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## **Resilience and community pride after a hurricane: counter-narratives from rural water systems in Puerto Rico**

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## **Resilience and community pride after a hurricane: counter-narratives from rural water systems in Puerto Rico<sup>2</sup>**

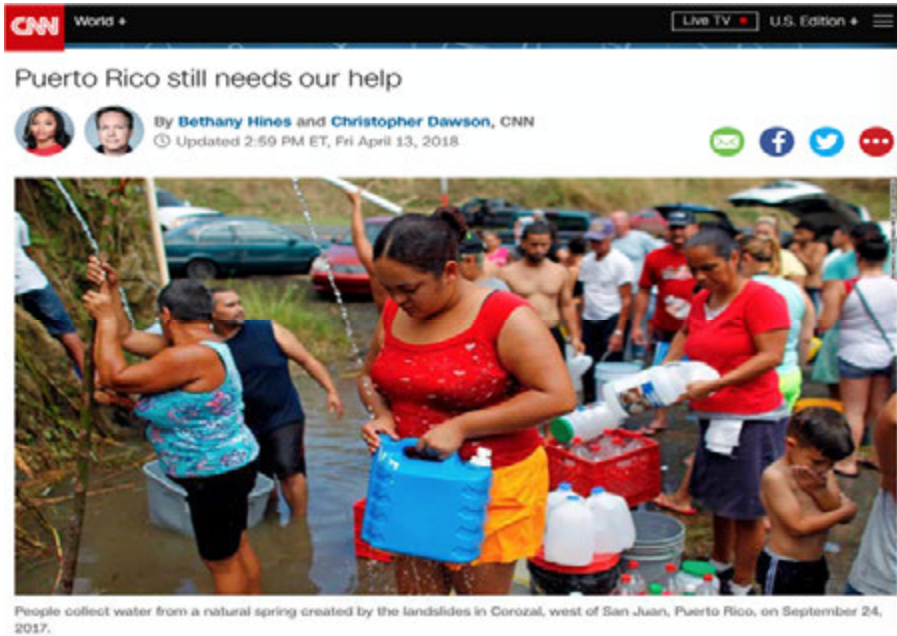
### **Introduction**

When Hurricane María stripped Puerto Rico of its characteristic verdant foliage, it revealed complex layers of hidden geographies. The media coverage in the United States presented the destruction through visual and textual references to developing and “third-world” landscapes (Mejil 2017; Whitley 2018; Jarvie 2018; Cedré 2018), while the accompanying headlines reminded us that its residents are “Americans” (Negrón-Muntaner 2018; DiJulio, Muñana, and Brodie 2017; Bernstein 2018; Sutter 2017). This provocative juxtaposition was supported by several photographic themes, such as residents surveying debris or floods engulfing vehicles and neighborhoods.

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*Excerpt of an article on the “Impact Your World” section of the web site CNN.com (Hines and Dawson 2018). The text has been updated several times since September 2017, while the image was last updated in October.*

The photographic narrative is generally consistent with the ways mainland American photographers have come to image Puerto Ricans in the landscape (Lloréns 2014; Cedré 2018), but surprisingly, among the iconic compositions in these photographs were some in which no damage was visible (Domonoske 2017; Gamboa and Silva 2017). These were pictures of people using water from streams and springs “where PVC pipes stick straight out of the hillsides along expressways and little roads” (Domonoske 2017). In many such images the faces photographed appear untouched by the crisis, but nonetheless there is an implicit hardship narrative in this subject that editors found particularly powerful, as illustrated by the use of the photograph in Figure [1]. Three weeks after the hurricane’s landfall, the news site CNN.com used it to replace the lead photograph of a frequently-revised article encouraging donations to relief organizations, and left it in place for the following eight months (Hines and Dawson 2018). The picture accompanies the headline “Puerto Rico still needs our

help.” The implied reason for this need is that when *Americans* are forced to resort to using potentially unsafe water collected by the methods depicted, the crisis is truly dire.

The visual narrative of an underdeveloped and hazardous waterscape has been reinforced by reports of contamination and the alarming fraction of Puerto Ricans “without access to safe water” in the months after the hurricane (Sutter 2017). In the dominant discourse, María caused a catastrophic transformation of residents’ modes of access to drinking water, so it is no surprise that budget-constrained recovery efforts focus on restoring the pre-María conditions by repairing damaged infrastructure and normalizing operations. However, the Puerto Rican waterscape and its transformation by the hurricane are both complex, and the efforts to mitigate disrupted water access and increased contamination risk should be part of water security planning that takes this complexity into account.

