

CONSERVATION

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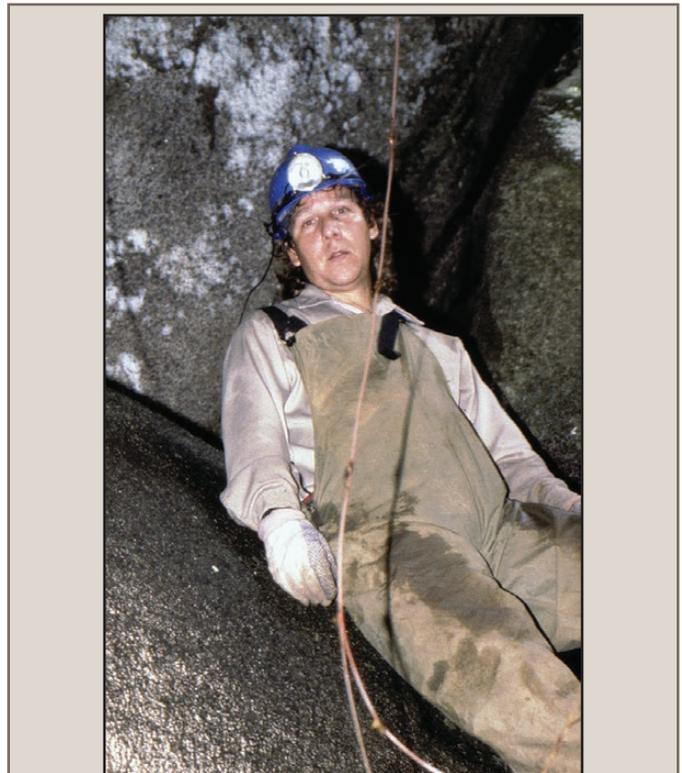
Perspectives in Conservation

For the last 32 years, Rafael L. Joglar has been working as a Professor and Researcher in the Department of Biology at the University of Puerto Rico, Río Piedras Campus. He was interviewed by Conservation Section Editor Jennifer Stabile during May 2018.

What path led you to a career in conservation biology at the University of Puerto Rico?

When I was a kid, my parents had a very strong and positive influence in my life, and we used to travel a lot within Puerto Rico. My parents would take the whole family (which is basically my two sisters and me) to El Yunque rainforest, and also to other natural areas in Puerto Rico. At that time, these were not common family vacations—people preferred the beaches. But my parents would take us to El Yunque and other high mountain locations in Puerto Rico. So from an early age, I was in contact with these spaces and maybe without realizing, or being very conscious about it, I became a naturalist. El Yunque became one of my favorite places in Puerto Rico. We used to go also to Barranquitas, which is in the central part of the island. It's high up in the mountains, green, beautiful.

Since I was a kid, I was in contact with these places, and I was falling in love with them. Then when I was in high school, I took a career placement test. From the results, it was obvious to me, and to everybody who was involved with my education, that I wanted to be involved in a career that will not confine me to an office. I was not qualified (or not interested), in working in an office from eight to five, sitting at a desk all day long. But I wanted to actually do something outside in the field. It was obvious from my exam that I wanted to have a job that didn't require me to work wearing a suit and a tie, but actually more outgoing, wearing blue jeans, T-shirt, and tennis shoes or boots. In my school, there were basically four careers that were very attractive to most students: 1) medicine; 2) law; 3) architecture / engineering; and 4) business. When we had the career week in my senior year, for the organizers of the activity it was fairly easy to place most students in one of these four categories. However, the organizers really had a very tough time trying to place me in a category since I was interested in doing fieldwork and being outdoors in direct contact with nature. At that time I was interested in biology and I was considering a career as a marine biologist. Although they had a hard time trying to locate somebody interested in biology or marine biology, they did place me in a marine biology lab within a neuroscience institution in Old San Juan. There I was lucky to be in contact with Dr.



RAFAEL L. Joglar inside “guajonales” caves, San Lorenzo, Puerto Rico, 1992.

Allan del Castillo. He was a researcher working with the nervous system of sharks in Puerto Rico and the Caribbean.

