

CASE STUDY

PUERTO RICO 2017-2024 / HURRICANES

CONTEXT / SETTLEMENT	SHELTER TYPE	SUPPORT METHODS
CRISIS	Hurricanes Irma and María, Sep 2017	
PEOPLE AFFECTED	3.4 million people (virtually the entire population)*	
PEOPLE DISPLACED	200,000 people displaced outside the island **	
HOMES DAMAGED / DESTROYED	250,000 severely affected *** 70,000 totally destroyed ***	
PROJECT LOCATION	Puerto Rico, USA	
PEOPLE SUPPORTED BY THE PROJECT	Over 20,000 individuals	
PROJECT OUTPUTS	3,000 shelter repair kits (2,000 for the 2017 hurricanes and 1,000 for Hurricane Fiona in 2022). 850 housing repairs and rehabilitations. Capacity Building to 3,000 ind. (household & community level) and 2,100 ind. at workforce level. 618 households directly assisted with secure tenure.	
DIRECT COST	USD 30,000 per HH on average for repairs	

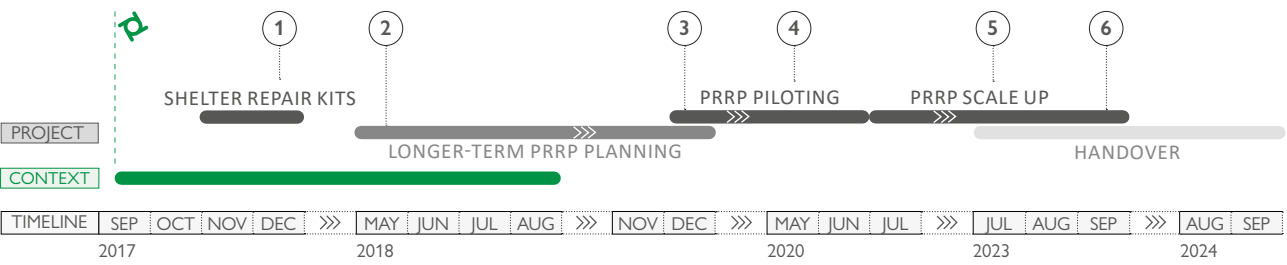
PROJECT SUMMARY

Puerto Rico, prone to hurricanes and earthquakes, suffered two devastating hurricanes in 2017, prompting the establishment of the Puerto Rico Recovery Program (PRRP) by an international organization and its local affiliate, from 2018 to 2023. Backed by USD 63 million in private funding, the program aimed to provide safe, affordable and resilient housing, address vulnerabilities, and foster community resilience through a holistic, systems oriented approach. Key components included housing repairs of hundreds of homes, capacity building, secure land tenure, advocacy and knowledge sharing.

Project Location



* National Library of Medicine, PreventionWeb, PewResearch. ** Boston College. *** Puerto Rico Builders Association.



-  **Sep 2017: Hurricanes Irma and María.**
- 1

Dec 2017: Over 2,000 shelter repair kits distributed.
- 2

May 2018: Majority of the program funding secured.
- 3

Dec 2018: Longer-term Repair Program pilots kick off in two municipalities.
- 4

Jun 2020: Program reforecast and additional programs launched following earthquakes and COVID-19 pandemic.
- 5

Jun 2023: End of land tenure program, with 618 HH assisted.
- 6

Sep 2023: Main programs completed (repair and capacity-building).



Storm-affected houses were temporarily covered with tarps prior to the repairs.



Many houses reported damage to roofing, as well as to indoor spaces. Beyond the building envelope, when possible, the project also supported households to repair kitchens and bathrooms.

CONTEXT

In September 2017, Hurricanes Irma and María struck Puerto Rico in close succession, causing catastrophic infrastructure damage, prolonged power outages and a breakdown of essential services across the island. The disruption effectively touched the entire population, with particularly severe impacts on older people, children, women and individuals with disabilities. Recovery timelines stretched far beyond typical disaster cycles, and by August 2018 full restoration of electricity was only achieved in some areas. Over subsequent years, additional shocks — a period of political unrest, earthquakes, the COVID 19 pandemic and later hazards — further complicated recovery.

Within this context, housing emerged as both an urgent humanitarian need and a long term development priority.

