepared by PREPA and FEMA and is expected to be ready in 2019. The panel recommends following this plan to improve electrical infrastructure.

Street lighting and traffic lights were still down in Toa Baja during the panel week, more than a year after Hurricane Maria. These pose safety and health risks for the community. The panel recommends prioritizing repairing and hardening these services because they are critical to daily needs, let alone after a major weather event.

Energy Efficiency. Energy efficiency practices, demand-response mechanisms, and renewable energy deployment in the municipal government and at community scale will complement the increasing investments expected for the power supply systems.

Energy efficiency and demand-response practices have direct economic savings as well as technical benefits for the electrical grid. For example, behavioral and awareness-raising campaigns alone could yield between 10 and 20 percent energy savings. Another action that can benefit Toa Baja is the light emitting diodes (LED) deployment plan being prepared by PREPA for public street lighting.

The municipality of Toa Baja should be very persistent and engage with the utility to follow up on the status of these projects and the availability of funds for energy efficiency practices, demand-response mechanisms, and renewable energy deployment actions at municipal level (including for

municipally owned properties, residential buildings, and businesses).

In addition, enforcement against illegal hook-ups to the grid is fundamental. These cause loss of income to PREPA and, therefore, loss of investment capacity for improvements to the grid, and such hook-ups may create extra safety concerns during floods.

According to FEMA, the observed performance of rooftop solar water heaters was excellent, but the performance of photovoltaic (PV) power systems varied depending on the type of anchoring system and the type of clamping system used. Wind loads, windborne-debris impact, and clamping mechanism failure were the causes of the systems' failures.

Toa Baja should actively pursue the installation of distributed-generation PV rooftop systems to be able to diversify the energy sources for municipal and private consumption, alleviate peak demand in case of extreme heat events, move toward energy transition and greenhouse gas mitigation practices, and provide energy to water pumps to improve access to drinking water in emergency situations. Including batteries in these PV generating installations would make them more effective during and after weather events.

Deployment of solar water heaters should continue, particularly by leveraging CDBG-DR funding outlined in the *Community Energy and Water Resilience Installations* (part of the HUD approved action plan) that provide vouchers directly to low- to moderate-income homeowners and businesses to install gas or solar power water heaters, stoves, or other similar appliances.

Microgrid. In 2018 the Puerto Rico Energy Commission adopted the Regulation on Microgrid Development. Microgrids may be an option to independently provide electric service during grid outages, as happened very recently in Puerto Rico. This regulation permits *municipios* to own microgrids, which means that exploring the option of installing one or more microgrids in Toa Baja is worth pursuing for several reasons, including the following:

- Energy supply purposes for specific areas;
- Energy supply for emergency response purposes during grid outages; and
- Moving from fossil fuel dependence.

Local contractors should be trained and certified, if needed, for the implementation and construction of code-compliant infrastructure.

Water and Sanitation

The adverse impacts of extreme weather events on water availability and quality are a recurring concern for communities in Puerto Rico. Resilience will be improved if clean water is available to the entire population in case of an extreme weather event such as a hurricane.

Toa Baja could pursue the following activities with the Puerto Rico Aqueducts and Sewers Authority (Autoridad de Acueductos y Alcantarillados) to increase and guarantee water supply in case of a natural disaster:

- Identify the municipality's freshwater sources;
- Develop infrastructure for emergency water collection, harnessing, and storage;
- Review the current capacity of the water distribution networks;
- Study projects for service improvement; and
- Raise awareness on sustainable water use and management during a crisis.

Communications, Innovation, and Technology

Communication systems are critical during emergency situations. Toa Baja should seek to install backup energy systems (generators with reliable fuel supplies or solar power systems) to keep communication systems and main operational buildings (i.e., emergency control center, police and fire stations) operating. Toa Baja should also seek to supply emergency personnel with satellite phones and backup batteries to facilitate communications during significant disasters.

The panel recommends that Toa Baja work with communication service providers to strengthen overhang lines and to deploy underground systems. Expected construction in Toa Baja (road improvements, housing developments, and the like) will provide a good opportunity to integrate resilient communication systems. Attention should be given to how to innovate within existing communication systems, to include sensors for flooding, and to build systems for real-time data and alerts to be sent to control and emergency operation centers.

Action Items: Physical Resilience

In summary, the ULI panel recommends the following to enhance Toa Baja's physical resilience:

- *Integrate nature-based design and recreational opportunities into Río de la Plata Flood Risk Reduction*

Project: The municipality should advocate to DRNA and USACE for them to design and implement a project that provides the same level of flood-risk reduction but that also provides recreational opportunities, natural areas, and parklike areas and is more compatible with the natural meanders and natural floodplain features of the existing river corridor.

- *Build complete streets:* Toa Baja's new streets should be conceived and designed within the conceptual framework of complete streets to enhance public health and economic activity.
- *Encourage natural drainage systems:* Toa Baja should encourage the Puerto Rico Planning Board, Department of Housing, and other CDBG-DR implementation agencies to use natural drainage systems (also called "green stormwater infrastructure" or "low impact development") on private property, redevelopment, and new developments.
- *Enhance land use and floodplain regulation:* The panel recommends Toa Baja advocate that the commonwealth implementation agencies move forward with existing policies and rules that require all new development or redevelopment in the floodplain (areas with greater than a 1 percent annual chance of inundation) to be elevated so the floor of occupied or critical mechanical system spaces is at least 12 inches above the 1 percent annual chance inundation level. They should also push for implementation of NAI rules for development.
- *Enforce building codes:* Toa Baja should also advocate for additional commonwealth resources for land development permitting enforcement, including plan review capacity staff and field inspectors.
- *Conduct municipal planning:* Toa Baja should move forward with comprehensive planning using the \$20,000 CDBG-DR planning grant.
- *Implement utility management strategies:* The panel recommends Toa Baja and Puerto Rico use CDBG-DR funding to support a strategy to harden critical utilities, such as power, water, sanitation, and communications.
- *Prioritize power supply infrastructure:* System-hardening measures should be a key priority of Toa Baja to improve the utility's physical infrastructure in the future and make it less vulnerable to hurricanes and floods.
- *Implement community energy and water resilience installations:* Advocate for and educate citizens about vouchers for low- to moderate-income homeowners to install gas or solar power appliances.
- *Enhance water supply and sanitation:* Toa Baja should look to partnership to increase and guarantee water supply in case of natural disasters.
- *Improve communications infrastructure:* Toa Baja should work with communication service providers to improve overhang lines and to deploy underground systems.



Build Civic Infrastructure

THE UNITED STATES–BASED NONGOVERNMENTAL ORGANIZATION Strive Together defines *civic infrastructure* as follows:

A way in which a region or community comes together to hold itself collectively accountable for implementing its own unique cradle-to-career vision and organizes itself to identify what gets results for children; improves and builds upon those efforts over time; and invests the community's resources differently to increase impact.

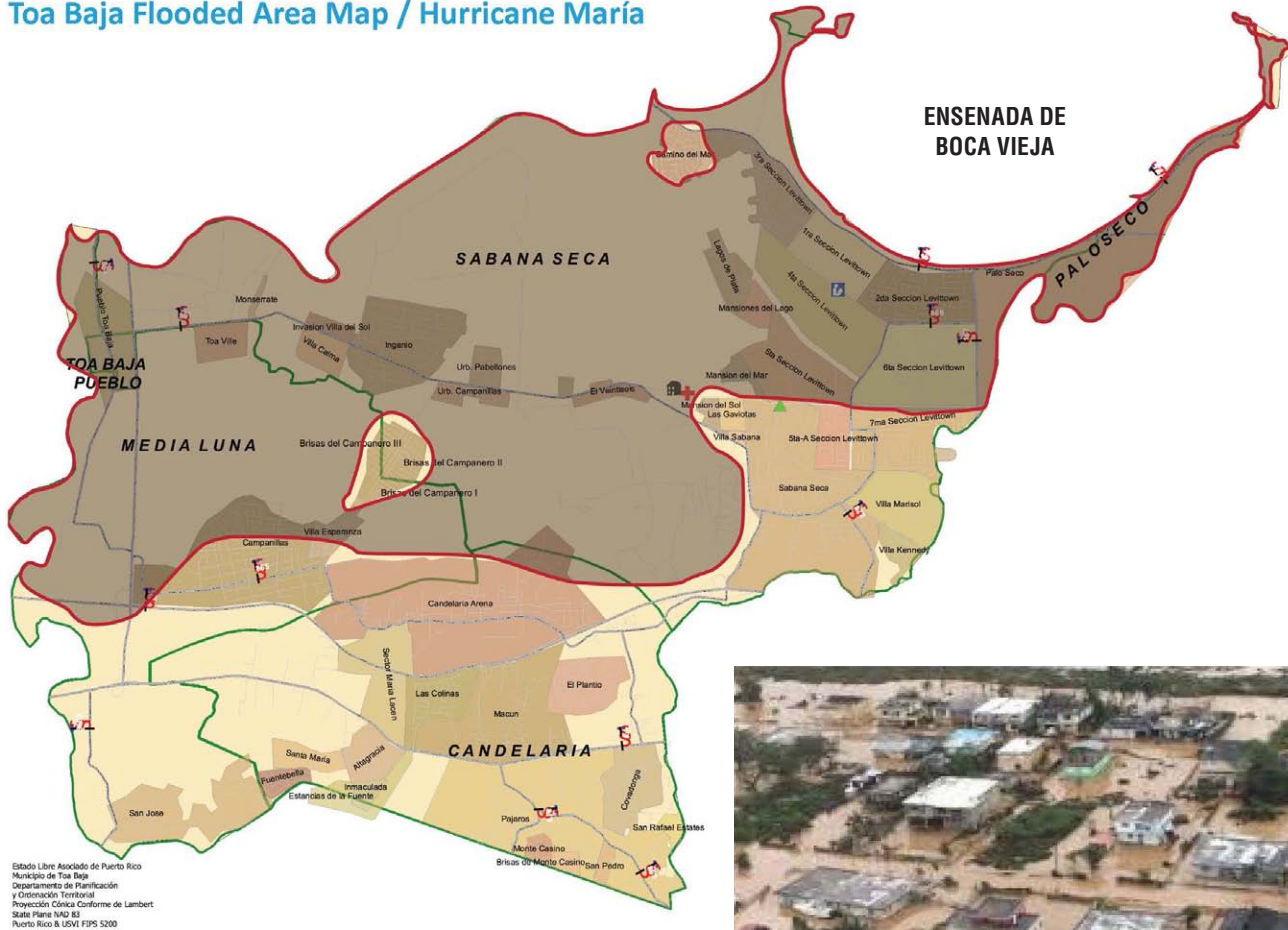
Civic infrastructure conceptually recognizes the role of civic society as an adjunct to the role of professional technicians, elected officials, and government agency leaders

