Interview with Greg Guannel

Interview Participants:
Melody Hunter-Pillion, *Interviewer*
Greg Guannel, *Interviewee*
Jamie Currie, *Videographer*

[Due to climate control sensors in the room, occasional audible beeping occurs during the interview session]

Melody Hunter-Pillion: So, for the record, I'm Melody Hunter-Pillion. I'm interviewing Greg Guannel, and today is Thursday, May the 31st, 2018. We are at the International Institute of Tropical Forestry in San Juan, Puerto Rico. And we're discussing experiences with, and lessons from, past drought and other extreme weather events, including hurricanes. We're also discussing management strategies to improve resiliency in the future, uh, in the face of future drought and other weather events.

So, Greg, tell us your name, your title, what agency you, you're with but also explain your role, what you actually do.

Greg: Alright. Uh, yes, so my name is Greg Guannel. I work at the University of the Virgin Islands. I'm the director for the Caribbean Green Technology Center. And, um, what I do is I focus on issues of, uh, infrastructure resilience, issues of energy independence and issues of waste reduction, waste management, uh, focusing mostly on, um, sort of reducing the amount of waste, reducing the recyclables, um, etc.

I'm a civil engineer by training and my focus before joining the university which I joined a year or so ago was on coastal engineering and more precisely hazard risk reduction by ecosystems, uh, ecosystems so mangroves, coral reefs, etc., etc.

Melody: OK. So, you are now living on which island and working on which island?

Greg: I work, uh−I live on St. Thomas, um, in the Virgin Islands but my area, I guess, my domain, my sort of geographic area is the whole of the Virgin Islands.

Melody: OK. Where, um, s-, were you on St. Thomas or in the Virgin Islands when Hurricane Maria hit?

Greg: Mm-hmm.

Melody: So let me ask you very specifically, um, about your exp-, your personal and then professional experience with Hurricane Maria. Where were you when the storm came in? And when I say where were you, sort of describe, um, community you were in, the people who were with you, if you were with family, and the sort of things you saw and heard.

Greg: Yeah. So, uh, the Virgin Islands actually experienced two hurricanes. We experienced Irma and Maria. Puerto Rico experienced, uh, mostly Maria. So, um, for Irma, I was somewhat

prepared, um, in a sense that, uh, at the beginning of the hurricane season, we did the sort of gathering of the, you know, supplies, and medicine, what not. So I was not too stressed out before the hurricane hit, but I knew that the house that I was renting with my family, my wife and two kids, uh, would probably not make it through the hurricane. It's a wooden house, um, a cottage, [laughs] so, I had very little faith. And, uh, so we actually went to a colleague of ours who has more, uh, sort of a sturdier house.

So, during Irma−So we moved there, probably, uh, a day before Irma, I imagine. We spent the night and then Irma happened the day after. Uh, and, uh, yeah, it was interesting. I mean I grew up in Martinique, so I went through I think one hurricane in the early '80s when I was a young, young child I guess at that time. Uh, and many tropical depressions, many sort of smaller systems, so, um, yeah, it was a, it happened during the day. The only thing I remember, really to be honest, is the fact that there was a door that was threatening to blow open, and so I was just watching whether or not the door would blow open. [laughs]

And then it stopped. [laughter] And that was good. Uh, and, uh, it was a very, it was mostly windy. It was a very strong wind storm. Um, and then after that we got out and we were sort of−I mean my kids and my wife were OK. My colleague who was upstairs was OK, but we were just sort of flabbergasted, I guess, by the strength of the wind, uh, and the hurricane, and the fact that−I mean, we couldn't see anything because it was like rain, you know. But the whole, all the vegetation was gone. So it's like three hours after the event, all the vegetation was gone. Trees were down, there was no power. The power went off half hour within the hurricane. And the electricity system is very unreliable, so it's not like we were surprised. But we were surprised to see all the poles down, and we realized that this was a, a big deal. [laughter]

There was a curfew that the governor installed, and, uh, the reason for the curfew was to allow, uh, first responders to do what they need to do and not be in their way. So, we complied with that curfew. There was no safety issue or nothing like that, it was really sort of let the people do what they need to do. Um, but, during that time we sort of went ahead and cleaned up the road with some, um, with the neighbors of my colleague who I didn't quite know. But we just, you know, different people got out, they, shared their impression and then started to sort of clean the road, removing debris, removing, you know, fallen this, fallen that.

I mean the, the amount of roofs that were gone, I mean it was really impressive. I mean you need to see some pictures to really understand. Then, uh, I think a day or so after I just went during the allotted time where curfew was lifting to check on the house, and the house was OK. But again, it was very impressive to see that on the other side of us, the other side of the valley, all the houses were damaged and the roofs were gone. So I think we just lucked out [laughs] because on our side all the houses were just completely fine, no damage whatsoever, but on the other side. So I think it was the orientation of the wind mostly.

Melody: And this was still Irma?

Greg: That was Irma.

Melody: OK. So you hadn't even [laughs] thought about this next storm coming yet?

Greg: Well, we were, no.

[laughter]

Greg: Of course, that was it.

[laughter]

Greg: Uh, yeah, so no power, so no power means no water, no running water. We have cisterns, um, so that was good, but getting the water, and that's when I understood why so many people had buckets and buying buckets at Home Depot because I didn't buy buckets. People were buying a lot of soap, too. I don't know, I don't know why. I still don't know why they were buying so much soap. But, um, I should have bought buckets. [laughter] To get the water out. But I had enough rope. And anyway, we were OK. Uh, but the realization that we would be without power for, I would imagine, until 2018 at the time was, uh, daunting. I mean we−I was really thinking, you know, have we got power back in, uh, Thanksgiving. So...

Melody: That's still a long time.

