Citizen Science: Stories of Science We Can Do Together
Season 2, Episode 1

[Theme music]

Bob Hirshon
Welcome to *Citizen Science: Stories of Science We Can Do Together*, a podcast brought to you by SciStarter, recorded live before a canned audience at Bob's Sound Library and Tropical Fish Emporium. In this episode, through the magic of radio and... *pod-io*... we'll meet fascinating scientists working in far-flung locales, from scenic Switzerland to the furthest reaches of deep space. Fasten your seatbelts and remember, all small electronic devices must be set to "podcast mode" until we arrive safely at our final destination.

[music fades out]

Caroline Nickerson
Hey, Bob.

Bob
Hey, Caroline. Welcome to the Sound Library. I'm so looking forward to starting this new season with you. And especially doing some virtual travel; I've been going stir crazy during the pandemic.

Caroline
Right, we all need a little travel, even if it's virtual.

Bob
Well, fortunately, we've got a pretty extensive collection of sound effects, animals, ambiences *[assortment of sound effects]* here in Bob's Sound Library. Everything we need for an escape.

Caroline
But first, I do want to thank Justin Schell, who led us on so many great adventures during season one of the Citizen Science podcast, and extend a warm welcome to you, Bob, for Season Two.

Bob
Thanks, Caroline, happy to be here.

Caroline
Great. And to kick of this season, we're gonna try something a little different. Since we've been cooped up during the pandemic, we thought we'd go on a virtual trip to visit some of our favorite citizen science projects, starting with CrowdWater.

Bob

Right, CrowdWater. They're using citizen scientists to sort of patrol rivers all over the world and report on pollution and water levels and other hydrological stuff.

Caroline
And they're located in Zurich, Switzerland, which seems like a great place to visit!

Bob
Sure, why not? And thanks to the magic of sound effects, our virtual travel time to Zurich is about seven seconds...

Flight Attendant
[Airplane interior]
Flight 52 non-stop to Zurich ready for takeoff.
And landing. Please fasten your seatbelts and stow all carry-on bags beneath the seat in front of you. Thanks for flying Bob's Sound Library and Tropical Fish Emporium!

[transition to Zurich street ambience]...

Bob
Oh, man, so nice to get outdoors! *[St. Peter's Cathedral bell]* And there's the bells of St. Peter's Cathedral!

Caroline
Magical!

Bob
Zurich is famous for all of its church bells! Ah, here we are, at CrowdWater Central, with Sara, Franziska and Mirjam! Could you guys introduce yourselves, so I don't have to mispronounce your last names?

Sarah Blanco
Okay, my name is Sarah Blanco and I am working in the CrowdWater project since September as a PhD student. And my role in CrowdWater will be more work toward water quality for the CrowdWater project.

Bob
Okay, Franziska?

Franziska Schwarzenbach
May name is Franziska Schwarzenbach (laughs) so maybe more difficult? And I work in the Crowdwater project as the community manager, so do a bit of background work and outreach for the Crowdwater project.

Bob

And Mirjam?

Mirjam Scheller
So I'm Mirjam Scheller and I started together with Sara in the CrowdWater project in September and I'm also a PhD student.

Bob
Great, welcome to all of you. So, Sara, maybe you could start us out and tell us a bit about CrowdWater?

Sara
Well, Crowdwater is a citizen science project in hydrology, which means that we are working and interested in the study of water. You know, regarding for example, water levels, which is really useful and important for decision-making about droughts or floods, for example.

Caroline
Right, so important. And, Franziska, how did CrowdWater get started?

Franziska
So in the very beginning it all started without an app or without anything global, so it started in Switzerland. And the first PhD students started to ask people on the streets about discharging rivers and about water levels. And then they started to develop a tool on how people can collect observations of water levels. So it got more and more complicated, and more and more possibilities to contribute to the CrowdWater project and, of course, more and more international, and now it is globally accessible.

Bob
Great, so that means listeners can join in, wherever they are. Sara, could you walk us through how they can get involved?

Sara
Well, everyone can join the CrowdWater project. And first you need a smart phone so you can download the CrowdWater app in your Apple or in your PlayStore. With the app we can make observations about water levels, or moisture, or plastic pollution, for example. So once you have the app in your phone, if you go for a walk in your neighborhood or in your city, you can use the app in any river that you find. So you can make observations about these categories, and you can create spots, and then you can see other spots if there are other observations near.