Postevent analyses of social responses to the impact of catastrophic climate events like Hurricanes Katrina and Sandy on major metropolitan cities and their neighborhoods have led to a definition of social resilience as comprising the following three dimensions:

- *Coping capacities:* The ability of social actors to cope with and overcome all kinds of adversities;
- *Adaptive capacities:* The ability to learn from past experiences and adjust to future challenges in their everyday circumstances; and
- *Transformative capacities:* The ability to craft sets of institutions that foster individual welfare and sustainable societal robustness toward future crises.

A key set of panel recommendations focuses on the designation of CDBG-DR funds to strengthen and grow Toa Baja's civic infrastructure. If social capital is not replenished, developed, and maintained—as is the case with physical infrastructure—the next tragedy will expose its depletion and fragility. The return on investments in civic infrastructure can produce a

Toa Baja Flooded Area Map / Hurricane María



An area of Toa Baja flooded by Hurricane María, with an illustration of impacts to the communities of Monserrate and Ingiero.

multigenerational return, which can be measured as increased human and intellectual capital that can be transferred beyond the geographic confines of Toa Baja.

Reestablishing and reinforcing Toa Baja's civic infrastructure is one of the key opportunities the catastrophe of Hurricane María presents. Like the new investments envisioned for Toa

Baja in physical infrastructure, energy infrastructure, financial infrastructure, and so forth, new investments, maintained over time, will grow the social capital that, though depleted post-María, remains in the form of support for the promising efforts of the local government.



Consensus Building and Civic Engagement

The panel recommends that growing civic infrastructure should focus on consensus building and civic engagement.

Forestalling the unfortunate tendency of humans to compete for what are perceived as limited resources, the panel strongly recommends that decision-making be based on a win-win paradigm instead of the more common win-lose approach. In the case of Toa Baja, *municipio* decisions should seek to engage and reduce loss because so many in the community have already and repeatedly lost so much.



Consensus can be defined as advice or a decision that the largest number of participants agree is satisfactory and actionable, though not perfect. Consensus-based decision-making among Toa Baja residents should be seen as a community-building technique defining their long-term values, integrity, and sustainability of their *municipio* as a vehicle for progress beyond the satisfaction of any individual in the group.

A top-to-bottom approach to engagement will probably be initiated by government in its role as administrator and arbiter of funding. However, consideration should be given to producing patterns and designing participatory processes that allow multidirectional engagement.



The ULI Advisory Services team engaged with the community through a series of events and interviews during the week on site.

In its post-Maria response, Toa Baja should strive to become a regional and national model of multidirectional and multidimensional civic engagement. Such an approach would typically encourage government to not simply inform and direct its downstream constituents but also to commit to be guided by the recommendations and priorities of residents and stakeholders operating on the ground. In the case of Toa Baja's neighborhoods, engagement structures that allow and encourage community dialogue can produce a broad degree of citizen buy-in for strategies and actions that may be considered noninclusive at higher levels.

Amidst a history of hurricanes and flooding, the collective impact of Hurricane Maria on Puerto Rican communities was unprecedented. The *municipio* of Toa Baja has a legacy of water management challenges because of the Río de la Plata and was profoundly affected. In some areas of Toa Baja, the water took over 24 hours to drain. Flooding in neighborhoods such as Ingenio reached 20 feet. Investments that recognize, strengthen, and support the expression of informal social resilience in communities like Toa Baja are what prevent the most severe outcomes.

Likewise, there is value in committing to implement multidimensional engagement. One way that engagement might be structured is to create separate though integrated processes whereby working groups are empowered to perform actual research tasks and craft recommendations that are transmitted to steering committees that assemble and consider all recommendations. Another approach might consider geographic (east Toa Baja, middle Toa Baja, west Toa Baja), sectoral (faith-based, small business, landowners, legislators, corporate, nonprofit, etc.), and interest (environmental, mobility, seniors, children and youth, unemployed, etc.) dimensions.

Emergency Preparedness and Emergency Response

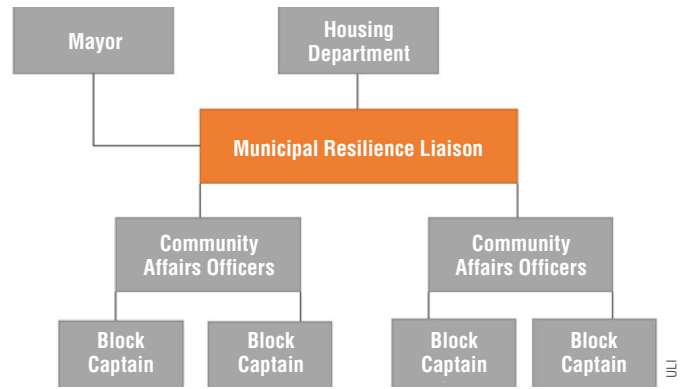
Toa Baja can increase its resilience by enhancing emergency preparation and response capabilities. Toa Baja’s Municipal Office for Emergency and Administration of Emergencies and Disasters has developed its Operational Emergency Plan (2018) in collaboration with the Emergency Management State Agency in accordance with guidelines established by the Department of Homeland Security and FEMA. This plan addresses the challenges arising in the hours leading up to an extreme event or disaster, during the event, and in the immediate aftermath.

Enhancement of emergency preparation and response abilities can use the following techniques:

- Actively request the preparation of action plans by those institutions that are mandated to do so in the municipal Operational Emergency Plan.
- Establish a network of block captains to foster communication and network support.
- Create community, pueblo, and urbanization-level representatives for communication and network support.
- Schedule and conduct periodic meetings (twice a year, one of those meetings being before hurricane season starts) to discuss preparedness planning and implementation capabilities.
- Educate and encourage each home to prepare an emergency plan.
- Educate and encourage businesses to prepare plans and to embrace their employees and stakeholders. Businesses should continue to participate in response and recovery.
- Establish or participate in a “push” alert notification system to residents to warn them of potential pending threats or hazards. This system could use the existing cell phone network and would become more resilient as the cell phone tower and power grid upgrades are built out.
- Continue to coordinate with commonwealth authorities and U.S. federal entities constantly and as part of day-to-day activities.

Municipal Resilience Liaison

Across the world, executive-level resilience-focused positions are becoming more prominent in public-sector administrations, particularly in communities that have environmental and economic vulnerabilities. The panel recommends the *municipio*



Panelists recommended hiring a municipal resilience liaison who would connect community groups while identifying and leading opportunities for collaboration on resilience projects throughout the municipality.

of Toa Baja use CDBG-DR funding to support the liaison identification process and initial needs. The government resilience liaison would be the designated lead in building resilience and coordinating all municipal resilience-related efforts.

The government resilience liaison would work across horizontal and vertical divisions within the municipality, specifically as follows:

- Connecting residents with resources, trainings, and tools;
- Coordinating municipal local government agencies with one another and third parties; and
- Disseminating information at all scales from commonwealth to community levels.

By breaking down these silos, the liaison would be able to pursue funding sources and other resources while working with key government and local stakeholders to implement projects, like the Río de la Plata project. The liaison will ensure that acquired resources are leveraged holistically and “get the most bang for the buck” by supporting projects that provide maximum co-benefits for the community.

Improved economic vitality for all residents supports the community’s ability to “bounce back” from a disaster. The resilience liaison will work with land use and real estate professionals to activate safe housing options for at-risk residents that are also in locations that can spur economic activity and help build critical capacity to support a local economy.

Overall, this position will be tasked with resilience thought leadership for the *municipio* and develop a strategy to help identify and address challenges and its capability issues

while pursuing and implementing projects and programs that enhance environmental, economic, and community resilience.

Action Items: Social Resilience

In summary, to further civic infrastructure in Toa Baja, the ULI panel recommends the following:

- *Consensus building and civic engagement:* In its post-Maria response, Toa Baja should strive to become a regional and national model of multidirectional and multidimensional civic engagement.
- *Emergency preparedness and emergency response:* Toa Baja can increase its resilience by enhancing preparation and emergency response capabilities. The municipality should work toward implementing the 2018 Operational Emergency Plan to prepare for addressing the challenges in the hours leading up to an extreme event or disaster, during the event, and in the immediate aftermath.
- *Municipal resilience liaison:* The panel recommends designating a government resilience liaison to build resilience and coordinate all municipal resilience-related efforts. The liaison would be able to pursue funding sources and other resources while working with key government and local stakeholders to implement projects, like the Río de la Plata project. This position would be tasked with resilience thought leadership for the *municipio* and develop a strategy to help identify and address challenges and capability issues, while pursuing and implementing projects and programs with maximum community co-benefits.



