Intro:

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Susan Washko:

Hello everyone, thanks for tuning into this episode of Making Waves, brought to you by the Society for Freshwater Science. My name is Susan Washko, and I'll be your host for this episode. Before we get into the podcast, I would just like to say that the opinions expressed in this episode are either mine, or the interviewees, and do not necessarily reflect the society as a whole. The topic for this episode is freshwater science at the border. We hear in the news about how the President's proposed border wall will disrupt wildlife such as big cats and butterflies, but we hear little about how it will affect freshwater and freshwater species. Considering watershed boundaries rarely match political boundaries, creating a physical barrier across a watershed would likely change aspects of the system. I wanted to learn a little more about what kind of freshwater research happens here in the border region, especially since it's such a tense atmosphere to work in.

Susan Washko:

So I reached out to four aquatic specialists in Tucson, Arizona to see what kind of binational projects they work on at the border, the barriers these projects face, and the benefits of binational projects. The interviewees were Claire Zugmeyer, an ecologist with the Sonoran Institute working on the binational Santa Cruz river and its water quality and wildlife, in addition to other factors. Miguel Grageda-Garcia, an international student from Mexico studying at the University of Arizona for his PhD. Miguel's research focuses on the Sonoyta mud turtle, an endangered species found only in two locations, one on each side of the border. The Sonoyta River in Sonora, Mexico, and Quitobaquito Springs in Oregon Pipe Cactus National Monument, Arizona. Joaquin-Murrieta Saldivar, a cultural ecologist with the NGO Watershed Management Group in Tucson. Joaquin specializes in community based approaches to watershed management that enhance multicultural aspects of the watershed, in addition to resilience. And lastly, Elia Tapia, another U of A international PhD student from Mexico, and Senior Research Specialist at the Water Resources Research Center. Elia works at the Transboundary Aquifer Assessment Program, a joint effort between the US and Mexico to evaluate shared aquifers.

Susan Washko:

I learned a lot from these folks. So I've organized pieces of our conversations into a discussion of the questions that I mentioned before. So the first thing was that I asked each person about their work to better understand what sort of freshwater science is occurring here at the Arizona-Mexico border.

Claire Zugmeyer:

So Sonoran Institute has been working for a long time in two places along the US-Mexico border. In Mexico, my colleagues are leading a big restoration effort in the Colorado River Delta. And then I've been working for the last decade along the Santa Cruz, more locally here in Arizona, tracking conditions in a stretch of the river near the border that receives treated wastewater that comes from both sides of the border. So tracking conditions and communicating them via a report series called The Living River.

Elia Tapia:

Well to answer to that question, I can talk about the Transboundary Aquifer Assessment Program. I've been working on that program since its early beginnings in 2012. I actually started working for the Mexican team because I was a Master's student at the Geology department at UNISON, so I started working there. I finished my Master's degree. I wanted to go for more, so I came here and I kept working for the same project. So I'm like a double agent that works for both countries. But it's good because it's further development of scientific research and it actually work really well. The commissioners from both the US and Mexico. They got together, they signed this cooperative framework that allowed both countries to start working on the priority aquifers. The aquifers that we study here in the Arizona Sonora border are the Santa Cruz and the San Pedro.

Elia Tapia:

The binational study of the transboundary San Pedro aquifer is one of the biggest milestones of this project. So it's a huge report, it's around 168 pages. It is long and it has information that starts with like the physical characteristics of the study area. We talk about hydrology, we talk about geology, geophysics, geochemistry, and we also analyze some of the hydrologic models for the area.

Elia Tapia:

A section that was important on the project was the recommendation, because even though we started ... we did a lot of work trying to harmonize different sources of information and providing something that talk about both the US and Mexico. It wasn't separate this time. It was really important. But the thing is, there's always more to do. This data, it can serve for the development of hydrologic models or groundwater models. So some of the recommendations also like keep monitoring, and there were a lot of things that we have to keep doing in order to keep promoting the understanding of these shared aquifer systems.

Elia Tapia:

So this report was released in 2016. We are also working on a similar study for the Santa Cruz. It's currently under USGS review and we hope to have it done by early next year, hopefully.