Greg: Yes. [laughter] But the realization of what our future will be, started to dawn on us and it was not very fun. But, you know, it's all right. Uh, anyway, so cleaning up, trying to understand what to do. We tried to live with, in our house, um, but there was just bugs everywhere. I mean bugs everywhere. And I mean like, uh, the wildlife was really confused and iguanas were in the middle of the streets. I mean everybody, like all the wildlife, all the birds, the mongoose, the iguanas, the chicken, everything was very confused. And, and there were all type of bugs that I'd never seen before, you know, and lots of mosquitoes. So it was just terrible, especially with kids. I have a three and a six-year-old now, but they were, you know, they were slightly younger at the time. They were fine. They just, one of them slept during the storm and the other one wanted to, um, watch cartoons I think during the storm. So they don't, they didn't quite pay attention to any of that. Um, they're just annoying kids, I guess. [laughter]

After the storm, not knowing how to, not getting away, you know, we were sort of busy. So we decided that for the sanity of everybody we would go back to our colleague's house. The−Her house was damaged, but it was OK. It was better, and she had a generator. And then, you know, she had a cistern as well. The generator was working on and off, but it was OK. It was giving us a little bit of power and there was no bugs. There were fewer bugs. So anyways, so tha-, yeah, yeah, I mean I can go on and on. But basically, everything was devastated in the island after Irma.

Melody: And then when did you start hear−After Irma, how long was it before you even started hearing about some other storm may be coming...

Greg: Well, there were some other storms here and there. Then we started to hear about Maria probably a, I'd say a week before Maria happened, so probably a week after Irma. I think the span was two weeks. And then there was a big sense of, oh no. [laughter] And dread, and like I don't want to go through this again. Here we go. Yeah. It's this sort of thing where you're tired but you have to do it, but you're tired, but you have to do it, and you don't want to do it, but you do it. [laughter]

So yeah, so we went back to my, I still didn't have any trust in our house. Um, it's not worth the risk and the, whatnot. It was funny 'cause my wife was sort of wondering what should we bring, what should we bring, you know? And I was like, you know, "Just bring the, the essential and, you know, expect everything to be gone." [laughs]

Melody: Did you have an apprehension that it would be even worse than Irma? Did, was that, I mean what...

I, I just go through the motions. I didn't have any, any thoughts to be honest. I just said, "OK, another hurricane. And we'll see what's gonna happen." [laughs]

Melody: And when that one hit, when Maria hit, was it different during the storm?

Greg: So, Maria hit was−So, so I learned two things. Number one, um, I had a waterproof backpack. Yes, I bought a waterproof backpack 'cause what I realized is that yeah, you can take your documents with you, but if water comes in the house everything gets wet. So, I had a waterproof backpack, and I had, um, better knowledge of the radars and the sort of, um, you know, like there was a radar in Puerto Rico that was tracking the storm so, and providing live information. So, so that was actually better 'cause I was able to see the storm coming, whereas Maria I was just sitting there like, "Anytime now." [laughs] So Maria hit and, um, yes, so that was fun. The non-fun part was that Maria hit during the night so we could not−It was just a very tense day, a very quiet but very tense day where everybody was just sort of like, you know, preparing themselves. And um, Maria hit during the night. The kids were asleep, like gone, so that was good 'cause, Irma was a little bit annoying with the kids but Maria, the kids were asleep so that was good.

And, um, yeah, I was just on my phone, to be honest, until everything went out. So yeah, I saw the hurricane come by. And I was, you know, texting and sending messages to my friends and my family, uh, outside of the VI [Virgin Islands] to let them know that, you know, how things were progressing. And, um, yeah, I think Maria was scarier. I don't know why. I think Maria was scarier because it was at night. Somehow the wind was not that strong, but where, where we were, we could hear the wind more, and it was like a, a train type of wind. And then there was just so much water. It just kept on raining, and so we had water coming into the house, through the window, through, like−We just started to get a lot of water. And so, we were not as worried. I was not as worried because what we did is the door that was sort of problematic during Irma, we just barricaded, put a lot of, you know, three, four screws and, and wood and whatnot so the door was OK. Nothing was moving structurally, but water was coming in like crazy. And then, you know, if it was like, we forgot to close a gas, uh, bottle outside, the bottle just flew away. Gas was hissing out. Then I had to decide whether to go and close the bottle or wait, and decided to go out because I didn't want, uh, you know, have it strike and just, you know everything explode. But at the same time, you know, going outside, you know. [laughs]

Melody: Dangerous.

Greg: So, Maria was very, very, very stressful, and it lasted a very long time. I think it started around 7:08 and ended up around 3:00, 4:00 PM. So that was just exhausting to be awake and just sort of like [inaudible 14:27]. Um, but it was mostly water. So, and then by that time everything that was supposed to be down was down. [laughs]

Melody: So that's what I wanted to ask, too, the aftermath.

Greg: Yeah.

Melody: When you go out after all that and see, and not just there in the immediate neighborhood, but later, as you're able to get around the island and just see. How, I mean just how devastating was it? What were you noting? Personally, and as a professional, what are you, you know you start to put that professional hat on, what are you thinking?

Greg: Yeah. So again, Irma basically cleared up everything. All the structural damage was done by Irma, I would say. I mean yeah, the big structural damage was done by Irma. Some of the thinking is that Irma shook a lot of structures. Those that failed, failed. If they didn't fail, didn't fail. But at the same time, because Irma shook so much of the structure, water then found new ways to get in during Maria because the structures were, you know, a little bit more−Because the wind wasn't that strong. But somehow water found ways. That's like, I mean up until now I just couldn't, I just have a hard time understanding how water was able to flow in some places in the house.