Advance Economic Development

ONE OF THE BIGGEST CASUALTIES of Hurricanes Irma and Maria was the general economy. Such effects were amplified for local economies, which were already resource-constrained. Facing major challenges from an 11-year economic depression, the commonwealth's economy was further depressed by the combination of physical damage to industrial and commercial facilities, long-term loss of power and water, damage to transportation infrastructure, and the impact on the local customer base. Several businesses in Toa Baja closed or reduced operations, resulting in the substantial loss of jobs and an increase in the unemployment rate.

A decreasing population reduced economic activity, and a lack of cross-neighborhood social cohesion has led to a sense of reduced security and safety. This situation has also increased stress levels and fear and reduced confidence in infrastructure, government, and other institutions. Physical, social, and economic impacts of the 2017 hurricane season led many to abandon low, flood-prone areas and the commonwealth overall.

For example, in 2016, the *municipio* of Toa Baja was home to 80,207 residents according to the 2016 American Community Survey, although as did the rest of Puerto Rico, Toa Baja suffered a population decline between 2010 and 2016,

estimated at 7,200 residents. This decline was especially noticeable among working-age people (ages 25–54 years), who made up 30 percent of this decrease. Economic conditions and natural events have led to a further loss in the working class and low income. In Toa Baja, 34.8 percent of families in the *municipio* are classified as low income, including 46.9 percent of children (2012–2016 American Community Survey Five-Year Estimates).

Despite these challenges, Toa Baja has several assets that can be leveraged to advance economic development within the *municipio* and better ensure long-term economic resilience.

Opportunities to help attract investment for future development projects and strategies to implement funds to rebuild businesses and homes are outlined in the following sections.

Leveraging Locational Advantages and Assets

Located on the northern coast, Toa Baja shares its metropolitan-area status with San Juan, Bayamón, Guaynabo, Cataño, Carolina, and Trujillo Alto. The *municipio* of Toa Baja is located in the western San Juan metro area, between the resort and residential area of Dorado and the industrial cities of Cataño and Bayamón. Toa Baja has a total land area of 23.24 square miles and is 25.2 miles from the commonwealth capital of San Juan. Toa Baja's proximity to San Juan and the San Juan Bay provides a huge opportunity for further development. With a very well connected highway system, the *municipio* of Toa Baja has huge locational advantages because it is within a 15-minute drive from the capital city and an hour from Ponce, the second-largest city, which is located on the south coast of Puerto Rico.

Several characteristics of Toa Baja present economic advantages and can be leveraged to help the community improve its economic resilience and vitality. These underused opportunities and assets include the following:

- **Coastal location:** Toa Baja can leverage its coastal location with beautiful seaside views and parks, particularly the bay of Ensenada de Boca Vieja. This area is largely untouched and connects the beach with recreational locations.
- **Proximity to high-opportunity areas:** Toa Baja is located between high-opportunity areas, San Juan and Dorado. Toa Baja can provide more safe housing and placemaking to attract residents who work in surrounding areas.
- **Freeway network:** This is an excellent asset that connects people and goods to surrounding municipalities and cities. Toa Baja can provide improved transportation and mobility options, like bus transit, to enhance connectivity.
- **Workforce population:** Toa Baja can leverage its workforce-ready population with technical training and education opportunities. Job opportunities must be strengthened and diversified to be more resilient to extreme events and general economic cycles.
- **Energy infrastructure:** Toa Baja has relatively reliable energy infrastructure compared with other Puerto Rican municipalities. For example, during Maria, utilities came back online quicker than in other areas. Expanding and leveraging this infrastructure can provide businesses

and homes with a dependable energy source during and after disasters. PREPA's plan to improve the code and resilience of the structures above ground and expand the system below ground presents an opportunity for the municipality to be a regionally attractive location to do business.

Recreation, Tourism, and Historic Preservation

Within the *municipio* of Toa Baja, the various rivers, canals, and old irrigation channels are assets that present a potential for recreation. These waterways and their natural edges can be established as a restorative greenway system with recreational trails that connect the various areas to the waterfront. This recreational network of assets also represents an educational opportunity to engage the community.

Toa Baja has opportunities to expand upon existing natural features that should be explored for investments in recreational activities that may cost-effectively support economic development.

Isla de Cabras to the east and Punta Salinas to the west, and the local attraction Ensenada de Boca Vieja are all underused assets that are preserved natural space. These two points linked with the beach along the Ensenada have huge potential for recreation. Its extraordinary location proximate to San Juan and San Juan Bay provides opportunities for further recreational development well connected by highway to the San Juan region. Punta Salinas has a variety of ecosystems, including mangroves and an extensive sand beach facing Bahia de Toa.

Isla de Cabras is a valuable asset with breathtaking views of the iconic San Felipe del Morro fort and the surrounding San Juan proper. This is a very well-known and much-loved area, with tremendous meaning to the local community, but has been neglected in recent decades. The panel recommends restoring this area, which could be refurbished to its place in the memory of the citizens of San Juan with minimal investment.

Restoring Isla de Cabras has the opportunity to build partnerships with and leverage proximity to the Bacardi distillery, which is a huge tourist attraction and can draw additional visitation for Toa Baja. Existing piers on the east side have the capacity to be used for water-taxi connections to San Juan proper and the nearby touristic Bacardi factory with its cruise ship tour cycle. Historic structures dating to the Spanish colonial era on the islet include Fortín San Juan de la Cruz and the ruins of the Antigua Leprocomio, which provide other great



Above: These images from Isla de Cabras illustrate the road connection from the Palo Seco barrio that divides the San Juan Bay to the east and the Atlantic Ocean, and also show the view to the Old San Juan area.

Above: The Punta Salinas coastal forest and public beach in Toa Baja.

resources to leverage visits to Isla de Cabras and should be included in the revitalization program.

Attention to the minor restoration of the beach, the existing damaged boat launch ramp, and the damaged beach pavilions could fulfill the large potential to support renewed beach activities in this scenic spot.

The historic Barrio Palo Seco was once known as the “Seafood Capital of Puerto Rico” with countless seaside restaurants at the entry to Isla de Cabras. Palo Seco has become blighted with Maria leveling the last blow to its

economic viability. However, with the potential to engage in a comprehensive revitalization program, this area could return to its previous economic strength.

The Ensenada de Boca Vieja waterfront beach has potential for restoration, which in turn would create multiple opportunities for outdoor recreational activities. Using both parks of Isla de Cabras and Punta Salinas as launching points, Ensenada de Boca Vieja has huge potential for aquatic sports, including kayaking, paddle boards, and Stingray catamaran sailing. The existing Avenida El Caño or hiker and biker trail that follows the adjacent



The Palo Seco barrio of Toa Baja with a view to Old San Juan.

avenue has various entry points to the beach while respecting the environmental sensitivity of the natural ecosystem and dunes. The panel recommends that efforts to stabilize and expand beach sands should be a priority for Toa Baja.

In an effort to enhance recreation opportunities throughout the *municipio* of Toa Baja, consideration should be given to multiple projects throughout the region, such as bringing back recreational programming on Levittown Lake. Strengthen recreation along the river edges through partnerships with neighboring *municipios* Cataño and Bayamón to improve the

linear park along Río Hondo and Río Bayamón and connect to a new Ensenada Boca Vieja pathway. Toa Baja should embrace a restorative greenway system with trail and other recreational uses that complement the recommendation to combine natural systems with the Río de la Plata project.

Finally, the legacy, and heart and soul of the community of Toa Baja reside in its historic Pueblo, which has been particularly challenged by extreme events and flooding because of its proximity to the Río de la Plata. Nevertheless, enough significant community support to retain and preserve the Pueblo exists, and even to override the dangers present until the river flood mitigation work is completed.

This intact town with its central plaza is important to the image and ceremonial functioning of Toa Baja and the place of its predominant cultural heritage. For these reasons, a program should be developed to retain some cultural or governmental programs in the municipal building on the square, as well as devote some resources to beautification measures. Longtime residents will continue to live and improve structures in the Pueblo that their families have lived in for generations, and some infill development may happen here as well on its own, even if ill-advised because of current flood danger. The panel believes abandoning the municipal old town Pueblo would not be prudent and the *municipio* should take steps to mitigate the problems caused by the area's proximity to the river.

Job Creation and Small Businesses

Since recovery efforts started, Puerto Rico has general plans to develop and implement new and innovative economic incentives to attract investment. These plans include targeted infrastructure investments that can produce maximum “spin-off” values for the economy, as well as those that can reduce the cost of establishing operations and producing jobs on the island.

As Toa Baja moves forward with natural drainage resilience solutions on public and private property, many jobs will be created to support the construction and maintenance of these green stormwater infrastructure facilities. The following is an overview of the panel's recommendations related to job creation and small business support in Toa Baja.

Small Business Support

Small businesses in Toa Baja have been particularly affected by the inability to open or reopen because of structural damage



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Central plaza of Toa Baja Pueblo.

and loss of utilities and other resources. As many as 50 percent of all small and medium-sized businesses are still either unable to open or reopen or are operating at significantly reduced capacity. With a limited ability to remain viable after a prolonged period of closure, this will have a lasting impact on both economic activity and the associated labor force in Toa Baja.

An important indicator of business impacts is changes in the low-cost disaster loans available to qualified businesses and their services through the U.S. Small Business Administration (SBA). Small business loans are critical to providing low- or no-cost capital to small and medium-sized businesses looking to reestablish operations in Toa Baja and will be a key component of this effort, given the duration and severity of business closures across the region. Although statistics are known only for the businesses that applied, anecdotal signs indicate many potential applicants fear applying for loans they cannot repay, thus leading many to walk away from their small businesses. Since the Puerto Rico Department of Labor reopened its doors October 6, 2017, applications for unemployment benefits stemming from the hurricane have significantly risen and are expected to keep growing.