SITUATION BEFORE THE HURRICANES

Puerto Rico is highly exposed to Atlantic hurricanes and seismic activity. Prior to 2017, many households lived in dwellings constructed in concrete/masonry, timber or hybrid systems reflecting vernacular and code compliant practices. While building standards and authorities exist, uneven application, varying quality in older construction and the socio economic fragility of many households meant that the hurricane impacts translated quickly into widespread housing damage and loss of habitability.

SITUATION AFTER THE HURRICANES

The immediate situation was defined by severe damage to roofs and walls, water intrusion, loss of windows and doors, unsafe access and disrupted services. Entire communities required external support to stabilize dwellings and begin incremental recovery.

Early distributions of shelter repair kits addressed urgent needs in late 2017. Amid shifting needs and a recovery process challenged by multiple causes, the Puerto Rico Recovery Program (PRRP) was designed to sustain a multi year effort.



In the early stage of the response, the project organized large-scale distributions of shelter repair kits.

PROJECT STRATEGY

The program adopted a holistic, systems oriented approach to recovery, explicitly linking household level repairs with broader enablers of resilience. The strategic intent was to:

- Repair and reconstruct damaged housing at scale using safe, locally familiar construction systems.
- Build local capacity and workforce safety to expand the island's ability to carry out repairs and maintenance, nurturing both housing and economic outcomes.
- Address structural barriers to assistance, particularly tenure documentation, through targeted legal and technical support.
- Advance advocacy and knowledge sharing to inform policy, practice and future recovery efforts.

A key design choice was to focus housing works on strengthening the building envelope first, to ensure immediate gains in safety, while the program's legal and capacity components targeted systemic issues (e.g., tenure barriers, skills gaps) whose resolution would multiply housing benefits over time.

Financing, largely private, provided flexibility to support an adaptive, multi year intervention. While program goals were clear, the pathways to achieve them were deliberately flexible, enabling adjustments in response to changing hazards, logistics and household priorities.



The hurricanes severely damaged roofs, walls and openings, and left the entire island without reliable electrical power for many months.

PROJECT IMPLEMENTATION

Phasing and sequencing. The program's first visible action was the distribution of more than 2,000 shelter repair kits to stabilize exposed homes ahead of a longer recovery journey. Each shelter repair kit contained essential tools, fasteners, safety gear, and instructions to help clear debris, repair structures, and secure temporary tarps. An in depth needs assessment later informed the program design, and pilots launched in two municipalities to test, learn and refine.

In the following years, the program scaled housing repairs and supporting services across 30 communities in 22 municipalities until its full handover to the local affiliate in 2024.

Delivery model. Housing works were executed by local small and mid size contractors, who procured materials and carried out construction. The program's architects and engineers provided quality control and carried out inspections; local building authorities were involved to ensure compliance and alignment with local standards. This approach was found to balance speed, quality assurance and market engagement, channelling resources into the local construction economy while maintaining oversight.

Roles and partnerships. A collaboration between an international organization and its local affiliate underpinned implementation. While the international team managed large scale construction through a team of local professionals, the local affiliate led beneficiary identification, outreach and relationship management, anchoring the program in community realities and trusted local networks. Beyond these core roles, partnerships with specialist organizations were forged around targeted objectives (e.g., legal aid for tenure). These collaborations proved vital to reaching more families more quickly and to tackling challenges that lay beyond construction alone.

Adaptation under compounding hazards. Program reforecasting in 2020 responded to earthquakes and the COVID 19 pandemic. Adjustments included sequencing works to manage disruptions, revising engagement methods to respect public health guidance, and safeguarding supply chains and contractor operations. The program's flexible design allowed it to maintain momentum without compromising safety or quality.

TARGETING

The local affiliate's proximity to communities and municipal authorities enabled principled beneficiary selection and case management. Households with significant hurricane damage, heightened vulnerability and barriers to self recovery were prioritized. Coordination with tenure and legal assistance teams ensured that households at risk of exclusion from formal assistance schemes could be identified and referred for complementary support.



The shelter repair kits included tools and gear to help families recover quickly.

