

# Education for Improving Resiliency of Coastal Infrastructure

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## **Other Participants/Partners:**

Resources, Faculty at the Department of Civil Engineering and Surveying, other faculties at UPRM and externally that have participated

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## **Other UPRM Partners:**

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**Agency Partners:**

PR Department of Transportation and Public Works and the State Highway and Transportation Authority, Hon. Eileen Vélez, Secretary.

ASABE: Dennis Flanagan, Johnny Grace, Megh Goyal, Annual International Conference.

USDA: Mr. Manuel Matos

University of Texas -Austin: Dr. Carlos Ramos

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Ernesto Díaz, MS, Director, PR Coastal Management Program, Department of Natural and Environmental Resources; President, PR Climate Change Council.

EPA (Mehta-Sampath, Ameesha) and PR Chamber of Commerce (Jeannette Vázquez) : EPA-led Healthy Buildings Long-term Recovery Initiative (Homes/Public Housing/Schools/Buildings), PI is a Member of the Puerto Rico Healthy Building Task Force.

EPA (Mehta-Sampath, Ameesha), "Innovative research project to increase radon monitoring capacity in Puerto Rico", UPRM-CRC as a partner in this initiative.

Davis Pittman, Patrick Deliman, Carlos Ruiz, Evelyn Villanueva, Patrick Deliman, Rumanda Jones, "Educational and Research Partnership (ERPA)", ERDC-US Army Corp of Engineers

PR Emergency Management Agency and USA FEMA

Association of Professional Engineers of PR

CRB (Community Resilient Building)

RE-IMAGINE Puerto Rico

**CRC Partner Researchers**

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## SHORT DESCRIPTION

The Year 7 proposal focuses on continuing the institutionalization of previous years' activities by means of creating the "UPRM-CRC Interactive Learning Hub." From here on, the UPRM- CRC IL-HUB. The UPRM-CRC IL-HUB will automatize remote and in-person access to learning possibilities by developing a platform in which participants can access interactive learning material, keep track of their completed course contact hours, and the automatic issuing of certificates of participation both for individual activities and cumulative certificates of achievement. The UPRM-CRC IL-HUB will also serve as a repository of self-directed learning and reference materials on resilience, coastal infrastructure, and natural hazards. Constituents from both the formal and informal education components of our program will benefit from the UPRM-CRC IL-HUB.

## ABSTRACT

This proposal focuses on building upon the first six years' accomplishments for supporting the educational needs for the long-term permanent reconstruction of Puerto Rico. Local communities continue to face unprecedented social, environmental, and economic challenges. These communities continue lacking sustainable and resilient critical infrastructures (e.g., housing, water, access to reliable and cost-effective power supply, appropriate and safe roads and accesses, reliable natural or built drainage systems, communication network, etc.) which are subjected to continuous natural hazards like hurricanes (winds, torrential rainfall, erosion, riverine and urban floods, nuisance floods, landslides), earthquakes (tsunamis, landslides, soil liquefaction), coastal floods (waves, hurricane storm surge, winter swells, astronomical tides), and droughts that result in risks of property and life losses. Due to the slow reconstruction process in Puerto Rico, most of the critical infrastructure continues to be extremely deteriorated, was built with outdated codes and regulations and is poorly maintained. There are many structures that were informally built or were built with outdated codes and regulations which do not comply with current engineering standards (Puerto Rico's 2018 building code represents a significant revision from earlier versions). Forty-four municipalities, including most of the major cities, are located in coastal areas. The rest are in steep lands, exposed to landslides, soil instabilities, erosion, and excessive humidity. The whole Island is exposed to extreme earthquakes. Nearly half a million people live in flood-prone zones. Geotechnical challenges are frequently encountered. Most recently widespread fires also aggravated the state of the natural ecology which affects runoff and flooding potential. The project continues supporting the multi-hazard capacity building (MHCB). Our ultimate goal is to help our stakeholders Recognize and understand the multi-hazards Puerto Rico is exposed to and continue

to educate the current and future workforce which is expected to work in the reconstruction of Puerto Rico's infrastructure.

Year seven (7) project has the main goal is to continue the institutionalization of the activities that have been implemented during the first six (6) years as they were partly presented in the CRC Year Six (6) Annual meeting of the project and the activities that will be developed in the future to support the development of the multi-hazard resilience workforce education program and updating it to assist in the long-term reconstruction of Puerto Rico. We propose to develop the web-based UPRM-CRC IL-HUB that will be hosted at the existing Civil Infrastructure Research Center (CIRC) at the Department of Civil Engineering and Surveying at the UPRM platform. The CIRC runs on average about 20 projects related to civil infrastructure, resilience, natural and technological hazards, and education. COVID-19 pandemic has forced us to move all of our Center's training from in-person to virtual. Providing virtual training has had a positive impact on the number of participants that we can reach due to the benefits to participants of virtual training such as flexibility, lack of travel costs, and increased accessibility. The UPRM-CRC IL-HUB will allow us to have one place for all the courses, webinars, seminars, workshops, and other materials that we currently have and will continue to develop. It will also help identify and access other websites and initiatives that can support our stakeholders find solutions to their problems. The UPRM-CRC IL-HUB will be accessed through individual password-protected accounts which will allow participants to watch and participate in interactive presentations, complete quizzes to assess learning, and track training hours. The UPRM-CRC IL-HUB will automatically issue certificates based on contact hours achieved. This project is envisioned to institutionalize the long-term permanence of operational activities and leadership on capacity building at UPRM which will act as a partner supporting many other initiatives within and outside the university. It is envisioned that the UPRM-CRC IL-HUB will contribute to position UPRM as a leader in multi-hazard education and preparedness to face expected future catastrophic events in Puerto Rico and elsewhere.

The UPRM-CRC IL-HUB will serve as a mechanism to preserve, store and retrieve the learning materials the project has gathered, produced, provided, accessed, or identified during previous years. It will also be available to our partners as a reference site which will serve as an engine to facilitate access to readily available information. The first level of education at the UPRM-CRC Project was to provide direct in-person instruction including classroom classes, "conversatories» (panels), workshops, conferences, and lectures. The second level of education added web-based information and remote instruction/learning experiences which included webinars and courses. The proposed third level of education aims to the automation of teaching/learning activities developed in previous years. This will provide flexibility, better accessibility, continuity to the UPRM-CRC learning activities, commodity to our constituencies, and increase institutionalization. It will also help expand

the number of participants and institutions that may have access at any time to the Center activities.