Most of the population in Puerto Rico receives water from systems operated by a state authority called the Puerto Rico Aqueducts and Sewers Authority, or PRASA, while a minority (2-3%) uses water from small, community-managed water systems. Updates about the status of the state water authority were reported in brief bulletins showing the fraction of PRASA customers with water service alongside other metrics of progress, such as the fraction of the total power generation capacity being distributed by the electrical power grid. The first bulletin after the hurricane reported that the water system was 44% operational, rising to over 99% in July 2018 (Government of Puerto Rico 2017). This water system statistic was widely interpreted as the fraction of residents with access to safe water (Sutter 2017).

Such interpretations by journalists understandably overlook the small fraction of residents that were not served by PRASA water systems before the hurricane. These residents consume water collected from stream, spring, or groundwater sources treated and distributed with community-managed infrastructure, so not only is the status of their water systems statistically insignificant, it is also often not seen as part of the central government’s responsibility. However, these non-PRASA communities receive disproportionate attention in spheres such as academic literature (Guerrero-

Preston et al. 2008; Jain et al. 2014; J. Arce-Nazario 2018; Alicea-Martínez and Rios 2016), environmental and rural development advocacy groups (Fedinick, Wu, and Panditharatne 2017), and reports by regulatory agencies — attention which is motivated by several factors. Non-PRASA communities are typically rural and poor, so the water service they receive is scrutinized from the perspective of social equity and environmental justice. It is assumed that non-PRASA communities exist because the Puerto Rican government lacks the resources to connect the remote communities to PRASA-managed systems. Agencies such as the United States Environmental Protection Agency (EPA) and the Puerto Rican Department of Health are especially attentive to these communities because they so frequently violate the legal standards for safe water as proscribed by the Safe Drinking Water Act (SDWA) and other EPA regulations. Thus, academics, regulators, and advocacy groups pay attention to non-PRASA water consumers because they are seen as under-served and unnecessarily exposed to risk. Like the bottles collecting surface and spring water after the hurricane, non-PRASA systems are deemed primitive, ineffective, and unsafe (Massey 2014), and would be best repaired by replacing them with PRASA connectivity. Access to the large-scale, PRASA-managed systems has been suggested for non-PRASA consumers in order to restore environmental justice for the poorest Puerto Ricans, reduce the risks of contamination and improve the territory's EPA compliance record, and establish more technologically advanced water management infrastructure for a vulnerable population exposed to increasingly frequent extremes of precipitation.

Recently, more attention has also focused on the positive aspects of non-PRASA communities, stemming from the hidden geography of Puerto Rican waterscapes that are not captured by analyses of demographics or risks. Non-PRASA water is safer than the level of compliance with EPA regulations would suggest, because required laboratory tests to detect risky water that were designed on the mainland are poorly correlated with risk in Puerto Rico (Santiago-Rodriguez, Toranzos, and Arce-Nazario 2016). Residents served by non-PRASA water systems have been powerful agents of environmental stewardship (Arce-Nazario in press) and their communities have created unique models of natural resource governance (Arce-Nazario 2018).

Narratives of thriving non-PRASA communities and water infrastructure beckon us to understand how they work and why they persist alongside large-scale, highly technical solutions. Their experiences during Hurricane María represent important clues, and a closer look at the experiences of non-PRASA communities during the disaster could show how their diverse approaches to water management are affected during extreme climate events.

This article explores narratives of post-María experiences from non-PRASA communities. It is based on mixed-method interviews with non-PRASA community residents about conditions after the hurricane, in phone interviews conducted between September 2017 and January 2018, and in in-person interviews carried out in December 2017. The interviews, which combined both structured and open-ended questions that allowed respondents to reflect on their experiences, were collected as part of ongoing work on community water management in Puerto Rico which is equally inspired by participatory methods in geography and oral history as a tool for environmental research (O’Keeffe et al. 2016; Arce-Nazario 2007). Patterns are evident in these narratives that highlight the different experiences of consumers depending on their water source and access technology, and also highlight the contrasts that these residents drew with neighboring, PRASA-served communities. The experiences related below reveal how non-PRASA communities contribute to the overall Puerto Rican waterscape. They also illuminate issues around the discourses of sustainability and agency, development, society and technology, and colonialism.



*Spaces defined by non-PRASA water systems serve multiple functions in the community, such as this gathering place in the foreground of a non-PRASA surface water collection site.*

### **Counternarratives of community water**

We have applied for help from too many different agencies and no one responds...we feel like have been forgotten.

*— Phone interview with the leader of a community water system in the eastern part of Puerto Rico*

Our community feels blessed because we are the only community in the area that has water...don't you see, our water comes from a spring in a cliff.

