Scientists in the Wake of the Hurricanes [1]

Submitted on 31 March 2018 - 8:25pm

Calificación:

CienciaPR Contribution:

No

Original Source:

American Scientist [2]

By:

KATIE L. BURKE

After a devastating storm season, researchers are seeking better ways to rebuild and to support their most vulnerable colleagues.

“The work that took us 12 to 15 years to build was destroyed in a couple of hours,” says Olga L. Mayol-Bracero, an atmospheric chemist at the University of Puerto Rico, Río Piedras. Hurricane Maria destroyed her office and one sampling station, another sampling station was almost completely destroyed, and her lab flooded. In total, the damages amount to about $700,000. “When I saw that nothing had survived at my cloud forest station, I was speechless,” she explains. “For one or two days, I thought, ‘What should I do? Should I do something else from now on?’”

After the news sank in, Mayol-Bracero decided to rebuild her facilities from the ground up. She’s not alone.

Anthony Dooley @El_Squid

Scientists have been caught up in the same infrastructure breakdowns that have affected everyone else in Puerto Rico. But restoring science is crucial for the recovery process and will help other communities in need. Fernando Tormos, a postdoctoral researcher at the Scholars Strategy Network who is studying Puerto Rico’s disaster relief, says, “Economic needs, which range from the institutional to the individual level, have deeply impacted the work of ecologists and natural scientists [in Puerto Rico]. Many have decided to leave the island while others have sought short-term employment with FEMA [the Federal Emergency Management Agency],

leaving them unable to continue their research."

Mayol-Bracero will not be able to begin collecting data again until months from now at the earliest—if she gets funding. Restoration is hindered in places where there still is no power—which constitute about a third of the island at the time of this writing. Mayol-Bracero cannot begin restoring her sampling station at Cape San Juan, for example, because there is no power there yet.

The lessons in Puerto Rico apply to other science communities hit hard during last year's intense hurricane season. It was the most expensive disaster year on record. Three hurricanes (Harvey, Irma, and Maria) occurring within a month of one another joined the list of the United States' five most costly hurricanes, revealing that Americans are remarkably vulnerable. Scientists are no exception. The scientific community has poured out support for researchers in the wakes of these hurricanes—offering their lab spaces to displaced graduate students, or donating scientific equipment and power supplies. But unless responses are systematized, they can remain slow, haphazard, and insufficient. Scientists in these disasters have lost equipment, access to research facilities, and people on their teams, some of whom were unable to work or left for opportunities elsewhere. Some scientists have abandoned their career. The underrepresentation of research from these areas will be exacerbated as scientists face more hurdles because of poor funding and increasing disaster risk—unless the scientific community and the public bolster support for them.

Researchers After a Disaster

Scientists are crucial for anticipating and responding to hurricane disasters, yet they were hard hit. Even those who study climate change and hurricanes were shocked by what they experienced. Oceanographer Miguel Canals Silander of the University of Puerto Rico, Mayagüez, who lives in the beach resort Rincón, says, "I'm an oceanographer and I work with meteorology, so I know a lot about hurricanes. But no textbook can prepare you for being inside one of these storms. It was like being in a 36-hour tornado. I know this sounds exaggerated. I swear we saw small tornadoes going through the houses. Roofs flying around, boats being overturned by the wind—not the waves. Our buoys recorded 30-foot waves in front of some of the most important hotels in the western area of Puerto Rico. Those hotels were wiped out. The erosion is incredible; it's like a war zone, literally. As a scientist, I felt so humbled by the power of nature." The Caribbean Coastal Ocean Observing System that Canals Silander directs lost $600,000 in research infrastructure. In addition, the obstacles he faced made returning to research challenging.

Canals Silander says that immediately after the storm, he "switched from research mode to survival mode." Like millions of other Puerto Ricans, he found that it took all he had to get by. He says about this time, "Days were long. Without power, without water, without anything. When you found some water, it felt like that made your day. You had to make 12-hour lines at the gas station. As a scientist, I thought I would always be prepared, but it turns out I didn't have enough cash. Banks were closed. It lasted for like a month. Everybody ran out of cash. I didn't even answer an email for a month."

In October, Canals Silander and his colleagues focused on submitting fast-tracked funding proposals for disaster situations to the U.S. National Science Foundation (NSF), through RAPID Response, a type of funding proposal accepted by the agency in situations of urgency with regard to access to data, facilities, or scientific equipment. Canals Silander says, “The people that are helping us submit proposals [in the Office of Sponsored Research at the University of Puerto Rico] are unsung heroes. We have people who lost their house, but they’re still helping us submit these proposals and doing everything they can.”

Despite all this effort, many ended up disappointed. The Directorate for Geosciences at the NSF received 190 applications for RAPID Response funding related to the hurricanes. They were only able to fund $4 million in awards for all three hurricane disasters, and few of those awards went to projects related to Hurricane Maria. By the time Hurricane Maria hit, the NSF was inundated with such proposals because of the previous two hurricanes.