The panel recommends Toa Baja consider providing grants to storm-impacted businesses for working capital, inventory losses, equipment and fixture replacement costs, storm repair, mitigation projects, and surety bonding that would support the recovery of small businesses. This grant initiative would allow businesses to reestablish operations, rebuild, recover, and grow. The government of Puerto Rico has two new CDBG-DR programs to assist businesses in Puerto Rico: the first is a Small Business Grant of up to \$50,000 and the second is for revolving loans (line of credit) for construction and commerce up to \$950,000. The available funds will be used to help existing small businesses, new ones, or those that are restarting operations, which suffered damages or interruptions from Hurricanes Irma and Maria, with limited access to critical capital to recover, grow their businesses, and preserve and create jobs for Puerto Rico.

In addition, a small business mentoring program might improve existing small business practices by providing training on improved accounting, fiscal management, marketing, and disaster planning. Providing much needed financial and network assistance to help storm-impacted businesses stay open will

also help communities recover and continue to have access to goods and services.

These efforts should be coordinated with existing SBA offerings both locally and federally. For example, Toa Baja should consider formalizing and enlisting the services of SCORE, a 501(c)(3) nonprofit organization that provides free business mentoring services to prospective and established small business owners in the United States. More than 10,000 volunteers who are active and retired business executives and entrepreneurs provide these services. In addition to mentoring, SCORE offers free and low-cost educational workshops each year, both online and in person. As an SBA resource partner, SCORE operates out of 300 U.S. chapters, including SCORE Mentors San Juan Metro.

Workforce Development

Workforce development programs must be developed and implemented to provide residents with the skills and experience needed to fill jobs in support of recovery. Workforce investment can capitalize on longer-term employment opportunities in growth sectors.

The economic history of Toa Baja is built upon agriculture and manufacturing. Toa Baja's pre-1900s economy relied heavily on agriculture, particularly sugar cane and cattle. After the 1950s, manufacturing started replacing agriculture as the main economic driver. Currently, the industrial sector continues to be one of the most important economic growth factors in the region. Some of the products manufactured in Toa Baja are metal, plastic, concrete, textiles, electrical and electronic machinery, and rum.

Current population characteristics and workforce demographics could support initiatives to grow both old and new safe forms of light manufacturing, including but not limited to assembly/reassembly operations, consumer electronics, or clothing manufacturing. Through education and job training, a foundation for more advanced manufacturing technologies should be considered because Toa Baja is home to a number of technical and trade schools.

The municipal government should pursue workforce training or job creation programs through HUD to provide future financial stability and to match the unmet needs of the current market.

As Toa Baja moves forward with natural drainage resilience solutions on public and private property, job training should be conducted to support the construction and maintenance of these green stormwater infrastructure facilities.

Role of Land Use, Real Estate, and Housing

Economic development is always connected to land use and zoning plans. Because of the problems with flooding, the land use restrictions in large parts of Toa Baja are extensive. Considerations for redevelopment and new development are needed to meet the most significant challenge that faces the municipality of Toa Baja: the lack of housing to meet its current demands.

Land Use

According to FEMA analyses, Toa Baja has the greatest need for housing among Puerto Rico's *municipios*. According to the Population and Housing Census from 2010 to 2016, only 103 residential units were built. The lack of new residential product was a result of two principal factors: first, the economic downturn of the island, and second, the proportion of residences with flooding concerns on their properties. These factors led to greater population loss.

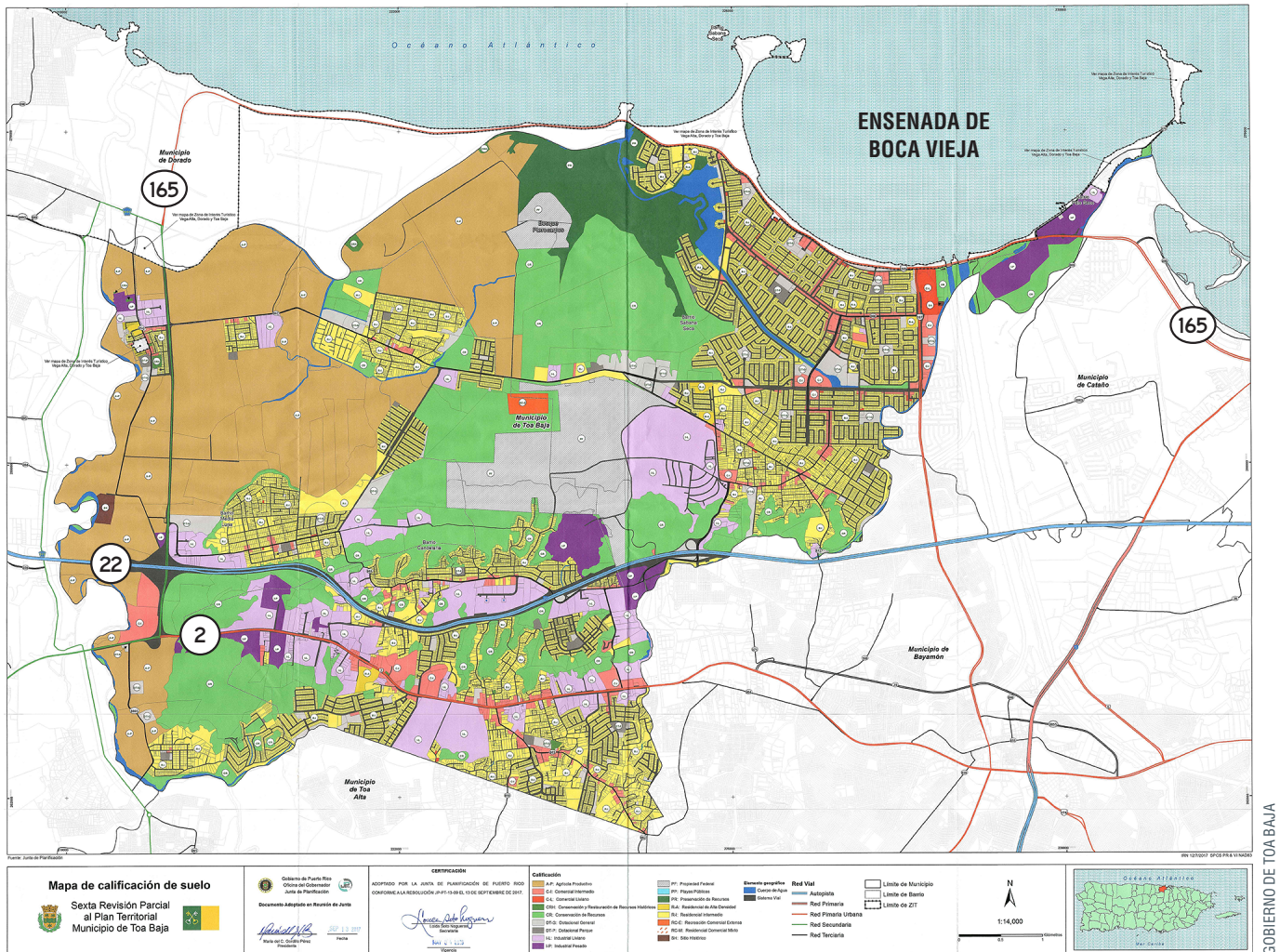
Before the 2017 hurricane season, Toa Baja experienced a housing decline, as seen from 2010 to 2016 when more than 2,100 units changed from being classified as occupied to vacant. In 2016, of Toa Baja's 34,592 housing units, 28,261 were occupied and 6,331 vacant. After the 2017 hurricane season, Toa Baja has well over 6,331 units that are vacant and require reconstruction. The demand generated from those who were displaced by Hurricane Maria is estimated at 4,000 to 6,000 units. Much of this demand is from senior citizens and people who were living in informal housing that was structurally less prepared to withstand the brunt of the storm.

Funding Opportunities for Housing

Through the Puerto Rico Disaster Recovery Action Plan's First and Second Allocation, CDBG-DR funding will be available to ameliorate the housing crisis being faced in Toa Baja and throughout Puerto Rico. Administered by the Puerto Rico Department of Housing (PRDOH), also known as Vivienda, the funds from this nearly \$20 billion program will begin to address housing needs as early as the third quarter of 2019. It is critical that Toa Baja and its affected citizens are prepared to apply for, and take advantage of, this funding.

The primary short-term opportunities for Toa Baja to secure funding for housing are as follows:

1. Chief among the 24 programs eligible for CDBG-DR funding is the Home Repair, Reconstruction, or Relocation Program. It will allocate \$2.2 billion directly to



Existing government classification of land use in Toa Baja.

homeowners in hazard zones (defined as areas situated in the floodplain, floodway, or areas vulnerable to landslide) who have confirmed damage to property and qualify as low or moderate income, among other criteria, with a priority given to the elderly population. Funding will not be available for reconstruction if the home is located in a floodplain. Those located in the floodplain who have substantial damage will be eligible for a \$150,000 voucher toward relocation to a new home outside the floodplain. If they are not located in a flood zone, they will be eligible for \$60,000 to repair the home on the existing site.

This program incentivizing relocation will be a catalyst toward the eventual vacation of vulnerable flood-prone areas and a significant step toward the realization of a future land use map that fosters resiliency and prioritizes safety and equity.

2. Municipalities will be able to receive CDBG-DR funds through the \$55 million Whole Community Resilience Planning Program (maximum award \$500,000) to conduct planning activities, including the execution of comprehensive plans and future land use plans. The selection criteria for this funding will become available in the first quarter of 2019. Municipalities that are considered high-risk communities will be qualified to receive funding.
3. Municipalities will be eligible for CDBG-DR funds to facilitate the hiring of staff at the municipality level who can lead the efforts to leverage funds from PRDOH.