So, for the whole week I was working from a boat in Fajardo doing skin diving and capturing sharks for his study. Every afternoon, all classmates would get together in my school to discuss and share the experiences that we were having. Almost everybody was wearing suit and tie and I would show up in a bathing suit, with a very dark tan because I have been in the sun all day long, chasing sharks, living my dream, and having the adventure of my life.

This desire to be outdoors and to work with biodiversity took you to the University of Kansas (KU), where you studied systematics and ecology. How did you get there?



With research assistants, Mona Island, Puerto Rico, 2011.

Early in my career, as sophomore undergraduate student, I was very much interested in zoology. During my junior year, I started doing research with two species of coquis: *Eleutherodactylus coqui* and *E. portoricensis*. I felt a very strong connection with those species and this kind of biodiversity. Then, after I finished my Bachelors, I did a Master's Degree working with Juan Rivero and I was actually employed by him at that time. I was his Research Assistant, so I was under his wing, working on his research projects, while I was carefully observing him in his job as a professor and researcher, and at the same time, publishing books on Puerto Rican biodiversity. So, I got a pretty good feeling of that world and ultimately, I became attracted to it. Then, after obtaining a Master's Degree at Mayaguez with Juan Rivero, I was ready to take it to the next level: a Ph.D. Program. In order to accomplish that, I had to leave Puerto Rico. I had two places in mind: Albany, New York to work with Margaret Stewart, or going to Kansas to work with Bill Duellman. Kansas was very solid at that time, for systematics and ecology, and I ended up going to Kansas and working with Duellman. So I moved to the Midwest (far away from the ocean and the tropical rainforest) and for five years lived there, working on my Ph.D. degree. For me working in the KU Museum of Natural History, surrounded by all this knowledge of systematics, evolution, and ecology, was a wonderful experience and once again I was living my dream.

Upon finishing your PhD under Dr. Duellman, what made you decide to head back to Puerto Rico?

After having been gone for five years, I was ready to go back to Puerto Rico. In a way I had to. I was awarded a fellowship given by the President of the University of Puerto Rico (UPR) to outstanding students to go abroad to do a Ph.D. The agreement was that upon finishing my degree, I had to come back and work at the UPR, at least for the same number of years that I was given the fellowship. I finished up my degree in Lawrence, Kansas in 1986, and immediately applied for a job at the UPR. At that time, I was very much interested in going to the UPR at Mayaguez as opposed to going to UPR at Río Piedras. Mayaguez is a smaller community, with a smaller campus, and besides that, it is where I went to school, so I had a history there and lots of wonderful memories. Unfortunately, there was no position for me at Mayaguez at that time.

So, in a way, I was forced to go to Río Piedras and I wasn't very pleased, at least in the beginning. Even though I was born and raised in the San Juan area, where the UPR Río Piedras Campus is, I felt more connected to Mayaguez. After living in Lawrence for five years I got used to that Midwestern kind of living—peaceful, as opposed to life in the big city. So, I was looking forward to Mayaguez and not to San Juan. But, you know, you do not have control of those things in your life. Here I am, working in Río Piedras for the last 32 years, which has been actually wonderful. I love it. It's home.

Your primary conservation and research focus has been the coqui frogs of Puerto Rico. What made you decide to focus on amphibians?

No matter where you go in Puerto Rico, you will hear these frogs calling. When I was a kid, I was intrigued by their calls and I would ask my parents and other family members, what is making such a wonderful sound? Nobody knew very much about them at that time. So when I was a kid I was fascinated by those things, I wanted to learn about them but there was almost no information. As I grew up, I began reading and trying to find information about them.

When I went to Mayaguez, for my undergraduate degree, I spoke to Juan Rivero about doing research. While interviewing me, he realized that I was interested in biodiversity. I told him I was living very close to the Maricao Forest Reserve, a rainforest, very similar to El Yunque but on the west part of Puerto Rico. He gave me the opportunity to study two sibling species of coqui. And that was the beginning. I read his book, and I started doing research under his guidance; the more I learned, the more I wanted to learn.