So in terms of the aftermath and the going outside um, most of it was after Irma, where, like I said, all the trees, all the leaves were gone on the trees. It's like living in a, you know, winter-scape, you know, a lot of houses destroyed, a lot of cars destroyed, um, a lot of, you know, um, yeah, a lot of buildings destroyed. My building at the university was destroyed, new buildings. Many dorms were destroyed in the university after Irma. And I'm a coastal engineer. And I was, so I was looking a lot at, um, the response of the shoreline, looking at how, you know, mangroves, were flattened, lost their leaves so, and then, uh, a lot of erosion. Looking at places where, you know, where we had wide beaches, the roads were OK. But where there were narrow beaches or, you know, revetments, the roads were sort of affected, you know, in terms of their integrity, so again thinking about, you know, how far do we build from the coast and things like that, you know?

A lot of the structures that were on the beach, very close to the beach, were destroyed, um, so again thinking about set-back distances, thinking about, you know, minimum width and stuff like that. A lot of corals on the beach, dead corals on the beach, a lot of gravel, you know, heavier-type rock, and coral heads on the beach, so it kind of made me think about, you know, when you talk about coral reef protecting against hurricane. I started to sort of thinking about how we might be overemphasizing the role that ecosystems play for hazard risk reduction, um, 'cause I don't think they really did anything, but at the same time they might have.

And then so after Irma−After Maria, I went back and looked at the, again at the same systems, and took some pictures and tried to understand some before and after. Um, between Irma and Maria some banana trees started to sort of grow back, you know? The leaves started to grow back. So that was interesting to see what that type of plants, you know, were growing back. I didn't−I'm not a plant person, so, but I think that there were a lot of opportunities that could have been, uh, taken advantage of if you know, you had a plan. Right? I mean, sure, from a personal point of view, people are shaken up. But I think it's such a usual sort of event with unusual impact that there were a lot of opportunities that could have been taken advantage of. Um, I didn't have any of the instruments, so after Maria, I reached out to a colleague of mine, I think from Oregon State. And then, um, this led to this, leads to that. And I think early November, a

team of, folks from Oregon State University, Notre Dame, Florida State−No, University of Florida, and some Japanese university came to do a high-water mark reconnaissance to look at, you know, how high the water went during the storm.

I wish we could've done the same, from my fluvial point of view, um, but we didn't have the time and didn't have the contact. But again, hopefully, I would be able to make some more contacts and try to see more people um, you know, would be interested in doing these types of studies shortly after the storm 'cause you lose−I mean, time is the, of the essence to kind of get some of those, you know, markers.

Melody: Why is that important to get those markers?

Greg: Well, helps, it helps us understand what happened. Helps us quantify what happened, how, you know, how strong, how high was the surge, how high were, you know, were the waves because we can then model that, right? And then we can, if the models are good, you know, match the observation, then we know that, you know, we can thus, then start making recommendation for better management, you know, then using whatnot or design of this and that.

Um, so, you know, and then from understanding how the ecology comes back also would help us think about, you know, how the systems react to those events and help with, you know, whatever management, but also, to put some bounds in what we expect from them. Because right now, there's this big wave of ecosystem services, which is fantastic, but I think that, you know, we don't really have a good understanding of what they do and how they rebound from extreme event, and thus, how we can really [inaudible] them after each event. So, anyway, so that's why, when, you know, the fact that so we notice that, you know, the trees lost all the leaves, and so, I think that it's contributed to a more sedimentation, uh, excuse me to more sediment plume, because there was more erosion of the top soil, because we didn't have the leaf cover anymore.

What was surprising in the VI was the amount of water after Maria. I mean, it rained for days and days. I think it rained for probably a week or two nonstop after the storm. So just a huge, huge amount of water coming down, and sort of, you know, all the systems, all the drainage was basically [inaudible]. [laughter] I mean, water was just going everywhere. So, like, you know, some roads were, were just dissolving.

I mean, after Maria−After Irma, the roads were fine. There was some damage here and there, but the roads were completely fine on St. Thomas. St. Thomas is very steep. Uh, OK. [laughter] But after Maria, it's like, you know, sugar. Like running water on sugar. It's like sh-, everything, and so, the roads got worse, and worse, and worse. And so, it was just, I think it was miserable. [laughter] Because we didn't have running water. We didn't have, you know, we didn't have, electricity. The roads don't work anymore. You have to wait for gas. I mean, it was, it was not too fun after Maria. It was just exhausting. And then there was this whatever, Julio, whatever storm that was forming, and we were just like, "I don't know if I can take this." [laughter]

Melody: So, let me ask you. When you talked about those leaves, you know, I've been to St. Thomas and St. John. It's beautiful, and so when I see the foliage, I'm just thinking it's, it's beauty. But you're saying, hey these leaves are doing a lot more than just providing some

aesthetic. It's more than just about looking good. Though what that, there−Those leaves are doing some work, when it comes to rain and that. Describe that to me the, the job of the leaves.

Greg: I'm not an [inaudible], but, I think what they do is, I mean, they capture some of the rain, they reduce the velocity of the water hitting the ground. So they reduce to - small amount - but they do reduce the amount of water hitting the ground, not just, you know, providing, you know. And then they reduce the velocity. Um, and then my understanding is that there might be some evaporation that happens at the same time. So my understanding is that they do help reduce the velocity of the flow, and the amount of water that hits the ground. And so, it reduces the amount of water that goes−The amount of soil that gets eroded, and the amount of water that, you know, goes into the streams. So that's my sort of understanding of the function that they provide.

From a coastal point of view, you know, the corals, the theory was that they would reduce the waves. Some people say they reduce storm surge - but they don't, I don't think they do - because they provide, you know, friction. Um, but the thing is, a lot of them got broken by the sheer force of the waves, so, you know, I think at some point, they're still providing that, you know, reduction. The mangroves, the, the theory is that, again, they, because they are sticks in the water, they will reduce the velocity of the flow, reduce the storm surge, reduce the wave. But the fact that, you know, after Irma, the trees were down, the foliage was down. The ability to provide that same protection, benefit after Maria was minimal, I think. But I think that we haven't, you know, we know, we haven't really studied those systems in those extreme conditions.