The CDBG-DR program budget outlines how funds will be spent. As the grantee, PRDOH will comply with the requirement that not less than 70 percent of the aggregate funds be used to “support activities benefitting low and moderate-income

persons” through its housing. The majority of the housing program activities budget supports single-family housing through Home Repair, Reconstruction, or Relocation Program funding. This program accounts for \$775,570,050 of the \$1,011,570,050 total housing budget.

HUD has established national objectives for CDBG-DR funding in support of the following:

- Benefiting low- and moderate-income persons, which are defined as households that do not exceed 80 percent of the median income for their area;
- Aiding in the prevention or elimination of slums or blight; and
- Meeting a need having particular urgency.

The CDBG-DR funds for housing represent a huge opportunity to rebuild. National priorities for these funds have considerations for minimizing displacement and affirmatively promote housing choice for projects resulting in the implementation of funds.

Overall, the HUD-approved action plan for Puerto Rico prioritizes moving families out of harm’s way. PRDOH as grantee will apply “elevation standards for new construction, repair of substantially damaged structures, or substantial improvements to residential structures in flood hazard areas, such that the lowest floor is at least 2 feet about the 1 percent annual floodplain elevation,” as outlined in the *Federal Register*.

Demand for roughly 6,000 units of housing is estimated to exist in Toa Baja today. This is partly to meet the needs of residents already in place in Toa Baja, but also to accommodate desires to attract new residents. Because of diverse needs, a variety of housing types should be considered to address several different constituencies and to take full advantage of all opportunities presented in the delivery of CDBG-DR funding programs.

The introduction of some different housing types for this area, such as attached and multifamily, might help achieve a more naturally affordable product, both for sale and for rent. The need to consider producing more rental housing options in Toa Baja can be supported by the fact that rates of rental units have been growing consistently at 3.5 percent per year over recent years. These types are also appropriate for achieving more efficiencies and higher densities, particularly necessary for infill development.

With respect to multifamily housing product, the arrival of these units will now be more viable because of the arrival of new financing mechanisms introduced through CDBG-DR programs, which should stimulate a significant new market for rental units. With the potential of increased employment of 4 percent and 9 percent LIHTC, the multifamily building type can become more present in the Toa Baja housing landscape.

For these reasons, the panel has identified the following housing types as appropriate to meet the varied demands anticipated:

- *Single-family housing:* Single-family houses constitute at least half the demand for new housing, totaling nearly 3,000 units. This is the dominant form of housing produced throughout Puerto Rico, where homeownership hovers around a striking 70 percent, and will be in high demand if delivered at the \$150,000 price of CDBG-DR vouchers available for new or replacement homes.
- *Attached housing:* As a result of economies achieved in construction and building areas, attached housing product, such as townhomes, courtyard, or compound typologies, can meet the need to produce more affordable housing product for sale or rent. At least 1,000 units of this type of housing could be absorbed for sale in Toa Baja and could also be purchased using CDBG-DR vouchers. This type of housing is appropriate and easily used in urban infill conditions positioned to achieve higher densities, making them even more affordable to build.
- *Multifamily housing:* With the introduction of new 4 percent tax credit financing through CDBG-DR programs, more affordable rental-housing production will now be much more viable and attractive to develop. Though customarily not a typical housing product, particularly in Toa Baja, various multifamily housing typologies associated with this type of financing can meet the economic and diverse social needs of a new, emerging demographic of renter. This is the most efficient and appropriate housing type for infill development, which achieves the highest densities, and the panel estimates that demand may exist in Toa Baja for as many as 2,000 rental housing units. This building type can accommodate a for-sale product in the form of condominiums; however, its use may now be most important in meeting the rental needs of a diverse demographic.

RENAISSANCE SQUARE, SAN JUAN

McCormack Baron Salazar Inc. and the Puerto Rico Department of Housing have officially opened Renaissance Square, a new mixed-income apartment community located in the Hato Rey barrio of San Juan, Puerto Rico. The new community has 140 rental apartment homes with one-, two-, and three-bedroom units affordable to families with a range of incomes; of the 140 units, 60 percent are reserved for very-low-income families, 20 percent are reserved for workforce, and 20 percent have market-rate rents.

Renaissance Square represents a sea change in the design and management of affordable housing in Puerto Rico. Located on the former Las Gladiolas public housing site, the new mixed-income, mixed-use community is just steps from the Golden Mile Financial District in Hato Rey and features market-rate amenities, high-quality finishes, and Spanish and classical architectural elements.

Renaissance Square was designed to be resilient: the buildings are built to withstand a direct hit by a Category 4 storm through hurricane-rated doors, windows, roofs, and structures. This resilience was tested during construction of the community, when Hurricane Maria hit San Juan. As a result of the design, delays in construction were minimal and the community was ready to receive families soon after the hurricane.

In addition to the resilient design, the new community sets a new standard for community design in Puerto Rico. It connects to the larger neighborhood, providing residents access to job centers, transportation, schools, and recreation. It also includes state-of-the-art site amenities with on-site management space, as well as a community space with a fitness room and a business center for residents. Renaissance Square also incorporates commercial space to be occupied by a Centro Ahorros Tienda.

A public/private partnership between the Department of Housing, McCormack Baron Salazar, Citi Community Development, and Hunt Capital Partners, the project used public dollars to leverage private equity, resulting in a \$35.5 million investment in the transformation of a formerly vacant public housing site.



Renaissance Square site in San Juan.

- *Affordable housing:* Affordable formally built housing in the Toa Baja community has always been in short supply. As the community encourages the development of new, safe housing options to meet demand, the panel recommends also supporting the development of affordable housing options that are available in the short term and can aid in recovery as well as long-term resilience efforts. Housing should be able to support a range of family types. The municipality can apply for HUD HOME program funds to help expand the supply of affordable housing by building, buying, or rehabilitating through rental assistance to low-income families.

Toa Baja's Existing Neighborhoods, Infill Housing, and Priority Investments

As Toa Baja considers how to plan for its future, it is evident that additional housing units will need to be developed in areas of low vulnerability. Given the March 2018 flood maps issued by the Planning Department of Puerto Rico, only limited areas in the municipality of Toa Baja can be targeted for development.

Toa Baja can consider a strategy of rehabilitation of current housing units in appropriate sites. Maria-impacted houses that occupy land in communities that are still active and viable may qualify for up to \$60,000 in rehabilitation funds through a CDBG-DR initiative. This may be a cost-effective and desirable option for some families to pursue on appropriate sites that are not prone to extensive flooding risks.

Potential to harvest and reuse materials from the countless abandoned houses in the area also exists on these sites. Recycling and reuse of materials during the rehabilitation process should be encouraged. This practice that turns “waste into wealth” has great co-benefits in a community promoting sustainability and equity.

As prioritized in the HUD Action Plan for Puerto Rico, the focus is on moving people out of harm's way. The existing smaller barrios are rather isolated and unfortunately positioned within the municipality. On the north and west side of Toa Baja, all neighborhoods have a greater than 1 percent annual chance of flooding. Residents who are also in the workforce find themselves in a very vulnerable situation that causes socioeconomic problems. People with higher income and high standards of living have already moved away. The groups still living here are the ones that have no real opportunity to move.

Although the panel believes the flooding risk will be reduced after the construction of the Río de la Plata Flood Risk Reduction Project, too many communities will lose lives and

goods when the next flooding hits the plain. The following recommendations should be considered in the light of offering alternatives to people who do not want to suffer damage again. The municipality would have to take the first step in meeting with residents with this uncertain future with the goal of encouraging sensitive urbanization and relocation from the floodplain. A joint initiative should be sought with strong participation of neighborhoods where people live now.

Relocation from the floodplain means passing through stages of sensitive negotiation with the stakeholders and community leaders and coming up with an offer that is reliable and fair. That means a social and economic deal to offer relocation to higher ground to parts of the community, for instance near the area of Los Magos. Another possibility could be to densify parts of Levittown. That is not easy, but near the Mansion del Mar and in areas with abandoned homes this may be considered. Vouchers could be deployed as a measure to aid in this relocation process.

In an effort to support infill housing and increased density, the case can be made to replace substandard units or vacant lots in core areas. However, new housing should not be encouraged in any flood-prone areas or neighborhoods until mitigation measures have been successfully completed. Where flood risks are lower than 1 percent annually, infill housing production can reinforce and revitalize existing neighborhoods while efficiently using existing infrastructure such as streets, schools, and services. Opportunities for infill housing development exist throughout Toa Baja, but particularly in highly intact urban areas such as the historic Pueblo, Levittown, and fronting the coast on Highway 165, once flooding issues have been addressed.

Planned Growth

Another important consideration is that Toa Baja is uniquely positioned on the edge of the San Juan metropolitan area. As a result, the municipality is highly subject to suburban sprawl and a disorganized and disparate development paradigm. Toa Baja has the opportunity to get ahead of this trend by carefully planning its future growth, which can be achieved by launching strategic locational planning efforts around mixed-use nodes. Although the panel recognizes the more immediate need to provide recovery housing may not be met by these longer-range strategies, the ability and need to provide affordable housing in these new-built communities cannot be underestimated.

An additional consideration pertaining to housing types discussed here is that all may be considered appropriate for use in master-planned developments. Similarly, these types

could also be effective in more socially driven planning regimes, such as residential co-ops and community land trust models, something that may be particularly relevant to Toa Baja in the near future to address more equitable development results.