Bob
Oh, I'm sorry, what does you mean "Create a spot?"

Sara

Okay, create a spot is, for example, if you go for a river and then you see for example plastic pollution in that river. Using your GPS of your phone, you create a point where you can describe how many plastic pollution you can observe in that point. So after this, other people who visit this point and are using the app, they can see for example what you made in the past, and they can update this point just like refreshing information about it.

Caroline
Wow, so anyone can add new data to anyone else's spot? I wonder if maybe people are kinda reluctant... One of the most asked questions at SciStarter about projects is "if I do something wrong, will I wreck the research?" So, Mirjam, are CrowdWater volunteers worried about this? And are people ever afraid to enter data?

Mirjam
Yah, thank you so much for that question, because that's like really what I also experienced when I first explained the app or the project to people, how they can do the observations. And all of them are like a bit scared. And so I also experienced exactly the same. And so I tell them you cannot do anything wrong, like, nothing will happen, because we will check the spots also, and we will give feedback and you will get a comment and so, yeah, there's really nothing you can do wrong there, so just start and go for it, and we will give you some nice feedback.

Bob
Okay, I'll try it. And it's a perfect time for it, because I don't know what the weather's been like there, but here we've had a lot of snow and sleet and rain. Have you been seeing that in Europe, and is it reflected in your CrowdWater data?

Franziska
So over the last weekend in Europe there was a lot of high flow because there was a big snow melt event. And a lot of precipitation in large parts of Europe, so lots of the rivers were really really full with water. And there was one user like updating his spot every second hour. So we had a really nice time series there. And so this, such a support is just amazing. And we are so happy to see such things, and also very interesting to see the stats of this spot.

Caroline
That's great. Any other stories or anecdotes you'd like to share?

Mirjam
My sister just told me last week, when there was so much rain or snow melt here, so she went to the river with her small children and they were at first not getting what had changed. But then she actually showed them the picture from the last time they were there– the picture that they made in the app– and then they were like really astonished, like, wow, it changed so much! The color of the stream and the level where the water level is, and so it was really a nice story that they told me. I'm really happy they learned something on their hike.

Bob

That's great. But you know, right now a lot of people are sticking close to home. Are there ways for people to get involved even if they can't go outside?

Franziska
Yes, and so that's where the CrowdWater game comes in, and that's a very cool opportunity to contribute to CrowdWater without leaving your house. So you can play the CrowdWater game and there there are 12 rounds every day, so you can participate every day. It's about five minutes that you need. So you compare the water level on two pictures of the same site. So they have been uploaded to the same spot. And then you determine the water level class. And because many people know more than just one single person, so we use the principle of the "wisdom of the crowd," we get a very good result there of the water levels. So the mean of all these people playing the CrowdWater game gives us a very good idea of the water level on these pictures. And of course you can also win very cool prizes, depending on where you live on the planet, maybe when it's winter for you, you get a bottle where your tea stays hot the whole day, with the CrowdWater logo, of course. Or if it's summer, you may get a swim bag so you can take it to the beach.So you will get something back from CrowdWater. For your participation.

Bob
Wow, you get a real prize? It's not a virtual, digital prize on screen that you download? It's a real prize?

Franziska
(Laughing) It's a real prize and we send it all over the world.

Bob
So cool.

Caroline
I want one! So, Sara, April is Citizen Science Month. Can you share your plans for that?

Sara
Well, we are planning on having two webinars during April. And our plan is to have our first webinar to present and introduce people to CrowdWater project and the app, so people can join this webinar and learn more about CrowdWater but also learn how to use the app. And then we will have another webinar; it's more like a follow up and feedback webinar where people can join to share their experiences using the app but also ask questions about the use of the project but also the app.

Caroline
I love it and I am really up for the challenge.

Bob
Anything else that you want to share?

Franziska
Yeah, maybe why it is so important to have this data from the CrowdWater project and why this data is so valuable. And that's just because there is such a lack of data about water, and water is so important for all of us, so it's definitely worth it to collect data about water with such a simple method like with the CrowdWater app. So it helps a lot also in regions where there's no water data at all. And people or just everywhere on the globe, everywhere people can get some measurements, and it can be such a high resolution where a sensor could never have such a high resolution, so that's absolutely worth it to collect this data to get more information about water.