*— Phone interview with the leader of a community water system in central Puerto Rico*

Hardship associated with the hurricane was most strongly expressed in interviews in groundwater-served communities, such as the first of the two excerpts above, while the most optimistic perspectives were offered by those, like the second narrator, served by surface water systems, particularly springs. Surface (stream and spring) water systems usually do not require energy to distribute the water, because the water

source and the storage tank are located at a higher elevation than the community, while groundwater-served communities must pump the water from underground. When blackouts affected the entire population after the hurricane, this distinction was significant. As is evidenced in the contrast between these excerpts, the tone of the interview is clearly correlated to the kind of water system serving the respondent's community. This pattern was the same in all of the twenty-eight interviews collected.

This difference in tone, which is also notable in the narratives that follow, suggests a difference in experience that calls out for our attention especially because surface water systems are assumed to be the riskiest type of system for non-PRASA communities, and are targets for conversion to groundwater systems where PRASA service would be unfeasible. Interviews conducted before the hurricane relate that the conversion of surface water to groundwater is even encouraged by threatened lawsuits against non-PRASA community water managers. The motivation for these actions is that groundwater is more frequently in compliance with SDWA guidelines, and ground water also has a significantly lower probability of yielding positive test results in traditional tests for fecal contamination. Guerrero-Preston et al. (2008) has argued that communities that use underground water necessarily become more compliant with the law. Pressure to dismantle surface water systems might also be the result of political pressure from groups that benefit from the economic stimulus associated with the installation, maintenance, and training required to create new underground water systems. Against all this reasoning, the voices of surface water system managers and leaders are nearly unanimous in constructing a counter-narrative:

Now the community feels prouder of their system, seeing how other people had to carry water, and we had water during the event. We even set up an oasis for the surrounding PRASA communities.

— *In-person interview with a community leader in the eastern part of Puerto Rico*

The interview quoted above was conducted in a community that is notable because, as described in oral histories collected before the hurricane, it was once a PRASA-served community that elected to manage their own water system when the PRASA



service was deemed insufficient (Arce-Nazario 2018). Thus, the very existence of this non-PRASA system disrupts the idea that non-PRASA communities are the groups that are abandoned when there is not enough available technology or enough political will for the state-managed system to reach them.

The narratives of this community after the hurricane demonstrate two linked factors that make non-PRASA communities important models to consider in planning for future extreme climate scenarios. The first is resilience, even under the effects of extreme precipitation. The ecological characterization of resilience as the basic ability to withstand and recover from disaster has been expanded to incorporate a framework intimately connected to social and environmental justice, in which resilience is predicated on the human rights to the ability to learn and self-organize (Walsh-Dilley, Wolford, and McCarthy 2016). The presence of this non-PRASA community enhanced the overall resilience of the region to the hurricane's effects, as it both provided water and transferred knowledge about water management to neighboring PRASA communities that did not have water access. The second factor is agency, a closely linked concept that is also foundational in environmental justice (National People of Color Environmental Leadership Summit 1991). The narrative fragment above shows that the water system's role in hurricane response imbues the community with agency and pride, a picture far removed from the common representation of non-PRASA communities as rural, isolated, and desperate for help. As another example of a system in which resilience was achieved with surface water and electricity-independent water treatment methods, the pride expressed here should be read as a powerful statement of what could be lost, beyond the actual and obvious value of water availability in a crisis, if surface water systems are routinely converted to groundwater systems when they cannot be connected to the PRASA infrastructure. The metrics used to identify risk and to assess water quality cannot ignore extremes such as the ones experienced during and after hurricane María. In these conditions, systems dependent on electricity were simply at a higher risk of not having access to potable water.

The statement that “we have been forgotten” quoted above was expressed by the leader of a community that did not have an electric generator for the groundwater

system. In the cases where an electric generator was available, the narratives were somewhat more positive. However, they document the complications and trials required to maintain the water systems, such as the difficulty in accessing diesel after the hurricane, and the fact that the most common kinds of generator found in these communities were not designed to be operated for an extensive time. The water in these types of communities often had to be rationed. Nevertheless the sense of pride and agency is still present, and the effectiveness of the human networks required to successfully manage the generators and the residents' water usage under these conditions also reveals the extent of the social capital present in these communities.

During the first days we had no water as a result of pipe ruptures and lack of diesel...now we turn on the electric plant for 4 hours which is enough to fill the tank...the fact that the community has water makes them feel very good, even though we don't have electricity, have lost the main road, and do not have communications.