Overall, Toa Baja's partnerships should prioritize projects that meet the following needs:

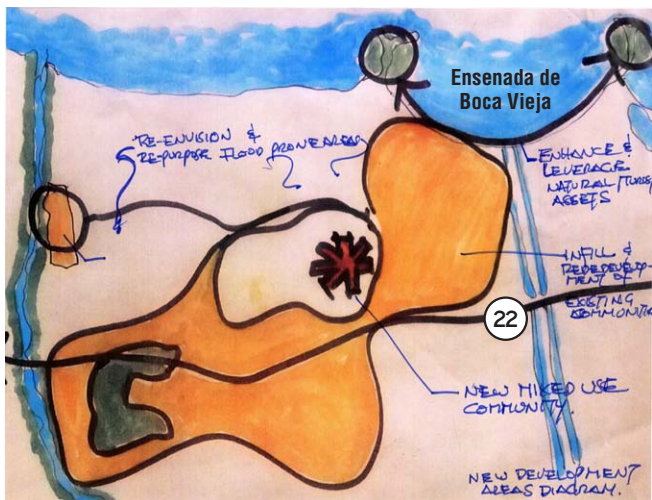
- Have high returns on investment in terms of economic development potential, job creation, and future property taxes;
- Catalyze additional investment nearby, encouraging the type of development and land use that would benefit Toa Baja in terms of activity, potential for tourism, and use of existing infrastructure; and
- Have spillover benefits to health, streetscape, and other *municipio* aspects.

Optimally, when considering locations to create the mixed-use nodes, the municipality should consider accommodating its long-term growth simultaneously with short-term needs, identifying property that meets the following criteria:

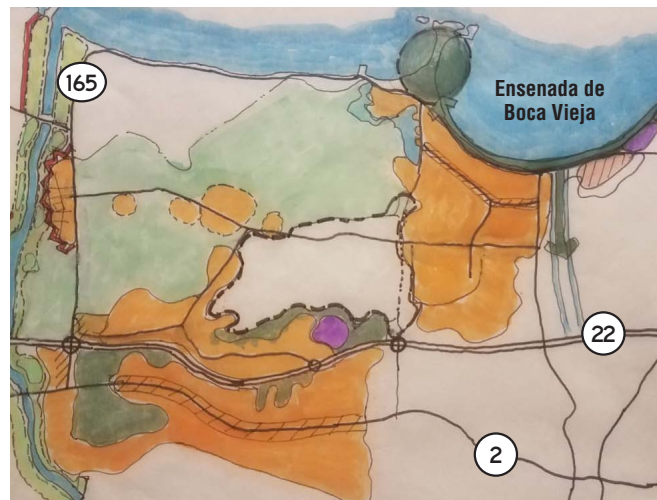
- Is located well above current (and future) floodplain levels;
- Consists of large contiguous tracts that have minimal encumbrances;
- Is accessible to highways and public transit;
- Preferably has one or few current owners; and
- Is flat or has limited topography.

Although not charged with identifying specific property, the panel recognizes that the former naval base in Sabana Seca meets these criteria (if considered after completion of the Río de la Plata Flood Risk Reduction Project) and could become optimal in meeting the current and long-term needs of Toa Baja. In addition, given the scale of this property (1,500 acres), it could be developed into a mixed-use community that provides exemplary sustainable practices while meeting the existing and future housing needs of the community. In addition, retail, medical offices, and institutional uses such as health, education, and cultural amenities should be considered to establish a broad base of community amenities all in the same place.

CDBG-DR funds may be available to launch planning efforts focused on this project through the Economic Investment Portfolio for Growth program (\$800 million). The municipality should position itself to qualify for such funding. The planned



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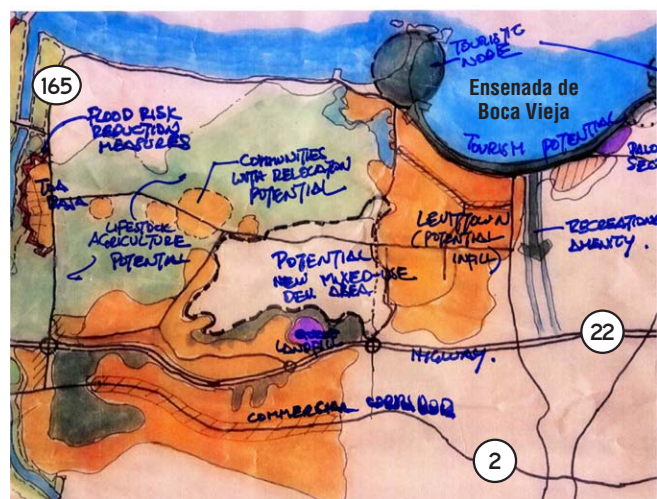
This set of concept diagrams depicts the panel's development concepts for a new mixed-use community. Above: A diagrammatic concept highlighting the potential to enhance and leverage natural assets at Ensenada de Boca Vieja, identifying boundaries for a new community near Route 22. Above right: A diagrammatic iteration refining the opportunity site for mixed use. Right: A schematic rendering of leveraged assets, including a tourism node around Ensenada de Boca Vieja, located near Route 22; the potential to concentrate commercial development along the Route 2 corridor; and water mitigation planning surrounding communities nearest to Río de la Plata.

community could house a new state-of-the-art government services center built to the highest standards of resilience and sustainability. This center would be a secure base of operations for any future weather events as well. Located at the heart of this new community, the government services center would be a tremendous generator of employment, augment demand for services in the immediate area, and foster walkability within the new community.

Action Items: Economic Development

Key panel recommendations to advance economic development in Toa Baja include the following:

- **Leveraging locational advantages and assets:** Use Toa Baja's coastal location, proximity to high-opportunity areas, freeway network, workforce population, and energy infrastructure to improve its economic resilience and vitality.
- **Job creation and small business support:** Support storm-impacted business by providing grants and mentoring programs to improve best practices.



T. RODRIGUEZ/ULI

- **Workforce development:** Pursue workforce training and job creation programs through HUD to stabilize unmet needs of the current market.
- **Land use:** Consider single-family, multifamily, and affordable housing models to meet the varied and expected housing demands.
- **Existing neighborhood infill:** Consider sensitive relocation efforts from the floodplain and replacement of vacant lots and substandard units.
- **Planned growth:** Consider opportunities to plan for housing relocation and future growth needs by launching strategic locational planning efforts. Study the feasibility of meeting land use, economic development, and housing needs at the naval base site in Sabana Seca.
- **Commercial activity:** Consider actively marketing, attracting, and locating industry and commercial activity along the Route 22 and Route 2 corridors.



Conclusion

THE PANEL HAS FRAMED ITS RECOVERY RECOMMENDATIONS through the lens of rooting Toa Baja in social, physical, and economic strategies as pillars of resilience. The outlined approaches for consideration are highly dependent on the distribution of CDBG-DR funds being allocated to the commonwealth through HUD and the delivery of the Río de la Plata Flood Risk Reduction Project by the DNR and USACE. CDBG-DR funds are designated to “protect people, and property, rebuild families, strengthen communities, generate long-term investment in social capital, and spur economic development.” Within the Puerto Rico Disaster Recovery Plan, programs that qualify for funds are categorized by housing, planning economic recovery, and infrastructure. CDBG-DR distribution models are managed at the grantee level, and the governor has designated the Puerto Rico Department of Housing as the grantee for purposes of administering the program and executing grant agreements with HUD.

The Action Plan designates PRDOH as the grantee and includes partners and subrecipients as intermediaries between the grantee and beneficiaries. Partners may include government agencies or organizations. Partner entities are about to designate subrecipients to undertake some or all aspects of program management to undertake certain eligible CDBG activities. Subrecipient means a public or private nonprofit agency, authority or organization, or an authorized for-profit entity.

The panel suggests that Toa Baja establish an inclusive and collaborative implementation task force composed of representatives from all pueblos, urbanizations, retail businesses, manufacturing, schools, religious organizations, chambers of commerce, agriculture, real estate, and all other stakeholders. To ensure that beneficiaries, that is, the persons to whom assistance, services, or benefits are ultimately provided, are represented and receive the maximum aid, the task force should undertake the following:

- Track progress against Toa Baja action items as outlined in its recovery plan and in this report.
- Continuously advocate for and track the implementation of the USACE/DRNA flood risk reduction project.
- Continuously advocate for and track the implementation of the hardening and enhancements to the electrical grid by PREPA.
- Continuously advocate for and track the implementation of activities funded by CDBG-DR grants.
- Continuously advocate for and track the implementation of activities funded by the FEMA–Hazard Mitigation Grant.
- Continuously advocate for and track other commonwealth agency implementation activities.

Achieving Toa Baja's vision for its future as a cooperative, cohesive, democratic, fair, sustainable, inclusive, healthy, and resilient place will require significant work to ensure the CDBG-DR funds are used to ensure maximum physical, social, and economic resilience. With dedication and strategic hard work, Toa Baja can better prepare for extreme weather and enhance its economic drivers to sustain the *municipio's* stake as a place that calls for *orgullo llanero*.