The program director for ocean science proposals at the NSF, Michael Sieracki, says that a priority was to save the longest-term data sets—although such data sets tend not to cover very broad areas. Sieracki also notes that by that time of year, “normally we’re all spent out.” So far, no extra funds have been specifically allocated for NSF research in response to the 2017 hurricanes.

Olga Mayol-Bracero

Edwin Hernández-Delgado, a coral reef researcher at the University of Puerto Rico (UPR), Río Piedras, who lost “the entire work of 14 ½ years [of coral restoration] in a single day,” says, “We have to reinvent the formula to make research more possible here. It’s not that we do not have the resources or the talent. We do. But we cannot compete in the sense that UPR doesn’t have the economic stability.” The fiscal board cut about $500 million of the University of Puerto Rico’s budget in 2017, a decision that in the spring caused strikes that shut down the school for almost

two months. The recession in Puerto Rico and the handling of austerity measures have made it challenging to live and work there, especially for scientists and other public servants.

Hernández-Delgado says he believes that local and federal funding agencies need to sit down with scholars from Puerto Rico and the U.S. Virgin Islands to brainstorm what can be done. For starters, he notes, a big problem is that scientists at their funding-strapped public institutions must compete with powerful institutions with plenty of resources, such as Harvard and Stanford. To boot, funding sometimes must be matched 1:1 by the research institution receiving it, which makes it difficult for institutions such as the University of Puerto Rico. Many coastal regions in the United States and elsewhere are vulnerable; Puerto Rico and the U.S. Virgin Islands are extreme cases.

Exacerbating the Brain Drain

“The Caribbean is a very undersampled region in the world for atmospheric parameters,” Mayol-Bracero says. “It’s a very important region in the world also in terms of climate change and climate variability.” Despite this need for more research, the area is losing local researchers.

Indeed, all the scientists interviewed for this story expressed concern about continuing their work and knew scientists who had left their institution for better opportunities elsewhere. “Some professors have left the island,” Canals Silander says. “We’re worried about the brain drain, which was happening already. We fear it will get worse.” Hernández-Delgado, the coral reef ecologist at UPR, is one of the many scientists in a tenuous position. He says, “I am a contracted professor. I float on soft money most of the time, because I have been really successful at writing grants. But it’s becoming increasingly difficult, and if I don’t get money, I’m out of the game.” His position reflects the larger problem of institutional erosion in a recession and public-funding crisis.

Edwin A. Hernández-Delgado.

Many mainland U.S. institutions have offered space and accommodations for recovering researchers, while remaining conscientious about not exacerbating the brain-drain problem. For example, they send tuition payments to students' home institutions. Still, some of those who leave will not come back, a trend that started when Puerto Rico's financial crisis began to worsen a few years ago. As chemical engineer Ubaldo Córdova-Figueroa of the University of Puerto Rico told *Times Higher Education*, "There are fewer faculty in tenure track, fewer researchers, and more

work for those who stay in the university. Significant cuts to the public university are also affecting academic life in general…. Real and permanent action requires a lot of effort from the global academic community."

Tormos, the researcher at the Scholars Strategy Network, notes the importance of "local knowledge that comes from experience," and points out that the observations of scientists who lived through the disaster and recovery have the potential to yield practical discoveries and solutions. Despite the challenges of doing science in Puerto Rico, he says, "There are a lot of Puerto Rican scholars who want to go back home." Tormos encourages the scientific community to think more deeply about advocacy and policy making: "We need to talk about how politics affects science. Puerto Rico is a case that illustrates that."

Olga Mayol-Bracero

The Value of Local Knowledge

Local expertise is essential to a community's resilience and recovery in the face of disaster. Mayol-Bracero's latest research, which she accomplished despite having lost her office and field sampling stations, demonstrates this importance. Mayol-Bracero became curious about the effects of the widespread use of gas and diesel generators, which have become an important

power source on the island for the residents still without power. Journalist Fernanda Zamudio-Suárez noted their constant background noise in a January report for the *Chronicle of Higher Education*. Mayol-Bracero explains, “I was running one day, about three weeks or a month after the hurricane, around my neighborhood. I was at the highest point looking down, and I saw this haze layer that I have never seen before. I told my students we need to monitor this, but we didn’t have instrumentation available and we didn’t have power available.” Mayol-Bracero talked with colleagues, who lent or donated instrumentation for them to do an air-quality study.