Bob
Great. Well, thanks for being with us and taking this time.

Crowdwater Team
Thanks for the opportunity
Yeah, thank you for the invitation!
Yes, thank you so much; it was really nice to chat with you.

Bob
That was great. I happen to live right near the confluence of two creeks in Maryland, and I'm thinking this would be a perfect place to set up a CrowdWater Spot.

Caroline
Yeah, definitely

Bob
Okay, who and where are we meeting next?

Caroline
Patrick Treuthardt, from Spiral Graph. That's where citizen scientists help astronomers study spiral galaxies.

Bob
Galaxies, okay... Perfect! I just happen to have Carl Sagan's Spaceship of the Imagination here *(transitions to lame Carl Sagan impression)* where we can visit billions and billions of galaxies...

[transition to Spaceship of the Imagination]

Bob
(giving up on Sagan impression) Yeah, that's about as far as I go...

Bob *(cont)*
So, what do you think?

Caroline
Nice ride! But no cupholders?

Bob
Hey, it was the 70s!

[Spaceship accelerates]

Caroline
And now we're a gagillion light years from Earth, let's meet our intergalactic guide. Can you introduce yourself, Patrick?

Patrick Treuthardt
Sure, yeah, I am Patrick Treuthardt, I am an astronomer at the North Carolina Museum of Natural Sciences in Raleigh, North Carolina.

Bob
Welcome to our humble spaceship, Patrick! Could you tell us a bit about Spiral Graph and what volunteers do?

Patrick
Sure. It's a actually a really simple project. So what people are actually doing is they're looking at pictures of galaxies and they should all be spiral galaxies which are just galaxies that look like pinwheels. And then when people confirm that, all we do is we have them trace out the spiral structure they see, we just have them trace over the arms. And we have multiple people doing the same galaxies, and we see where people agree and that helps us determine where the spiral arms are.

Bob
And why have *people* do this? Aren't computers really good at processing images?

Patrick
These images aren't the greatest, like the contrast between the arms and the interarm regions is pretty low, and so computers have a hard time distinguishing where the arms begin and end. But people are really good at seeing patterns and people can actually pick out these spiral arms pretty easily. So that's why we want people to trace out the arms, so that way we don't have to use the images, we can use people's tracings, we can measure the spiral arms that way.

Caroline
Okay, so why do you want to measure them?

Patrick
So it's an interesting idea, so not many galaxies have their spiral structure measured to begin with. And the interesting thing is that there are relationships between how tightly wrapped the

spiral arms are and properties of these spiral galaxies that are much more difficult to measure then then just measuring the spiral arm structure. So the tightness of the arms relates to things like the mass of the supermassive black hole found in a galaxy's nucleus. It also relates to the mass of the stars that make up that bright ball that's in the center of the galaxy that we call the bulge. It also relates to how fast the galaxy rotates, and that also relates to the amount of dark matter contained within a galaxy. So basically by measuring how tightly wrapped these arms are, we get good approximations for a number of parameters for a galaxy relatively quickly and cheaply.

Caroline
That's incredible! And where are you now in the project?

Patrick
So we have right now we have a total sample of about twenty thousand galaxies we're looking at it. And we broke that into a sample of about 6000 and a sample of about 14,000. The first sample of 6,000 we were, we think we're done collecting the data on those. And the other set of fourteen thousand galaxies were we're actually finishing that up pretty pretty soon, and we estimate that we should be done in about a month.

Bob
So are you about done? Is that it for the citizen science portion?

Patrick
No, no, at this point, we still need people, we still need people to work on it. If people get busy you know and can't spend so much time classifying, we can always use more people to help. You know the faster we're done, the faster we can you know start analyzing the data. People are always welcome to help and are greatly appreciated.

Bob
And are the volunteers are doing good work for you? Are you getting usable data?

Patrick
Oh, man, yeah, the volunteers have been fantastic, let me tell you. I mean there's some users who have classified you know ten thousand galaxies over the lifetime of this project which is literally less than a year now. And so that there is one user who has done probably had about ten thousand galaxies at this point. But there are plenty that have done you know, a thousand or more. They found a satellite, a tumbling satellite. They've found supernovae, one has been previously unclassified, so this person managed to get that actually registered in the International Astronomical Union database. Yeah, there are just unusual-looking galaxies; people pointed out weird things that we just tag and hopefully are able to look at later. Just recently somebody found a galaxy that looked kind of like a race car. I think it's a type of galaxy called an "elliptical shell g alaxy" but it's not like when I've ever seen before so I don't I don't know for sure that that's what it is. So there's just a lot of a lot of things people are finding and just pointing out – it's fantastic. People are really engaged in this project. It's great.