Appendix: Action Items

Physical, Social, and Economic Resilience Recommendations

	Recommendation	Key players	Funding source	Time frame
Physical resilience	Integrate nature-based design and recreational opportunities into the Río de la Plata Flood Risk Reduction Project	TB Municipality, DRNA and USACE, FEMA	Others	Ongoing until built
	Design new streets based on the complete streets framework	TB Municipality, PR Planning Board	TB Municipality	2–5 years
	Encourage the use of natural drainage systems on private property, redevelopment, and new developments	PR Planning Board, Department of Housing, and other CDBG-DR implementation agencies	TB Municipality	2–5 years
	Advocate for policy that requires all development or redevelopment in the floodplain to be elevated by at least 12 inches above the 1 percent chance inundation level and no adverse impact rules for development	TB Municipality, PR Planning Board, Department of Housing	TB Municipality	2–5 years
	Advocate for additional resources for land development permitting enforcement	TB Municipality, PR Planning Board	TB Municipality and other municipal partners	2–5 years
	Conduct municipal planning using the \$20,000 CDBG-DR planning grant	TB Municipality	CDBG-DR funds	0–12 months
	Use CDBG-DR funding to support a strategy to harden critical utilities	TB Municipality, PREPA, Department of Housing	CDBG-DR funds	2–5 years
	Educate citizens about vouchers for low- to moderate-income homeowners to install gas or solar power appliances	TB Municipality, Department of Housing, residents	CDBG-DR funds	0–12 months

Social resilience	Prioritize consensus building and civic engagement activities and strive to become a regional model for other municipalities	Residents, TB Municipality	CDBG-DR Whole Community Resilience Planning	12 months
	Enhance preparations and emergency response capabilities by implementing the 2018 Operational Emergency Plan	Residents, TB Municipality	CDBG-DR Whole Community Resilience Planning	12 months
	Designate a Municipal Resilience Liaison to coordinate municipal resilience-related efforts, pursue funding sources and other resources, and work with key government and local stakeholders to implement projects	TB Municipality	CDBG-DR Whole Community Resilience Planning	12 months
	Establish an inclusive implementation task force composed of representatives from all urbanizations and sectors to track progress and advocate for needs	Residents, TB Municipality	CDBG-DR Whole Community Resilience Planning	12 months

(continued next page)

	Recommendation	Key players	Funding source	Time frame
Economic resilience	Promote and leverage coastal location, proximity to high-opportunity areas, freeway network, workforce population, and energy infrastructure to attract developers and contractors	TB Municipality	Future funding form CDBG-DR gap and Low-Income Housing Tax Credits	0–24 months
	Support storm-impacted businesses by providing grants and mentorship programs	TB Municipality	CDBG-DR Small Business Financing	0–12 months
	Pursue workforce training and job creation programs through HUD to stabilize unmet needs of the current market	TB Municipality, Department of Housing	CDBG-DR Small Business Financing	
	Review single-family, multifamily, and affordable housing models to meet the varied housing demands	TB Municipality	Other	
	Consider sensitive relocation efforts from the floodplain and replacement of vacant lots and substandard units	Residents, TB Municipality	CDBG-DR Home Repair, Reconstruction, or Relocation program	0–12 months
	Identify locations for housing relocation and growth by launching a strategic locational planning effort, and study the feasibility of meeting residents' needs at the Sabana Seca site	Residents, TB Municipality	CDBG-DR Home Repair, Reconstruction, or Relocation program	0–12 months
	Provide assistance to homeowners lacking property title	Residents, TB Municipality	CDBG-DR Title Clearance Program	0–12 months
	Prepare residents to apply for home repair and relocation assistance	Residents, TB Municipality	CDBG-DR Home Repair, Reconstruction, or Relocation program	0–12 months

About the Panel

James (Jim) M. DeFrancia

Panel Chair
Steamboat Springs, Colorado

DeFrancia is a principal of Lowe Enterprises Inc., a national real estate development company engaged in residential, commercial, and resort development activities. He is also president of Weston Capital Corporation, an affiliated, privately held firm engaged in real estate asset management, consulting, and development on behalf of private investors, banks, government agencies, and insurance companies. Earlier, he held several positions with ITT Corp., including president of its Levitt homebuilding subsidiary in Puerto Rico and responsibility for the restructuring and sale of ITT/Levitt's international land assets. Before joining ITT, he held executive positions with an international investment group in Venezuela. Prior to his private-sector experience, DeFrancia served as an officer in the U.S. Navy.

Most recently, he has been engaged in hotel and resort development in the Rocky Mountain region, including new hotel projects in Aspen and Steamboat Springs. He also oversaw operations of hotel assets in Snowmass in his capacity as the receiver of some \$500 million in real estate assets there, appointed by the District Court of Colorado. He also served by British Court appointment as the receiver and manager of Shanghai Links Executive Community Inc., a British company holding land use rights in China, and was actively engaged in community development in Shanghai, including golf course development.

DeFrancia is a Life Trustee of the Urban Land Institute and a member of the ULI Resort Development Council. He is a past director of the National Association of Home Builders, former Virginia representative to the Southern Growth Policies Board, and former member of the Metropolitan Washington Airports Authority Board. He served as a member of the Defense Department's Marsh Panel and was appointed by the Secretary of Defense specifically to contribute residential development expertise in restructuring the housing systems of the Department of Defense. He also served as a member of the Housing Advisory Group to the Committee on Banking, Finance and Urban Affairs (U.S. House of Representatives) and has been a guest lecturer/panelist for the Urban Land Institute; the Bank Lending Institute; the Lincoln Institute of Land Policy; the

Graduate School of Design, Harvard University; George Mason University; and the George Washington University. He is fluent in Spanish and has lectured in that language.

He most recently served as an adviser to the Secretary of the Navy on maritime strategy in the Western Pacific, as well as U.S. Navy energy policy. He has also served as an adviser on growth and development policies to the governments of Bermuda, Mexico, the Netherlands, the Philippines, the United Kingdom, the United Arab Emirates (Dubai), and Saudi Arabia, as well as the Vatican. He has similarly advised several U.S. cities and the Port Authority of New York and New Jersey. In addition, he has been a contributing writer to publications on urban growth, transportation, and real estate development.

DeFrancia is a graduate of the U.S. Naval Academy with a BS in engineering and executive studies in business and finance at the University of Michigan and the Wharton School. He has also completed strategy, economics, and policy courses at the U.S. Naval War College. He is a member of the Atlantic Council and the U.S. Naval Institute.

Sarah Sieloff

Panel Vice Chair
Oakland, California

Sieloff is the executive director of the Center for Creative Land Recycling (CCLR or "see clear"). CCLR promotes the sustainable, equitable, and responsible reuse of underutilized and environmentally impacted properties by educating, advocating, assisting, and convening stakeholders to revitalize communities through land recycling.

CCLR works across the United States, including in Puerto Rico, and under Sieloff's leadership it has grown substantially since 2015. She has increased CCLR's annual fundraising, realigned its strategic direction, and established the organization's programs on the East Coast and in Puerto Rico. She also led the successful absorption of two East Coast nonprofits to expand CCLR's policy and advocacy work at the national level and spearheaded a national effort to protect catalytic U.S. EPA brownfields funding in 2017.

Before joining CCLR, Sieloff served as the Memphis Team Lead for the White House Council on Strong Cities, Strong Communities, where she led an interagency federal team that helped the city of Memphis better manage and leverage \$25 million in federal funding. Sieloff has a background in international development, speaks fluent Spanish, and is a Truman Scholar. She earned her master's in public affairs from Princeton University and her BA from Eckerd College, and previously served as a panelist and chair, respectively, for ULI Advisory Services panels in Georgetown, South Carolina, and Commerce City, Colorado.

Michael Bloom

Houston, Texas

Bloom directs the Sustainability Practice for R. G. Miller Engineers Inc., based in Houston, Texas. He plans and designs natural drainage systems that increase operating income, reduce detention requirements, increase developable land, and provide an anchor for natural amenities, such as trail systems, that improve health outcomes and social connectedness. He recently served on a Houston District Council Technical Assistance Panel for the city of Wharton, Texas, to help develop recommendations to enhance the West End Area, which was subject to recent repeated flooding. He also served as an expert contributor to and reviewer of the ULI report *Harvesting the Value of Water: Stormwater, Green Infrastructure, and Real Estate* (May 2017).

Bloom also provides resilience and sustainability consulting services. He plans and designs stormwater management and floodplain management systems, rainwater harvesting systems, water reuse systems, and water conservation programs. He develops and implements industrial and municipal stormwater pollution management programs.

He is the current chair of the Houston Chapter of the Environment & Water Resources Institute of the American Society of Civil Engineers and currently serves on the Public Policy Committee of the ULI Houston District Council and is a member of ULI's National Community Development Council (Black Flight). He serves as an appointed member of the Houston-Galveston Area Council's Bacteria Implementation Group, a stakeholder group working to improve bayou health in the region. Bloom is a member of the Steering Committee of the

Houston Land and Water Sustainability Forum, which focuses on the use of natural drainage systems in land development.

Bloom is the author of riparianhouston.com, a blog with various articles on drainage, land development, and sustainability.

A Registered Professional Engineer in Alabama, Arkansas, Louisiana, New Mexico, Oklahoma, Pennsylvania, Texas, and Virginia, Bloom is an Envision Sustainability Professional, a Certified Floodplain Manager, and a Board Certified Environmental Engineer. He holds a BS in mechanical engineering from Syracuse University (1989) and an MS in environmental engineering from Drexel University (1994).

Christopher Calott

Berkeley, California

Calott is an award-winning architect, urban designer, academic, and real estate developer. He is presently the Lalanne Chair in Real Estate Development, Architecture & Urbanism at UC Berkeley and the faculty director of a new Master of Real Estate Development + Design Program, which he founded in 2018. He is also co-chair of the Master of Urban Design Program, leading the discourse on contemporary practice and student thesis research projects. Before Berkeley, Calott was the director of the Master of Sustainable Real Estate Development Program at Tulane University, where he developed a curriculum in "regenerative development," working in post-Katrina New Orleans and throughout the United States.

His teaching and applied research have primarily focused on the value and agency that design can play in the creation of vibrant and more socially equitable urban places through a critical understanding of real estate development practices and their impact on social, economic, and urban form. Additionally, he has pursued significant research in the areas of urbanism, housing, and redevelopment through competitions, community-based projects, and published investigations tied to teaching appointments at numerous universities throughout the United States, Mexico, and Latin America. His longstanding work and research on informal urbanization patterns and social justice issues at the U.S.-Mexico borderlands culminated in *Frontera/*

Border: 7th Concurso Internacional Arquine, an international design competition and congress convened in Mexico City.