“In November, we started to measure [important air pollutants such as] black carbon, which is a fingerprint for combustion processes, particulate matter, carbon monoxide, and sulfur dioxide,” Mayol-Bracero says. “The first month of data showed that we had very high sulfur dioxide levels, as well as some carbon monoxide, and that they were very high at nighttime, which is when most people turn on their generators.” These are problematic pollutants that can cause or exacerbate health problems such as asthma, and sulfur dioxide is also an indirect greenhouse gas. The high amount of sulfur dioxide suggests a new source of sulfur, because such pollutants are normally regulated to prevent high levels of this gas. “In those first months after the hurricane, the government of Puerto Rico granted a waiver for ultra-low-sulfur diesel,” Mayol-Bracero explains. “Because of the emergency, they allowed people to burn fuel that has higher concentrations of sulfur than the one that the law [normally] allows. I think that has a lot to do with the higher levels of sulfur dioxide that we are having in the atmosphere.” Mayol-Bracero’s results are currently in review. Such a study would not be possible without the observations of a local scientist, exemplifying what can be missed when an area’s citizens are underrepresented in science.

Photographs courtesy of Dale Morton (*left*) **and Paul Jobsis** (*right*)

Disaster Preparation

“What happened in Puerto Rico is not unusual and could happen anywhere,” says Daniel Aldrich of Northeastern University, who researches disaster recovery and who lost his own home in Hurricane Katrina in 2005. “Most Americans are underprepared for disasters.” This lack of preparedness is true not just of individuals, but also of institutions. Aldrich says, “Universities don’t think of themselves as vulnerable, and overall people in floodplains tend to underinvest in preparation.”

Affected universities’ insurance policies are not covering all of the losses. For example, marine scientist Tyler Smith of the University of the Virgin Islands (UVI) lost his office and couldn’t access his lab for about two months (parts of that lab are still unusable). “Anything [in my office] that wasn’t hard plastic or metal was pretty much destroyed,” he says. “My computer was with me, but

I lost all my books.” Personal items in the office were not covered by university insurance, and only about 50 percent of the damage to buildings is going to be covered by the university’s insurance. The building housing the UVI Marine Science Center where Smith works lost its roof and began to have mold problems as it sat waiting for a temporary roof. Meanwhile, Mayol-Bracero is also in limbo; she says she has not yet learned what damages to her office will be covered by her university’s insurance.

During a humanitarian disaster, research is not the main priority—understandably so when people’s lives are at stake. “In a disaster, the [university] thinks [first] about life, property, and then education, and then research was last,” says Smith. “It’d be nice to have a prioritization where we [researchers] can have more control directly over what’s going on in terms of recovery, so that we can jump right in and get that stuff done.” Institutions will need to consider how to empower researchers to get on the ground quickly after a disaster to assess impacts and monitor recovery.

Aldrich says, “Disaster means there already is a crisis.” Indeed, the affected locations in the 2017 disasters, including not just Puerto Rico and the Virgin Islands but also Barbuda and Texas (hurricane damage), Bangladesh (floods), Mexico (earthquakes), and California (wildfires), had been known to be vulnerable for years beforehand. However, solving their systemic problems with infrastructure, public funding, and political impediments has been no simple task, leaving people vulnerable in the meantime.

Given that reality, the research community needs to consider how to support its most vulnerable members. Aldrich’s research shows that community resilience is related to strong social networks, pointing to the need to build relationships between underrepresented groups and research organizations. Scientists’ responses demonstrate their desire to help. How can that support be scaled up strategically? It is apparent that institutional and federal disaster responses need to be reevaluated and that resources need to be allocated for researchers in the event that federal funding falls short. Researchers in the United States could also consider how they might advocate for people among them who cannot vote in all national elections.

Content Categories:

- Biological and health sciences [3]
- Environmental and agricultural sciences [4]
- Atmospheric and Terrestrial Sciences [5]
- Chemistry and Physical Sciences [6]
- Engineering, math, and computer science [7]
- Undergraduates [8]
- Graduates [9]
- Faculty [10]
- Industry and Entrepreneurs [11]
- Educators [12]
- Other Science Careers [13]

---

https://www.americanscientist.org/article/scientists-in-the-wake-of-the-hurricanes [3]
https://www.cienciapr.org/en/categorias-de-contenido/biological-and-health-sciences-0 [4]
https://www.cienciapr.org/en/categorias-de-contenido/environmental-and-agricultural-sciences-0 [5]
https://www.cienciapr.org/en/categorias-de-contenido/atmospheric-and-terrestrial-sciences-0 [6]
https://www.cienciapr.org/en/categorias-de-contenido/chemistry-and-physical-sciences-0 [7]
https://www.cienciapr.org/en/categorias-de-contenido/engineering-math-and-computer-science-0 [8]
https://www.cienciapr.org/en/categorias-de-contenido/undergraduates-0 [9]
https://www.cienciapr.org/en/categorias-de-contenido/graduates-0 [10]
https://www.cienciapr.org/en/categorias-de-contenido/faculty-0 [11] https://www.cienciapr.org/en/categorias-de-contenido/industry-and-entrepreneurs-0 [12] https://www.cienciapr.org/en/categorias-de-contenido/educators-0 [13] https://www.cienciapr.org/en/categorias-de-contenido/other-science-careers-0