Caroline

That is amazing! But with people processing that many images, and doing it so fast, are there any issues with accuracy?

Patrick

You know it's almost like the question "are people inherently good or inherently evil," you know, and man, you find out that people are inherently good when you see what they're doing on this project. I mean they're incredibly conservative and cautious as to what they input. They're like, "well I'm not totally sure that this is a spiral arm, so I'm not going to do this is that okay?" and I'm like, you can take some liberties, you know, if you think the spiral arm goes out a little farther, you can trace that. There's some room for interpretation. I mean that's why we're using people; we need your brain to interpret the spiral structure. And so, yeah, it's amazing how good people are at this and how they don't want to sow chaos into the project. How they're very careful and want to provide good data; its really great.

Caroline

Anything else you'd like to share?

Patrick

I don't think so. I mean I just want to say that I'm really grateful to everybody's participation. I mean, we really did not think that we would you know finish 20,000 galaxies in basically a year; we thought it would take two maybe three years to do, so it's amazing that people have been so helpful with this project.

Bob:
Thanks, Patrick!

Patrick

Yeah thanks a lot, this is great.

Bob

[News Segment music]
And now, once again for the very first time, it's time for a little something that we like to call "The News." With Caroline Nickerson!
[Music out]

Caroline

You bet! We have a few updates for you, loyal listener. Most importantly — Citizen Science Month! It's coming in April, and there's really something for everyone. Whether you're planning an event for your community group, finding a featured project to do on your own time, or just doing something cool, creative, new and related to citizen science, you can celebrate it in April. Go to CitizenScienceMonth.org to learn more. And – spoiler alert – there are citizen science month events for every project featured in this podcast.

Bob
Yeah, and I also heard from a reliable source – that would be you – that this year, libraries will play an important role.

Caroline
You heard correctly! And our supporters, the Network of the National Library of Medicine, are currently accepting applications for $5000 mini-grants to support 13 different United States libraries during Citizen Science Month. Do you represent a library? Apply! Learn more at SciStarter.org/NLM

Bob
And we'll be talking with some of those library folks in an upcoming podcast. You know, but it's not like April is the only time we have citizen science events, right?

Caroline
That's right. Really...it's more of a Citizen Science Year. We have an event coming up in March with the Neureka Project, which is all about contributing to mental health and dementia research by playing games on your phone. You can find the details and the featured project on SciStarter.org/NLM. That's the letter N, the letter L and the letter M: it stands for National Library of Medicine, so SciStarter dot org, forward slash NLM. Thank you so much to the Network of the National Library of Medicine for supporting us during that event and the head of the Neureka Project, Claire Gillian, for joining us virtually from Ireland during that event to answer questions! We'll see you on March 18, 11 AM Eastern, SciStarter.org/NLM.

Bob
Wow, so cool. Ireland, we are so cosmopolitan. By the way, where do you live when you're not here in Bob's Audio Library?

Caroline
Well, Bob, I live on Zoom. In fact, our listeners can join me on Zoom any given Monday at 7 PM Eastern for Make It Count Monday, the weekly livestream show from SciStarter and NC State University! Host Deja Perkins and I have fun and learn a lot about a featured project each week with a different guest speaker. Learn more at SciStarter.org/NCSU.

Bob
Yeah, Make it Count Monday. Yet another way you can join the citizen science party! You can also check out the thousands of projects looking for your help at SciStarter.org, and they include the project we're visiting next, run by Scott Eustis.

Caroline
Scott is awesome. Scott is the community science director at Healthy Gulf, and I know he'll introduce himself, we're going to hear from him in just a moment. But Healthy Gulf is an inspiring non-profit that operates all around the Gulf Coast, but no matter where you are in the

world, you can participate in Land Loss Lookout, and help document land through several different protocols that might need restoration. I'll let Scott tell you about it.

Bob
Okay, so that means our next stop is the Mississippi Delta. Hey, the Spaceship of the Imagination control panel is completely blank...

Caroline
Well, you do have to use your imagination...