Formerly based in Albuquerque and Santa Fe, New Mexico, Calott was a principal of Calott + Gifford Architecture/Urban Design and founding partner of the real estate development firm Infill Solutions: Innovative Urban Design and Development. For well over a decade, his two firms worked together to create innovative mixed-use housing, dense infill developments, affordable housing, and vibrant public spaces working principally in cities throughout the American Southwest. Using regional urban building typologies in strikingly modern forms, Calott's architectural and real estate development achievements led *Fast Company* magazine to recognize him as "one of 50 brilliant urbanites helping to build the cities of America's future." His commitment to design excellence also transformed nonprofit affordable housing and publicly financed urban design projects, often working with urban and rural Native American populations, and traditional Hispanic communities.

Currently, Calott maintains an active design and real estate development practice based in Oakland, engaged with large redevelopment projects in the sweeping landscape of Silicon Valley. Working with enlightened investors dedicated to confronting the most challenging problems in the Bay Area, through innovative design he seeks real estate development solutions for mixed-income housing and equitable community redevelopment.

Calott holds a BA, honors, in urban theory and design from Brown University. He received a certificate in architecture from the Institute for Architecture and Urban Studies in New York, and his master of architecture degree from Princeton University. Calott was awarded a Loeb Fellowship at Harvard University's Graduate School of Design in 2011–2012.

Don Edwards

Washington, D.C.

Edwards is considered one of the most deft mediators and civic engagement designers working today in the field of land use and development by international, federal, regional,

state, and local planning, transportation, parks, and economic development agencies, corporations, universities, foundations, and community-based organizations. His work addresses the challenges of climate instability, urban development, economic prosperity, and social justice.

A 25-year District of Columbia resident, Edwards designed and facilitated many of its most complex development projects, including the Strategic Neighborhood Planning Initiative, the Anacostia Waterfront Transportation studies, D.C.'s Transit Alternatives Analysis, the citywide site evaluation and eventual master planning of the Nationals' Baseball Park site and neighborhood, the four-year-long assessment and revision of the District of Columbia's Comprehensive Plan and the assessment of the D.C. Zoning Code's technical and legal infrastructure as well as its revision. In 2012, he mediated Georgetown University's 2012 Campus Plan agreement, ending three decades of town-gown conflict.

Civic engagement projects of national significance that Edwards has designed and managed include the District's Anacostia Waterfront Initiative, the African Burial Ground National Monument in Lower Manhattan, the National Museum of African American History and Culture on the National Mall, and the Detroit Works Project. Edwards currently manages the civic engagement programs of D.C.'s \$360 million replacement of the 11th Street bridges and the H St/Benning Rd line of DC StreetCar.

As the executive director of the Panos Institute-Americas, he developed programs promoting environmental justice and sustainable development to nongovernmental organizations and environmental media throughout the United States, the Caribbean, and Latin America. That year, he also cofounded the U.S. Citizens Network for the U.N. Conference on Environment and Development. He subsequently represented the CitNet as a member of the U.S. delegation to the Earth Summit in Rio de Janeiro.

Edwards led U.S. civil society organizing for the UN International Conference on Population and Development (ICPD) and the 2nd U.N. Conference on Human Settlements (Habitat 2). At the same time, he served as chair of the Environmental Justice Working Group of the Sustainable Communities Task Force of the President's Council on

Sustainable Development. He served as a member of the Sustainability External Advisory Council of the Dow Chemical Company for 10 years. He helped grow the practice of deliberative democracy as a senior associate of AmericaSpeaks. He also serves on the boards of Casey Trees, Casey Trees Farm, and EcoDistricts. He is a member of the African Atlantic Research Team at Michigan State University.

Fernando Liaño Berjano

El Paso, Texas

Liaño joined the city of El Paso as sustainability coordinator after working as a consultant for the last decade in the fields of climate change, energy efficiency, and sustainability.

He has been involved in technical assistance projects in climate-change mitigation and adaptation, sustainability, and energy efficiency for public and private institutions in Latin America, the Caribbean, Europe, and Asia. He was also responsible for business development activities, enabling him to build effective communication and productive relationships between local authorities, academia, business leaders, and sales executives. The institutions he has worked for, and collaborated with, include the World Bank, the United Nations Development Programme, the Inter-American Development Bank, the European Bank for Reconstruction and Development, and the Development Bank of Latin America.

A native of Spain, Liaño holds a master's in agricultural engineering from the Universidad Politécnica de Madrid and is a Certified Energy Manager and Certified Measurement and Verification professional by the Association of Energy Engineers.

Trini Rodriguez

Alexandria, Virginia

Rodriguez is a principal at Parker Rodriguez Inc. She is a landscape architect and architect with a variety of experience ranging from building design to urban infill and large-scale urban design, landscape architecture, and master planning.

She has managed and designed award-winning master plans for projects throughout the United States and abroad. Her interdisciplinary expertise has served a broad spectrum of public agencies, institutions, private developers, and corporations.

She is fluent in Spanish, French, and English. Rodriguez was on the Master Plan Team for Disney's Celebration; Xerox's 2,250-acre Lansdowne Resort; the 2,400-unit Cameron Station, a Virginia military base reuse; the 2,500-unit Riderwood Village in Maryland, and scores of award-winning urban infill projects.

Tom Roth

Miami/Fort Lauderdale Area, Florida

Roth's 30 years of experience span the spectrum of commercial real estate. He has led the development and acquisition of over \$2 billion in commercial assets in the United States and abroad.

Since 2013 Roth has served as a founding principal of Grass River Property based in Miami. In this position, he has led the efforts on acquiring and redeveloping the iconic CocoWalk and Shops at Sunset mixed-use projects.

In his 10 years at Hines, his acquisitions and development portfolio included office, retail, and land properties in Chicago, South Florida, and Barcelona, Spain. As Hines' project officer in Miami, Roth acquired a full city block in Coral Gables, repositioned the existing office asset, and developed the highly successful mixed-use 2525 Ponce de Leon. Roth subsequently led the sale of 2525 for the then-highest price paid per square foot for a Florida office building. He also acquired about 1.5 million square feet of Miami-area office buildings for Hines value-add and core investors. For Hines in Barcelona, Roth led the development of Diagonal Mar Centre, a 3 million-square-foot urban retail development on the Mediterranean Sea.

Before Hines, Roth served as vice president of acquisitions at Walsh, Higgins & Company in Chicago, where he acquired 1,000+ acres for the company's business parks and urban developments. He also developed numerous build-to-suit projects; these included a highly technical 400,000-square-foot facility for the IRS in Detroit and a major hotel and conference

center at the University of Cincinnati. He has worked with several high-net-worth offshore buyers in acquiring a variety of single-tenant retail assets throughout the United States. He has been an integral part of numerous underwriting initiatives targeting large office buildings and multiasset portfolios across the United States.

A Chicago native, Roth has been a member of the Urban Land Institute since 1986 and is currently the chair of Mission Advancement for the ULI District Council in South Florida. He received a BA in economics and urban studies at the University of Michigan–Ann Arbor and received his MBA. from Northwestern University’s Kellogg Graduate School of Management.

Bob van der Zande

Amsterdam, Netherlands

Van der Zande is director residential markets for the Metropolitan Region Amsterdam, a booming region with 2.5 million inhabitants and strong economic and demographic growth. He set up the Amsterdam Investors office to facilitate emerging markets and connect with national and international investors to speed up housing production.

He is recent past chairman of the Urban Land Institute The Netherlands and global governing trustee of ULI. At Expo Real Munich and MIPIM Cannes, he is leading the Dutch Holland Metropole presentation and programs in a public/private collaboration of over 20 partners.

As a member of the executive board of the Watertorenberaad, a national Dutch council for innovation in city development, van der Zande is one of the drivers behind new development strategies.

He started his career as an urban planner and has worked in the field of city and community development since 1978. He has been on the board of directors in two city departments since 1994. He graduated as an urban designer at Delft University of Technology.

Kamilah Acebal-Acevedo

Intern
Miami, Florida

Acebal-Acevedo is currently a junior architect at FONS Design and Architecture LLC, a design-and-build firm in the heart of downtown Miami. At FONS, she is involved in the design process through extensive code research, consultant coordination, and overall project development. She graduated from the University of Miami in 2016 with a bachelor of architecture and a minor in Architectural Engineering. While at the University of Miami, Acebal-Acevedo worked closely with the nonprofit Friends of the Underline during the predesign phase of the 10-mile linear park that will surely become an urban landmark. She is fully bilingual in Spanish and English. Having been born in Puerto Rico and raised in Miami, she goes back to the island frequently and is grateful for the opportunity to assist in the post-Maria redevelopment efforts.

Jessica Boehland

The Kresge Foundation
Troy, Michigan

Boehland works as a senior program officer at The Kresge Foundation, which is committed to expanding opportunities in America’s cities. The Kresge Foundation’s Environment Program seeks to help cities build their resilience in the face of climate change, with work focused on climate-change mitigation, preparedness for the effects of climate change, and social equity. Boehland leads the team’s grantmaking and other activities related to energy. Before joining Kresge in 2008, she served as managing editor of *Environmental Building News* and editor of *GreenSource* magazine. Her writing has appeared in these and many other publications. In 2017, she was named among *Midwest Energy News*’ 40 Under 40, recognizing young leaders helping to drive America’s transition to clean energy. She serves on the boards of the Environmental Grantmakers Association and the Funders’ Network for Smart Growth and Livable Communities. Boehland holds a bachelor’s degree in environmental studies from Oberlin College and a master’s degree in environmental management from the Yale School of Forestry and Environmental Studies.



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