So, I think that for me from a personal point of view I saw that, you know, there was some opportunities to, to, to create better protocol to, to after, you know, storms like that. And I guess, you know, we didn't do a thorough job but one thing maybe would be doing in the future is maybe figuring out, you know, how we can measure some of these attenuation rate in the, in the forest and in the coastal, some of the coastal habitat. The sea grass, the theory again, sea grass reduces waves, providing drag and friction and whatnot, but the sea grass were gone. I mean, all of the sea grass beds were gone.

So, again how we talk about ecosystem services, I think we need to start to be a little bit more careful and temper expectation and maybe be more strategic. One thing that I want to say from, um, is that the storm revealed how bad the drainage system of the VI is. Um, and how, you know, sort of planning decisions that were made led to more flooding in some areas, and we really didn't have a sense of the hydrology, so I think what came out of this is the need for more measurement, more data. I think it was good because it's, I mean, ultimately what we're gonna get is more data, uh, collection, better understanding of the systems, etc., etc., so we can, sort of, think about better mitigation options, I think.

Melody: And so, maybe with that you've already answered my next question but let me ask you this and, and, 'cause I know you're projecting ahead and thinking about, "What do we need to do to make this better?" Um, so what has changed for your science and what you're doing after that storm?

Greg: Well I think it, we now have, having lived through this, I think the, the opportunity to sort of refine some research questions there. The opportunity for more collaboration, more partnership is there, reaching out to−We are a small university, we don't have a whole lot of redundancy, or we just have gaps to build next in, in, some fields. So, the opportunities to partner

with folks from UPR [University of Puerto Rico], folks from North Carolina State [University], from, you know, elsewhere. I think there are some cool science that can be done, to sort of better understand impact of hazard but also, you know, effectiveness of mitigation options.

Um, you know, going back to ecosystems services, I think that, you know, I'd like to, sort of, revisit some of what has been done, and try to see if we can start maybe creating a more complex, probably less satisfying but maybe a little bit more tempered, um, sort of dialogue about, you know traditional infrastructure and, you know, green infrastructure, as we call it. And how the two interact when we think about hazard, you know, mitigation.

Melody: And when you, you said that, you said maybe less satisfying, and what you do mean by that when you say, you know in these conversations?

Greg: Well, I mean, we'd like to say, "I found the solution! It's gonna save the world! And everybody's gonna be happy and merry!" Right? And, uh, it's not exactly like that. [laughter] When you get your paper published, it's wonderful but the reality is probably sometime not like that. I mean, and I think there was a lot of, uh, enthusiastic, uh, papers that were published saying how coral reef and mangrove are gonna be the new, sort of, way of doing things and I think that we need to, sort of, cool it down a little bit. [laughs] I mean that's my perspective and I guess that's the type of question I think that came out of, the type of thing that came out of, you know, of the storm. I mean when we talk about, you know, forest conservation practices and for, you know, reduced sedimentation, and this and that, that's great, but when you have, you know, a extreme event that occurs that, you know, wipes out all of those, sort of, parameters and you end up with huge amount of sedimentation. I mean, I'm, again, I'm not a hydrologist but I think the question is, OK, so what does that mean, you know? Um, you know, I mean, it's again, it's a forcing scale and a temporal scale, and I think we tend to just so, um...anyway, that's, that's the sort of thing that comes to mind.

Melody: So, it's, uh, not to put words in your mouth, but not all the eggs in one basket sort of thing. There's gotta be more than a plan a-, it can't just be a one solution thing.

Greg: Yeah. Yeah. Yeah.

Melody: So let's, unless you wanna add something else about hurricanes, I wanted to move on to drought.

Greg: OK.

Melody: So, um, and, talk about your experience with drought in the Caribbean. And I don't know, were you here during the 2015 drought?

Greg: No.

Melody: So you weren't here during that? But, sometimes I think we look at these things as just one event though. But, I guess, drought conditions continue. So, in general though, you could talk about drought and what's happening in the Virgin Islands. So what is your experience with drought in the Virgin Islands?

Greg: So, I don't have a whole lot of experience with drought. But I have, I guess, some drought condition experience. Um, we've had a, sort of, drier year, last year. Before, you know, Irma, Maria and all that jazz, um. I mean the Virgin Islands, especially St. Thomas, we import 99 percent. So, you know, then, so in terms of−It's a pretty urban lifestyle. So the way that I was impacted by drought, or a drought, drought conditions, shall we say, is my cistern emptied and I had to buy water. And I had to basically be very careful about my water usage. It's like 200 bucks to fill up, um, probably, I forgot. Maybe a $150 for 200 gallon? Or $200 for 400 gallon? But it was around $200 to fill up my cistern. I forgot 'cause I moved since then.

Melody: And how long does that last you? Like if you fill that up, that would last your family like --

Greg: I have two cisterns. So I was sort of filling one, emptying the other, sort of thing. So I don't remember to be honest how long it lasts. Uh, yeah, I would say maybe a month, two month. Uh, I don't, yeah, I−So what I did after I saw that we were starting to run out of water, is I had a third cistern that I sort of arranged to really maximize water capture on the house. And then I just had this connected network of, you know, tubes, [laughter] to fill one, and when one was getting low−'Cause there was one major one that we were drawing from. And so I was just sort of transferring water from one to the other as soon as I saw it was getting some, you know, lower, uh, value, lower volumes. We didn't keep really track of time to be honest. I was just like, "Oh! Wow! Time to do this, time to do that." So, uh, yeah. And then after we bought the water, we became even more, sort of careful about water usage and stuff like that. Um, so --

Jamie: How did they, how did the kids react to it? I mean, 'cause I, I imagine you had to teach them. How did you, how did you go about doing that, and did they have any, any interesting responses?