Bob
Oh, right! Okay, I can do this. Warm breezes...singing birds... frogs...oh, yeah.

[segue to river delta ambience]

Caroline
And here we are; nice to be back on Earth.

Bob
You said it. That's right, home-bound listeners, close your eyes and enjoy the warmth and humidity of the Louisiana river delta.

Caroline
Ah, there's Scott! Hey, Scott, welcome to the Citizen Science podcast! Could you introduce yourself for our listeners?

Scott Eustis
My name is Scott Eustis; I'm the community science director at Healthy Gulf.

Bob
Hey, Scott! Could you tell us about Healthy Gulf?

Scott
Healthy Gulf is an environmental nonprofit and we've been working for clean water, healthy wetlands, and sustainable fisheries in the northern Gulf of Mexico for the past 26 years.

Bob
And Land Loss Lookout, that's the citizen science portion of Healthy Gulf, right? How does that work?

Scott
On Land Loss Lookout, we have a server that will show you different images of wetlands in Louisiana, and you'll be directed to one of six projects. Each of the six represents a process that has affected our wetlands. One of them is shipping channels: we do have a lot of federal

shipping channels in Louisiana, and they have carved up a certain amount of wetlands. Shipping channels have a particular shape and size and orientation in relation to the wetlands, so we will take you through a tutorial that trains you to look for those patterns, to look for those shapes, sizes, and orientations. And if you see that pattern in one of the photographs that you are served, we want you to tell us "yes."

Caroline
And why is this project important?
Eustis:
We're seeing that the wetlands are disappearing almost from the inside out, where very interior spaces, far from any shipping channel, far from any oil and gas field far from any place that eat people in coastal Louisiana would go in a boat, the wetlands are being lost. And they're being lost in a way that it's like thousands of tiny little ponds are forming way out in the middle of the marsh. That's what we recognize as the impact sea level rise. And it's something you can't see by boat, because it's happening far away from where you can access by boat in these shallow waters. So often when we're showing these photographs to people from Louisiana, it's a bit of a revelation even if they've been on the water all of their life, because it never had that aerial perspective combined with the training to recognize the pattern.

Caroline
And anyone in the world can do this project? You don't have to be on the Gulf Coast?

Scott
Yes, yeah. To date, we have a few hundred participants; we'd like a few thousand frankly, to go through a tutorial. You can, if you do it once, you'll go through one tutorial to look at one impact pattern. You can do it six times for the six different patterns; we invite people to keep doing it until they've done all 6.

Bob
So you'll be getting all this great data to protect the Gulf, but also you're informing people, and educating them about the importance of the Gulf at the same time, right?

Scott
Yeah, we're trying to reach out. Because we love the Gulf. A lot of the time, people are introduced to us in a tragic way, but– maybe we're biased, but we think it's one of the most beautiful places on the planet. If you care about wetlands, the Mississippi River delta is the only river-dominated delta on the planet, you know, and so it's very unique in its shape, the dynamics, and then just the way it produces food. So we hope people can go through this project, see some of the things that have happened, but also dream with us about the hope for restoring it after all, you know all of the oil drilling has gone away.

Caroline
Thank you so much, Scott.

Bob
Very cool! Okay, Caroline, ready to segue back to HQ?

Caroline
Sure. So how do we get there?

Bob
How about canoe?

Caroline
Sounds like a plan.

Bob
Wanna take the front?

Caroline
Yeah, just hold it steady... I'm gonna get my paddle and... let's go!

Bob
Okay. Well, that wraps it up for us here at Citizen Science: Stories of Science We Can Do Together. Join us again next month right here in Bob's Sound Library and Tropical Fish Emporium for another action-packed CitSci Adventure.

[theme music]

Caroline
This podcast is brought to you each month by SciStarter, where you'll find thousands of citizen science projects, events and tools that you can get started with to turn your curiosity about the world into real impact. It's at SciStarter.org, that's S-C-I S-T-A-R-T-E-R – like you're starting the science– dot org. SciStarter is supported by a number of generous partners and collaborators from all around the world. SciStarter's founder is Darlene Cavalier. And thank you so much to you, the listener and the citizen scientist for getting involved and making a difference. If you have any ideas you want to share with us, and things you want to hear on this podcast, get in touch with us at info@scistarter.org. Our email address is info at SciStarter dot org. Thanks again, Bob, and I'll see you next month!

[Theme music out]