COMMUNITY ENGAGEMENT

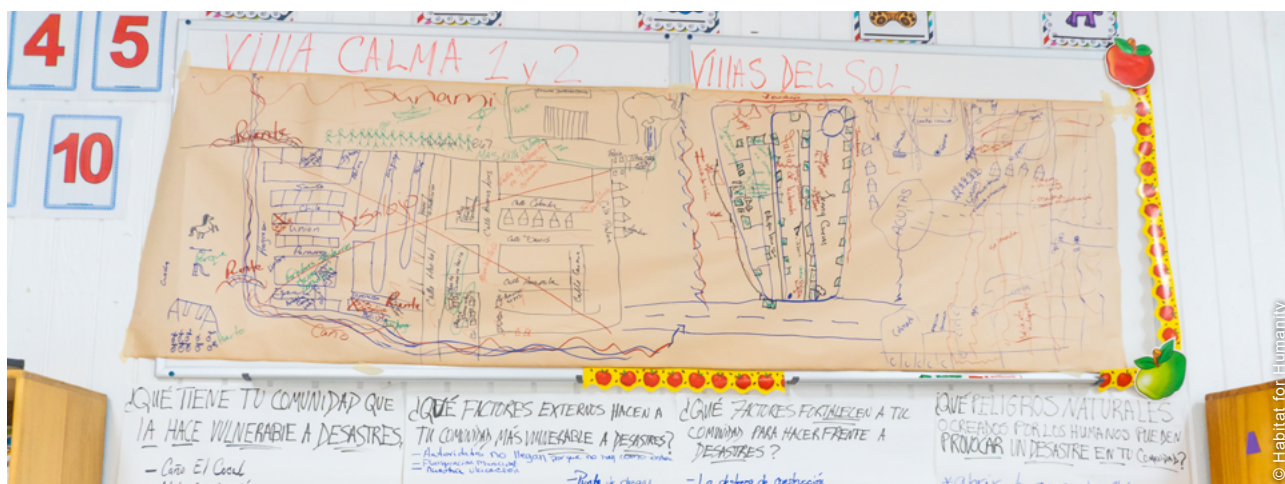
The program embraced intentional, community centred engagement. Outreach teams worked with community leaders and residents to identify needs, map risks and co design priorities. Practical tools included risk mapping workshops that facilitated collective diagnosis and planning. This engagement model strengthened trust, improved the fit of technical solutions and supported social cohesion as neighborhoods progressed through recovery.

LAND TENURE

Approximately 85,000 families had been denied federal assistance for lack of proof of ownership after the hurricanes. To address this, the program partnered with a leading legal aid foundation in Puerto Rico and around 50 attorneys were mobilized to provide direct legal and notarial services. Some cases were relatively straightforward, while others required court proceedings, which were time consuming and costly. This institutional partnership, combined with internal referrals from the repair program, enabled large numbers of households to formalize ownership more efficiently.

TECHNICAL SOLUTIONS AND DRR

The programme combined practical repair solutions with disaster risk reduction measures to make homes safer and more resilient. Repairs were carried out using concrete/masonry, timber or hybrid systems consistent with local practice, with priority works focused on the home envelope and safe access. Typical interventions included roof repair or replacement, wall rehabilitation, replacement of windows and doors for safety and weatherproofing, and improvements to access. Where budgets allowed, kitchens and bathrooms were upgraded to restore functionality and support health.



Community risk mapping workshops were organised to facilitate collective diagnosis of vulnerabilities and possible mitigation measures.

MAIN CHALLENGES AND ADAPTATIONS

- **Cascading shocks.** A period of political unrest, earthquakes and the pandemic required reforecasting and tactical shifts in sequencing, engagement and logistics, adding time and complexity to an already demanding recovery environment.
- **Administrative and operational hurdles.** Multi year, multi component recovery entails evolving frameworks, heavy coordination and rigorous oversight. Balancing quality, pace and compliance stretched management systems and called for ongoing refinement.
- **Tenure barriers.** Lack of proof of ownership blocked many families from accessing other assistance. While the program's legal partnership alleviated this for thousands, addressing such barriers at scale is inherently complex and sometimes lengthy.

EXIT/HANDOVER

A dedicated handover phase (July 2023–September 2024) consolidated results, completed outstanding works and closed the tenure component by mid 2023. By distributing roles between international and local actors, the program reinforced local systems for ongoing housing support. Documentation, knowledge sharing and advocacy aimed to inform future recovery and reduce the risk of exclusion for vulnerable households in subsequent disasters.



Over 800 houses were repaired, with priority given to walls and roofs, as well as access interventions. Local, safe construction practices were followed.