Greg: No. No. The thing that they miss−We were living in Miami before, and I had like a little plastic sort of splash area, you know, like this amount of water, and it's like that. [laughter] So they miss the sort of play with water. No more bath, no more sort of splashing around. No more playing with water. So that they didn't like. Uh, they don't like to shower. So for them that was not a big deal that, you know, I was giving them short showers. The major sort of angst was waiting for the hot water to come because they really don't like to take cold showers. So that was a bit difficult, but, um, yeah, I mean, the relation−So we don't drink the, the cistern water. We, um, some people buy bottled water, but I just buy like a 10-gallon refillable thing. Um, so, uh, so that's fine. So it was, I think for them it was mostly the playing with the water that they didn't like. Um, but, yeah, apart from that, I mean, we had a dishwasher and stuff like that to try to really minimize water usage. And, you know, short showers, and, yeah. And we didn't do, I think one of the biggest user of water is the toilet? Um, so, I think there was some extreme moments. [laughter] But, uh, I think you just learn to live with it.

Melody: Is it one of those things too, were you literally like, you notice more when it's raining like, "Thank goodness, the cistern's gonna get water?"

Greg: Yeah.

Melody: Or if you're waiting a long time for water, you become concerned?

Greg: That's right.

Melody: Talk to me about that.

Greg: That's exactly−Well, I mean, it's just, it's just what you said. [laughter]

Melody: You say it! What is that like, when you have a cistern that is so rain-dependent?

Greg: Yeah, you just, every time it rains you, you're happy because, you know your cistern is getting filled. And when the rain doesn't last long enough, um−So one thing that I wanted to do was to, um, put some gauge in my cistern and, and see, you know, the type of rain you get the impact from the filling of the cistern. 'Cause sometimes you get some of the, sometime you get a little light rain, you know. Sometime, you know, it's really, really sunny, and then all of a sudden, it starts raining. And then it stops. Uh, so, you know, you have a hot roof, you know, evapotranspiration, right?

So, that's something I've been playing around in my head, of like trying to see if I can look for a different type of rain event, you know, how much water we capture. But, yeah, I mean, it's exactly what you said. When it's dry, when sunny for many days I'm happy, but I'm like, "Ah, I kinda need some water!" [laughs] And then, you know, when it starts raining, I'm, I'm sort of happy. If it rains too long, of course, but it does never really rains too long, I mean, Ir-, Maria was annoying, but apart from that, it's fine. So, no yeah, it's exactly what you say. It rains, I'm happy, and I know that I'm getting water in.

And when I see that the water is overflow-, the, the−When I see that the cisterns start to overflow, and all the cisterns are full, so when I see that some of the excess cisterns are overflowing, then I go outside and I just sort of, um, you know, make the connection to fill the biggest cistern. But there were a few times where in July, where we had a few rainstorms and the, the, the cisterns were overflowing. Then I called the kids and I say, "Playtime!" [laughter] 'Cause it's free water and everything is full. So you know, I fill up the tub and everybody bring their toys and, you know, they just like splash around. So we had a few days like that, uh, uh, when the rainy season−Like we had a beautiful rainy season, uh, a rainy, few rainy events, uh, in July, July-August. So it was really fun. Uh, we had a lot of bath.

Melody: The way you describe it though, water, and you said, you know, "No playing with the water," um, so in a sense it's this sort of living in your environment where, that, water in that sense is not a toy but a luxury.

Greg: I wouldn't call it luxury, but yeah, I mean, yeah. Yeah. I mean it's, you need the water, right? [laughter] 'Cause I mean we had, we had a day when there was no water and it sucked. [laughs] 'Cause you cannot shower, you cannot do anything. So yeah.

Melody: So when you think about different types of extreme weather events -- flooding, drought, hurricanes, whatever it might be -- what is the biggest concern to you? Especially when you think into the future. What's your biggest concern? Especially as a professional, what do you think in this, in the future gonna be the biggest, uh, you know, challenge?

Greg: Uh, insurance. I think insurance is gonna be the biggest challenge. I mean, you know, how can you afford all those things? [laughs] I mean, if you see this from, you're gonna be cheaper if we move to renewable. But, I mean, from a house point of view and the impact of hurricanes, I mean insurance is gonna be a big deal. And the type of, uh−'Cause you know, the first reaction is, "Oh, we're gonna, you know, have a bigger, stronger, and more stringent code and more code enforcement," and it's like, "Yay...Shoot." [laughter] 'Cause things are expensive. And on an island, you need to import a lot of things, so insurance.

And then, um, I guess from a drought point of view, it's gonna be loss of cultural identity because if you have to import−'Cause things will get imported, I mean, it's drier, dry here, it's wet somewhere else food gets produced. We get food. It might be expensive food, but it's also going to be food that is not from where you are. And so the sort of cultural connection, I think, is, uh, something that is very−I mean, we're starting to lose it already because so much of the, big, massive food gets sort of, like, you know, it's, it's expensive to buy local food because imported food sometime can be so much cheaper. You know, people eat like strawberries and blueberries, and stuff like that. And just, I mean, I don't because mostly I just refuse. But I think it's easier to have access to blueberries and strawberries than some−Like, I have never seen like, like guava fruits in a supermarket in the Virgin Islands, so. I mean it's, guava fruit is not that exciting, I prefer the juice and the jam. But, the same, I mean, what I'm saying is that, um, yeah, there's some, some native, you know, I would say, uh, ecologically-relevant type produce that we just−That are harder to get.

Melody: Such as?