I was completely blown away by the things I was learning at that time. While I was going to school in Mayaguez, on weekends I would travel to San Juan to see my family but also to go to El Yunque, where I was doing most of my coqui project. At that time, nobody wanted to go to El Yunque at night with me. All my friends were having a good time in San Juan on the weekend and for all of them it was too bizarre and too weird to go to El Yunque at night to look for frogs. So I had to go by myself every weekend. Now, everybody wants to go to El Yunque, but at that time, it was impossible to convince anyone to go. I've been working in El Yunque for about 45 years now. I feel El Yunque is my second home.

In 1986, after a five-year absence from Puerto Rico, I was able to notice that our frogs were having a hard time. It was obvious to me that we were losing amphibian populations and there was the possibility that we could be losing species. Even though I didn't know what was going on, I was very much worried about the loss of biodiversity.

In 1989, I remember presenting these findings in an international symposium on herpetology in Venezuela. I talked about the possibility that three of our species were extinct and several populations were declining. The audience was very upset; I felt as if they were going to throw rocks at me. People were not happy at all by the fact that I was implying that some frogs could be extinct, so, I was almost slaughtered there. As you know, science is very conservative. I presented that paper in 1989 and it was in 1990 that people got together in California and started talking about declining amphibian populations (DAP). In the 1990s many herpetologists, especially the most conservative ones, were having a very hard time trying to cope with the possibility of DAP.



NATURAL History of Puerto Rico class field trip, UPR-Campus, Río Piedras, Puerto Rico, 2012.

Now, no one will argue that amphibians are having a hard time and populations are disappearing. In the beginning it was difficult and other scientists had difficulty believing me when I said that frogs were having a hard time in Puerto Rico. They would say: “No, no, no, you have no idea what you’re talking about. Please don’t say this in public. What you’re seeing are natural population fluctuations. We’ve seen that with all the frogs, and all species in the world. Their populations go up and they go down, these are natural population fluctuations. Please don’t use the word extinction.” So, yeah, it was hard, very hard in the beginning.

And what are the greatest threats to the amphibians of Puerto Rico?

Well, it is difficult to know. When the University of Puerto Rico Press published my first book on the coquis of Puerto Rico in 1998, I was completely convinced that we had lost at least two species: *Eleutherodactylus karlschmidti* and *E. jasperi*, the two most distinct and bizarre species of coqui on the island. When I wrote that book I didn’t have a very good idea of what was going on. Of course I went through the whole list of the usual suspects: pollution, deforestation, invasive species, and climate change.

At that time we didn’t know about the amphibian chytrid fungus, so in the beginning it was difficult to know what factors were responsible for disappearing frogs. Six years after that, we

discovered that the chytrid fungus was in Puerto Rico, and we also realized that we had lost three species of frogs. This was probably due to a combination of factors such as chytrid fungus, climate change, and deforestation. We also learned that hurricanes could have an impact on local biodiversity. We were working in El Yunque in 1989, when Puerto Rico was hit by Hurricane Hugo. We were monitoring two endemic species of frogs—*Eleutherodactylus coqui* and *E. portoricensis*—when El Yunque was hit very hard by this Category 4 hurricane. We had no choice but to follow our study and try to figure out its effects on the amphibians on our study site. We documented that *E. coqui* was able to cope with the drastic changes that the hurricane caused in the rainforest. The other species, *E. portoricensis*, a specialist with a much more limited distribution in Puerto Rico, did not adapt to the changes caused by Hugo, and started to decline. What I didn’t know then, but I know now (30 years later), is that this species is declining so dramatically that it could go extinct in the near future.

Learning from Hugo, let’s discuss Hurricane Maria, which hit Puerto Rico in September 2017. How do you think that will affect the biodiversity of Puerto Rico?

María was an extremely powerful hurricane, and even though it was classified as Category 4, it was borderline Category 5. After

observing the damage it caused on vegetation at El Yunque and Carite forests and on vegetation and structures in the San Juan area, I have the impression that María was actually achieved Category 5 status several times while hitting Puerto Rico. Winds were so strong that all radar installations on the island were destroyed, including the Doppler, even though it was built to resist winds of 160 miles per hour.