— *Phone interview with the leader of a community water system in the eastern part of Puerto Rico*

We are very happy with how the community has worked together, considering that other neighboring communities don't have water...We have been providing water in gallons to neighboring communities, we never denied water to anyone...the generator is turned on from 6am-6pm and we have divided the community in two sectors, one sector gets one day and another sector another day, because the generator would get exhausted if everyone gets water the same day. But the people are very happy with my work, since I have been moving to establish the water service quickly after the hurricane. At the beginning people did not understand the magnitude of the problem and their patience was exhausted and I even got frustrated, but people finally understood the situation and we all got together to work and collect money to succeed.

— *Phone interview with the leader of a community water system in the western part of Puerto Rico*

It's been our blessing after the hurricane. It's been the greatest blessing, because now I look at other sectors, where I go to work, at how people carry water, and they carry it in a way that makes you say 'wow, we're so blessed in my community, we don't have electricity, but we have the most valuable thing.' Even if it's off one day and on the next, we have water that when you turn on the tap of the faucet in your house, it gets to you.

— *In-person interview with a community leader in central Puerto Rico*

When interviewees explain that their communities feel good, or proud, to have water in the midst of the crisis, it demonstrates a value beyond the simple necessary resource of water. There is a value to agency, which looks nothing like the helplessness reflected in headlines. Most interviews provided this sense of community pride in their resilience and in the fact that the water system is not just a system to distribute a particular chemical compound, but one that serves multiple social functions in the community (Fig [2]). For example, interviewees explained how the individuals and families involved in the management of community water systems developed the networks to reach governmental and nongovernmental agencies for help and supplies during the crisis. Non-PRASA infrastructure could also be adapted to hurricane relief: for example, the space used as a community center for issues related to the water system became the center for receiving and distributing the goods in several communities (Fig [3]). In this way, the non-PRASA waster systems were seeds of resilience that facilitated the effective distribution of resources.



*Emergency relief supplies being organized by a non-PRASA system operator.*

## **Discussion**

The narratives of leaders of community water systems reveal that these can become hidden instruments of agency and structures for remembering. The systems comprise not only tanks, generators, and chemicals, but also managers' expertise, residents' habits of cooperation and coordination, physical infrastructure, and relationships with neighboring communities established in previous crises. All this allows these communities to quickly identify resilient methods for water access and quality during hurricane events.

The community choices and their experiences described here counter official

narratives which promoted technological solutions with the nominal purpose of lowering health risks and fostering development. The non-PRASA communities' apparent resistance to connecting to the larger water distribution system fits into a pattern observed by authors that deconstruct concepts of development as tool for colonialism (Escobar 2011), and also echo the field studies by Kropotkin, which noted that certain communities keep local traditions instead of accepting new models offered as if they were based on science, "but are no science at all" (Kropotkin 2012).

Of course, the generally positive experiences of the surface non-PRASA water systems should not be read as a solution for water access throughout Puerto Rico, but as a reminder that the various lenses through which we usually view this catastrophe in academic and non-academic contexts are tinted by colonial histories, hierarchies of power, modernist economies, and other biases. Individual narratives provide another view. While they seem to echo the crisis response model described by Solnit (2010), in which survivors of a crisis do not tend towards an "elite panic" which tries to preserve inequalities, but rather towards altruism and new social bonds, it is crucial not to interpret the evidence of non-PRASA communities sharing water in these terms alone. The origin for the Puerto Rican term "becoming people again," which describes this kind of humanization, is a short story about Puerto Ricans facing a power outage in New York City, "The night we became people again" (González 1972). In a very real sense, non-PRASA communities were already "people" before María struck. A new sense of solidarity was undoubtedly one part of the post-María experience across all of Puerto Rico, but the non-PRASA experience better illustrates Aldrich's (2012) observation that existing social capital has tremendous positive impact on how communities behave and adapt to crisis. The non-PRASA communities did not necessarily have to transform to create new social structures, since these communities already have a key structure that enforces interactions and collaboration, even during difficult times. Their narrated experiences of the crisis are likely to already affect decision-making at a local level, and if we do not discount or distort their stories as they filter into social and ecological research, they will also contest the prevailing policies of colonial water regulation.

More broadly, the narratives presented here and their subversion of official narratives

encourage us to look more deeply at the images and the ideas that were dominant after the hurricane event. The interactions captured on camera at the rivers and makeshift spring water distribution systems include people carrying water for neighbors, bathing each other, and reminiscing, reminding us that people appreciate water for multiple reasons that extend beyond the biophysical and engineered definitions of water quality. These images and narratives also show how accessible these alternative water sources were for families because of the geography and land tenure system of Puerto Rico. Water management policy may be one of many colonial constructions that has mischaracterized both the needs and the inherent strengths in Puerto Rican rural communities. Recovery from Puerto Rico's crises requires us to listen more carefully to its people, its landscapes, and its history.

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