Greg: Well, like, um, I don't know the name in English. [laughter] But I would say, like maybe starfruit, maybe? I don't see them in, in the store. There's lots of tropical fruits, I don't know their name in English, that I don't see that, you know, are pretty common in the Caribbean. Breadfruit, which is a staple in many Caribbean, uh, island is non-existent in the store in the VI. But I know they grow, I've seen a few breadfruit trees. Um, they are being sold, but it's like $10 per fruit, you know? Because it's such small quantities. But, you know, we get a lot of potatoes, we get a lot of sweet potatoes, we get a lot of the, you know, root vegetables. Not all of them, but we get some cassavas and stuff. But, you know, sometimes I think, it's easier to buy potato from Idaho than, you know, cassavas or you know, dasheen or, you know, all the type of more tropical-type root vegetables. I mean, I don't know a lot of the names, so it's hard for me to, to explain them. Again, it's not my specialty, so.

Melody: But the idea you're talking about of losing, uh−That the climate and extreme weather can have this impact on your very culture. And I think, it's really important. For you, um, as an engineer, what would you say is the biggest impact on your job and what you feel like is, uh, a must for you to be doing? What's like, uh, you're feeling pressed or obligated to−I'm trying to find the right words to ask this question. But what's, yeah, what's that big thing that you like, "This is what I really or my--?"

Greg: Well, data collection.

Melody: OK.

Greg: Data collection, uh, especially in the VI. Really understand what's going on, what's happening, how it works. And then um, like I said earlier, tempering some of the ecosystem service excitement, or what I perceive to be an excitement. Sometimes, over excitement.

Um, communication. I think, communication is important. Trying to communicate some concepts to people. I think people don't understand the environment around them. And, um, and I think, it's because we live an urban life more and more. I mean, it was interesting yesterday to hear the talk, you probably don't hear the talks since you're here, but I don't know if you heard the last talk yesterday about, you know, urban systems are most sustainable type systems, um, and that's good. But, I think, you know, I sometimes wonder about the impact it has on people really understanding what's around them, and they depend on what's around them. Anyway, that's the decision for another day.

But, um, another thing I forgot to mention after the hurricane is waste. So much waste. [laughs] I mean, there's the waste of the stuff that is destroyed, but you revert to a extreme camping lifestyle. So everything has to be throwable or, you know, you throw away a lot of stuff, because you don't have water or you just don't want to deal with dishes 'cause it's just this pain to just get the water to do the dishes. We were still doing dishes, um, to try to minimize that, but, you know, I, many people just had, you know, disposable stuff, plate and, you know, wares, or whatever. And there was a lot, a lot of trash. I mean [laughs] bottled water everywhere. Can this, can that. Um, so the amount of waste generated by the hurricane itself, but the lifestyle that goes after the hurricane was tremendous.

Melody: So, for you, in your profession, of the extreme weather events, are hurricanes sort of, or the aftermath, the ones that most affect what you do?

Greg: Well, I mean, the during, in the sense of if we understand the system, if we have more data about how the system works, we can better do things to minimize some of the impact. But apart from loss of life, I mean, most of it is the impact, right? So, yeah, so it's after. I mean, we cannot do anything about preventing a hurricane. It's really trying to minimize negative impact, right? So, yeah, I mean, yeah. In that sense, it's mostly aftermath, but I think, right now, we are at a point where things are not optimal, so we can see how things don't work by really spending some time looking at what happens right after, right? At the same time, we don’t want to wait too long. [laughs] Because some evidence goes away.

Melody: Have you, um−Thank you. What sort of mechan-, practices or methods have you and your colleagues maybe adopted or helped the community to adopt if you have, since Irma and Maria? Or have you adopted any new methods or practices, um, as far as resiliency? Either drought or hurricane.

Greg: That's a talk. [laughter] That's a talk now, 'cause of the incidents, it's the word-of-the-day.

Melody: Yes.

Greg: Um, I think sustainability and fair-trade were the word-of-the-day for a while, now it's all about resilience. I mean, for me, it's really a desire for more collaboration, more inter-disciplined work, you know, better understanding of what inter-discipline work is and how it works. Some people tend to call it, "I do this. You do that. We get together." It's more than that, um, because

after disaster, everything gets jumbled up, so it's not as distant as we want it to be. So, I think, I our approach to discip-, inter-discipline work has to change. Um, just a higher awareness, really. I don't think it has changed anything. It just, a higher awareness of waste issue, energy issue push for. 'Cause I don't think we have had the time or the money to really sort of implement new ways of doing things.

So, higher awareness, higher understanding of what needs to be done. Um, starting to, you know, collect more data, or be part of discussion about how to collect more data, what data to collect. So, yeah, so, I think, there's been a lot of, uh, sort of positive outcome in terms of, you know, looking at opportunities to do more work together, with others. Uh, it hasn't been easy, you know, because there's always, you know, the usual human conflict, whatever, but yeah, I mean, yeah.

Melody: When you look at, um, the mangrove forest, that sort of thing, and I know, Kristen showed some, um, graphics yesterday and pictures and that sort of thing, and so, what are your thoughts when you see that about the future or when you think of how these sort of, I guess, natural buffers, and how they recover or don't recover.

Greg: Oh, I guess, that's my point about we need to try to understand what we expect from ecosystems, because it effects exactly that, you know? You have a drought, the system is weakened by the hurricane. What can the system do for you? Not a whole lot. So, I mean, I think it will lead to some question about management, with the different type of management um, I don't know. I don't know. I mean, I'm not an ecologist, so, I'm just, I guess there's a limit in the type of thinking that I can do, but, um, yeah, I mean, yeah. For me, it's just, what is it gonna do? But again, I think, we, we are but small humans in a big scheme of things. So you need to look at the historical perspective, you know, and a lot of talks yesterday were talking about, we've had droughts forever.