When Hurricane María hit our island on September 20, 2017, it confronted us with a reality we have forgotten or ignored for a very long time: Puerto Rico is, and has always been, in the route of hurricanes. María also demonstrated that hurricanes could have a devastating effect on our way of life—communications, economy, and on the way we produce and consume water, food, and energy.

Hurricanes can also devastate our biodiversity, affecting species that were already in a delicate or critical state, such as the Puerto Rican Parrot (*Amazona vitatta*) and *Eleutherodactylus portoricensis*, among others. Hurricanes can alter habitats and this might help invasive species colonize or, if already established, increase in numbers. This is probably the case of at least two invasive species in Puerto Rico after Hurricane María: Green Iguana (*Iguana iguana*) and the Cuban Tree Frog (*Osteopilus septentrionalis*).

What are some of the challenges you face working on conservation projects in Puerto Rico?

Puerto Rico is going through extremely difficult times. A year after the hurricane, many Puerto Ricans still struggle without electricity or a roof at their homes. To make matters worse, before the hurricane, we were trapped in an economic and political crisis. We have two different governments (U.S. and our own) imposing extreme austerity measures and this is causing serious problems, particularly on the most vulnerable sectors of our population (elders, retired, sick, and students). Both governments are imposing 60% budget cuts to the University of Puerto Rico, the only public university on the island. This will have a huge impact on our research, and on our conservation efforts.

The same thing is happening with conservation agencies (Department of Natural and Environmental Resources, USFWS, EPA, etc.). Before the hurricane, and before the economic crisis, the Department of Natural and Environmental Resources (DRNA) didn't have much power or budget. Now, with this crisis, DRNA is almost non-existent and this situation will have serious implications for conservation issues in Puerto Rico. Because of our economic and political crisis, there will be less and less money and resources allocated to conservation. It has always been a challenge but now it is going to be even more difficult.

What keeps you motivated to continue working, despite these obstacles?

I love Puerto Rico. I feel I am very lucky to be born and raised on this island. I also love working at the oldest and only public university in Puerto Rico. This has given me the opportunity to serve, not only the university community but also the general public, an important goal for the UPR, and one that I have taken very seriously. And then, of course, I love biodiversity. So, I will keep on working as long as I can. My interest hasn't changed even though my body doesn't feel the same, particularly during fieldwork. I am still surrounded by excellent students. Some of my former students still join me in the field as well. Carlos Andrés Rodríguez and Louis Santiago have been helping me in the field after Hurricane María. Their help in training students and gathering data is very much appreciated.

I am impressed by the number of people who are monitoring amphibian populations in Puerto Rico these days. Some of them are my former students or colleagues, and they learned about coquis in my lab. Frogs are being more carefully looked at in comparison to when I started 32 years ago. In 2017 some colleagues using acoustic recorders concluded that three species of Puerto Rican *Eleutherodactylus* (*E. karlchmidti*, *E. jasperi*, and *E. eneidae*) have gone extinct and that several populations of several species have been extirpated from lowlands in Puerto Rico, validating what I published in my coqui book in 1998 and in our DAP publication in 1996. I do not feel proud nor happy about this. I was hoping I was wrong.

What is next for you, what projects do you have on your desk?

If possible, I would like to stay at the UPR. Unfortunately this is a big question mark, right now. The UPR is under a lot of fire; there are people in the government who would like to see the public university shut down. But if things go well, I would like to keep on teaching and doing research at the university.

If given the opportunity, I would like to keep on training more students. Currently, I have a wonderful Ph.D. student, Alejandro Ríos, who is studying acoustics with several species of *Eleutherodactylus*. We just submitted a paper on harmonics used by three endemic species. I would like to keep on publishing books for the general public on Puerto Rico's biodiversity. There are some manuscripts sitting on my desk waiting for the opportunity to be published. I also would like to keep working with you (Jennifer Stabile) and Louis Santiago on the wonderful coqui project on Mona Island. More than anything I would like an excuse to go to that paradise island.