OUTCOMES AND WIDER IMPACTS

- **Safer, more dignified homes.** More than 800 households returned to safer dwellings with improved envelopes and habitability, reducing exposure to storms and restoring privacy and health.
- **Increased access to assistance via tenure.** By providing legal support to 618 households (and facilitating many more through broader legal partnerships), the program helped unlock access to public recovery resources and reduced systemic exclusion.
- **Strengthened human capital.** Training more than 1,400 people supported safer works and created livelihood opportunities in the housing sector, contributing to household income and community level resilience.
- **Community engagement and cohesion.** Risk mapping and participatory processes supported local ownership of recovery priorities and fostered trust in institutions, with positive spillovers for future preparedness.
- **Adaptive program management.** Reforecasting and flexible delivery preserved momentum under adverse conditions, offering a model for multi year recovery in hazard exposed contexts.



In addition to the repair component, the project assisted over 600 families with insecure tenure in the process of formalizing ownership.

STRENGTHS, WEAKNESSES AND LESSONS LEARNED

STRENGTHS

- ✓ **Holistic, scalable approach.** The program linked housing repair with workforce development, land tenure, and advocacy, addressing immediate safety while tackling systemic barriers to recovery.
- ✓ **Community centred engagement.** Decision making was anchored in local needs through outreach, risk mapping and collaboration with community leaders, improving relevance and take up.
- ✓ **Flexible and adaptive implementation.** Clear goals but flexible pathways led by local professionals enabled reforecasting and responsive adjustments under earthquakes, pandemic measures and supply volatility.
- ✓ **Strong partnerships and private funding.** Collaboration with local organizations, government entities and private donors expanded reach and enabled components beyond construction, such as legal aid.
- ✓ **Advocacy and policy influence.** By demonstrating practice based solutions to tenure and repair challenges, the program contributed evidence to inform wider recovery policy.

LESSONS LEARNED

- **Embed a person centred, trauma informed approach.** Recovery work intersects with the psychological impacts of disaster; training technical and construction teams in empathy, trust building and shared decision making can make construction processes safer experiences that support holistic recovery.
- **Co create recovery plans with communities.** Jointly defining priorities and risk reduction measures improves fit, fosters ownership and strengthens social capital for future preparedness.
- **Secure flexible, adaptive funding.** Long term, less restricted funding allows programs to pivot as needs shift, reducing administrative bottlenecks and enabling continuity through cascading hazards.
- **Sustain secondary benefits.** Housing repairs drive knock on gains in health, mental well being and financial stability; programs should plan for follow up or connect families to local networks to maintain these benefits after handover.
- **Address tenure early and at scale.** Integrating legal aid through dedicated partnerships is essential where proof of ownership blocks access to assistance; internal referrals from repair teams help identify and prioritize cases efficiently.

WEAKNESSES

- × **Limited organizational readiness.** Staffing and deployment constraints delayed implementation, worsened by work-visa bottlenecks for Spanish-speaking personnel from Latin America. Additionally, recruiting specialists who combined institutional knowledge, mission alignment, and post-disaster construction experience proved highly time-consuming.
- × **Operational complexity.** Managing evolving frameworks, multi year logistics and cross cutting components created administrative strain and required ongoing improvements in planning and data management.
- × **Variable internal efficiency.** The breadth of activities (repairs, training, tenure, advocacy) occasionally led to competing priorities and documentation demands, risking delays without dedicated management capacity.



FURTHER READING ON SHELTER PROJECTS

On responses to hurricanes in the Caribbean:

[SP 2010 / A.3 GRENADA / 2004](#); [SP 13-14 / A.4 CUBA and A.5 DOMINICAN REPUBLIC / 2012](#); [SP 17-18 / A.11 DOMINICA / 2017](#); [SP 8TH ED. / A.8 BAHAMAS / 2019-2020](#).

RECOMMENDATIONS MOVING FORWARD

- Recognize and build on the added value of the global network and expand viable presence through local partners' expertise to extend impact at community level.
- Foster a learning culture capable of adapting procedures; keep objectives and budgets flexible to account for external challenges in changing disaster contexts.
- Invest in piloting and proof of concept to strengthen program design integrity and inform future local programming.
- Improve sustainability by integrating additional strategies as upgrades to repairs/rehabilitation (e.g., more robust waste management, lower emission transport options).
- Strengthen communication protocols in disaster and recovery settings and ensure that field assessments are comprehensive enough to prevent recurrent rounds of data collection for assessments.