So, I think again, what would be interesting, and I think, we mentioned that yesterday, is for more collaboration among islands. I mean, earlier we were talking about supply chain and food imported, but, I mean, we could maybe see if there could be more, for a policy side, more trade among islands, uh, between the US island and non-US island and stuff like that to sort of maximize the flow of some of those commodities. At the same time, every single island–I mean, Puerto Rico even it's big they said well they can only do 40 percent of their food supply. So, I think, we have to be realistic. But at the same time, I think that, I think, we have to sort of put things into perspective, put things into a geographic and temporal sort of context, before sort of going too crazy about, you know, "Whoop!" [laughter] I don't have an, an answer, but that's what basically comes to my mind is to sort of temper things a little bit as much as we can, um, 'cause we're not the first and we won't be the last.

Melody: Right. So is there anything that can be done about waste though, when you saw, uh, what happened after Irma, and in particular, Maria, or any ideas on or had there been discussions about how that can be improved or, you know, something like that?

Greg: Yeah, but I think, it requires some massive cultural shift. I mean, the push for bottled water, I think, it's not an evil scheme that a bunch of guys did in a room, but I think, there was a push for bottled water and pushing, you know, different size of water. You have baby bottles, you have mini bottles, you have–So this idea of filtering your own water, I mean, what, what I

bought before the storm was a water filtration system. Uh, it's like, you just like fill up this big jug and then you just let it go, do its thing and then you have a drinkable water. It requires some works, so it's not as easy as−But I think that we need to rethink some of our way of living or expectation. Standard of living, I think, need to be revisited. But again, I think, it's not−It goes against market forces.

So, I don't know exactly what's, how to do it, but I think that from an energy, water food consumption, sort of perspective, I think that there are, I think they are ways. I mean, you know, there were native Indian tribes and I don't know. I'm not a historian, I'm not anthropologist, I'm not a sociologist. I'm not any of that, but somehow, it seems like those cultures survived. So, I'm not saying we need to go back to that. But, I guess, what I'm saying is that there, there are some readjustments that maybe one can do to sort of um−Like I said, we didn't buy any water during the storm. I kept, I just was filtering water. I was filling my 10-gallon thing, but I didn't buy any bottled water during. Yeah, and I still don't. [laughter]

Melody: I just have two more questions.

Greg: Yes.

Melody: And then Jaime may have some, too. But um, what you talked about, you know, natives. They lived through it and for many, you know, decades. And so−Well, actually centuries. And what, and in past centuries people had more connection with the land. And so, the expectations are different because they're, like, really connected with it. Um, but, so that's why I'm wondering, if we go back a little bit, even in your past, when you think about your parents, grandparents. Um, even if it wasn't in the US VI but, you know, in the Caribbean. Do you recall, do you have childhood memories of storms, or how your parents or grandparents reacted, or what they taught you, or, you know what I mean?

Greg: So, so I want to temper things a little bit there. Basically, I went a little bit overboard. Um, the native Caribbean people, from my understanding, um, sort of had a way to live with those extreme events. Um, the way that they were building things, the way, I mean they were also nomads. And I think they are better reading of some of the weather patterns. Um, but I don't have any idea of what the, sort of, you know, in terms of life lost. I don't know. I know that during slavery times, there was huge, huge human losses. Um, but it was because the sort of, uh, I mean, I mean, my understanding -- and I'm not an expert -- but my understanding is that slavery times, the population was made of Africans and Europeans who had no knowledge of the geophysical, ecological processes in the Caribbean. And so, there was a big learning curve in terms of their understanding. It was, my understanding is that it was like, in 1800 or something like that that they finally started to understand, sort of what hurricanes are, how they move. And they started to make some predictions about, ooh, a hurricane is coming. But you still had massive loss of lives. Um, because of the type of structures that they had and the sort of disregard for life that they had, especially slave. Um, so, you know, in terms of−So, when I was talking about earlier was really pre-Colombian era. Between Colombian to now, I think that there's only been improvement in terms of limiting the amount of life lost. What, I think there was a paper, an article the other day about 4,600 people dying in Maria in Puerto Rico. And I think most of it's the aftermath. And I think that's what we're spending more time on now because you know, structures get blown away, but few structures crumble on people.

Um, so now, in terms of, um, past experience, I, um, no. I think I was in those, uh, infrequent enough. Especially now, you know. I remember, um, talking to, emailing, uh, texting my, you know, family in Martinique, cousins and whatnot. And saying, "Hey, there's a hurricane coming called Maria. You should be careful." Um, and, uh, it was, "Hey, we know what to do." Because we have, like I said earlier, a lot of tropical depression, category one, and those. Again, structurally, we're good. Um, and the assistance and all that stuff, not to the degree of the Virgin Islands. But my point is that, uh, there's a lot of complacency, actually, that I found, they didn't take the storm seriously. Luckily, they didn't get hit. The Dominican got completely devastated. And, I think again, Dominica got devastated and they were in big trouble because after Irma, they sent a lot of their equipment to help other islands not thinking about themselves. And, and I really appreciate that. But again, I'm like, "Hmm, it's hurricane season." [laughs] So, I am not sure that we can say that there is this wisdom, you know. I, I'm not sure. That's all I'm going to say.

Um, and I, if anything, I think that with modern technology, we're becoming more complacent. Um, communication, I forgot to talk about lack of communication after the storm. But, you know, not having cellphone, not being able to reach out to people. That was a very, a big pain in the ass. Not having Internet, that was really difficult. Um, and, uh, but at the same time. So, modern life gives us great tools that we get used to, but at the same time, I think we also get complacent. And I know, you know. It's good that human life loss, loss of human life is now somewhat minimal compared to the thousands of people who were dying or are still dying in like Philippines and in other parts of the world with typhoons. But at the same time, I'm, the question is, you know, are we going to get complacent, you know? Um, so, so, that's, that's actually maybe not the answer you wanted, but that's what comes to mind.

Melody: Uh, the answer I wanted was what you have to say. So, yeah.

Greg: OK. [laughs]

Melody: That, that's what I wanted. What you gave me is what I wanted, so because I want your opinion. Jamie, do you have anything?

Jaime: I do, um. So, the first one. This is kind of−I, some of my questions are, are more, uh, specifically tailored for thinking about the, the general public. Um, if we have, if you know. We're going to be kind of producing a documentary about this sort of, for people who don't really−People who either don't live on one of the Caribbean Islands or who don't have much, who don't have, who haven't had the same experiences as you. So you said earlier, that you've been having droughts forever, you know. And, I, I guess my first question would be, um, just at a basic level, what has changed? Why are you, why are you here at this, at this drought, at this ecological drought workshop? What brought, what, what predicated that?

Greg: Well, all of a sudden I said, "Oh, drought. What a wonderful thing!" [laughs] I wanna come and learn more about it. Well, I mean, I'm just maturity. I'm an older person now. I've seen the world. [laughter] No, I mean seriously. Like as a kid, I never paid attention to it. Because yes, uh, growing up in Martinique we had some drought. And you see things change. But you know, we do what they tell us in terms of water, water in Martinique is uh, river filtrated, uh, filtration. So, you know, we ration some water. At some point, we use some cistern water, like external cistern, very rudimentary. But I mean as a kid you don't pay attention, you just do what your

parents tell you to do and you don't think about these things, right. And luckily, my parents, uh, you know, didn't grow up in a poor situation, so I never had to worry about that. My parents both sheltered me from that, in the same way I'm sheltering my kids from, from all that.

Uh, so, then as a student and whatnot, you just−I mean, I don't know, it's just time. It's not something that I looked for. But now, when you start looking at disasters through my work, and, you know, starting to try to get a better understanding and understanding what they say about the future. Then, um, yeah, I became interested because I am looking more and more at hazard impacts. Uh, I'm not a hydro−I'm not a specialist in any of the things you're talking about. But I'm looking more and more for my work at impact of hazard and hazard mitigation, so that's why I'm here. Um, I sort of forgot your question?

Jaime: Yeah, no. Uh, I mean, yeah. Basically, I just to follow-up, I mean, uh, what have, in general, what, sort of, what are, what are they saying about the future? What are, what are we looking at?

Greg: Well, what they're saying is that it's going to be drier, here in the Caribbean now. Yeah, uh, it's the future, who knows. But that's what the models are saying with some level of confidence. Uh, maybe you're wondering whether how I interpret that, maybe?

Jaime: That would be great.

Greg: Uh, I don't know how to interpret it. I just feel like it seems that there are some things you can do to minimize the impact of drought. Uh, that's what some of the people are saying. And I think you know, from a mitigation outreach, you know, sort of your initial, sort of entry, I think communicating those management practices is best. You know, like the same way that I'm thinking about, "What does that mean?" for coastal risk reduction. So, they're asking the same thing, what does that mean for you know, drought risk reduction? Uh, and so, being able to understand that helps me put my work in a larger perspective. But it also tells us that there might be things that we can do. But again, my main fear is the loss of cultural identity at some point. But am, am not an anthropologist, not a sociologist not any of that, just, uh, so I cannot−But it's like, as a sort of mundane pedestrian person, that's the thing that sort of worries me.

At the same time, putting back in to perspective, you know, putting my review of historical perspective, and maybe, it's gonna get worse. But, at the same time wondering if things can be done for inter-island trading or less attachment to some of, as much as cultural identity is important, as much I think, is manufactured and short-term. So, can we use that to start a dialogue about changing references frame? But that's the type of thing that went to my mind.

Jaime: And, in your own words, what is drought?

Greg: [laughs] Uh, dry conditions. [laughter] Lack of water.

Jaime: All right. A+ for, A+ for concise. [laughter] Um, I'm feeling, I'm feeling pretty good.

Melody: I feel good about−Wanna ask you though, the, my last question. Anything else that you really wanna add, a comment you wanna make about weather, about what you do, why what

you're doing is important right now and important for the future, um, something that we, our questions didn't address?

Jaime: Or if you're, or if you're looking around for like a message to the, to the outside, to the outside world about why people, why should anyone care, why should people care about this? You know, anything like that as well, that would be --

Greg: Hmm. [sighs] Um, I think that, um, yesterday they were talking about climate refugees. And I think that the thing that makes me a little bit anxious about, you know, climate change and climate change impact is impact on societies, specifically. I mean, I don't know how much of what's going on in the US right now, I don't think it's linked to climate change. I think it's more economic. But, um, I'm sort of wondering if what's gonna happen. I mean in Europe, you had a level of migration from African countries, economic conditions but also from my smallest, I mean, there was some climatic sort of, you know, push-the-gas-pedal-a-little-bit, you know? We still have the usual human conditions, strife, whatever. But then I think climate change makes, puts a little more stress on that. And I'm sort of wondering, you know, say that drought conditions are really, really bad and you have a mass exodus of−Kinda like what happened after Maria, all those Puerto Ricans who had to move to the States, right? And that creates some, you know, awkward situations sometimes.

Um, that's, I think, so yeah, I mean, I think that yes, so I don't−I mean from a hazard point of view, I think that we need more data, we need to figure a way out, we can look at it from a rational point of view. It's the consequences of society and lifestyle. More, higher insurance rate, what does that mean? Less people, fewer people can afford, like more renters, less owners, what does that mean for the society? Drought condition, importing more food, what does that mean? I mean, it's the social impacts, which are not what I do, that I think we need to start paying attention and start putting ahead some policies, strategies, or messages because otherwise, this sort of gut projection, human reaction will take place and it's not gonna pleasant.

Transcription by CastingWords