Joaquin-Murrieta Saldivar:

When I first came to the US, here to Tucson to study at the U of A, I joined something that at that time and still call today, the International Sonoran Desert Alliance and it was a community based organization. With that organization which we help install, it was Mexico or Sonora representation, Tohono O'odham, as well as the US. So that wasn't binational, it was actually tri-national.

Susan Washko:

Yeah.

Joaquin-Murrieta Saldivar:

With the O'odham Nation being part of that. So we did a lot of community collaboration and engagement, visioning in terms of the power of the Sonora and the binational power of the Sonoran desert. And what that meant at that time, I'm talking in the early '90s, to strengthen those collaborations bi-nationally, we influenced several programs with the federal, state, and local governments. There were some agreements signed and things like that, and because of that, at some point it was the sister parks exist between Organ Pipe and the Pinacates.

Joaquin-Murrieta Saldivar:

Because of that, also the designation of the Pinacate as a biosphere reserve, in addition to the upper gulf biosphere reserve along the Colorado, in the delta of the Colorado River in Mexico. So that community therefore was highly influential, to the point that Parks Service used to have a annual budget for sister parks. There were some visionings of creating corridors up to a hundred miles on both sides of the border in terms of protection and conservation and things like that.

Joaquin-Murrieta Saldivar:

So the dynamics, the energy, it was fully a collaborative effort, tri-nationally/bi-nationally between different cultures and different nations on how the border was actually blending elements of cultures and nature. But that was able to be done, and bringing visitors from Organ Pipe to the Pinacates and vice versa, and some people they never done that. So it was nice to break those barriers, to talk with people on both sides, and to understand the different protected public lands on both countries. That breaks a lot of barriers, actually.

Miguel Grageda-García:

Recently I have been working on this project related with the Sonoyta River, which is in the Northwestern part of Sonora. Yeah. Right side of the border. There I was working with the Pinacate Reserve in Mexico, so we were involved with different conservation projects trying to study the depletion, the water depletion in the river, and also how this is affecting the native species, like the Sonoyta mud turtle and to endemic fish that inhabit in this area.

Miguel Grageda-García:

So it was very interesting to be part of this big project because there are different agencies in Mexico, and also in the US that have been participating, such as the US Fish and Wildlife Service, Arizona Game and Fish, the Arizona-Sonora Desert Museum. They are being involved especially with people that have expertise working with freshwater fish. So they have been going to this part of Sonora to try to study the Sonoyta pupfish, which is one of the endemic species there, and the longfin dace. There are some refuges that were developed to keep this species in case of the river was ... totally dry.

Miguel Grageda-García:

So thanks to these researchers, we kept a good size population in this part of Sonora. So thus how the research has been keeping these two species still in the area. Also some other institutions in Mexico, like CEDO, which is the Center of Studies for Desert and Oceans is in, in Puerto Penasco, they develop a refuge for the longfin dace and they have the only population right now of this longfin dace that once inhabited Sonoyta River, and they have it in the, in this center in Puerto Penasco. There is many people who have been collaborating in this area. I think this is very important to keep that binational collaboration.

Susan Washko:

The second question I asked was about the benefits of these binational projects.

Claire Zugmeyer:

So, for the Santa Cruz where I largely focus, we're really lucky in the US to have this treated wastewater being released into the river. It's sustaining aquatic habitat, it's recharging our aquifers and it's ... really,

the river is important for our regional economy. And so, a lot of the water is coming from Mexico, so we need to have a binational look and approach to it. So we're tracking conditions and understand how important the stretch of the river is. But we also recognize that Mexico is part of the equation.

Miguel Grageda-García:

So if we talk about binational things, it's very interesting to ask nature that. So nature, how do you feel about working bi-nationally? Nature is going to respond maybe, just what do you mean? I mean my borders as nature is more on ecosystems, is more on watersheds. It's more ... those are my natural borders. But in terms of binational borders, nature is going to say, well what are you talking about? So saying that the importance of the binational work, binational collaboration, binational intentions, is to bring nature back to the natural thinking.

Miguel Grageda-García:

So can a US scientist and a Mexican scientist that are working on the same watershed, that are working on the same mountain range, come together and talk about, "Okay, how are we dealing with these issues? I mean, you have some issues. I have some issues." Nature is the same. But the issues for the most part, they are political, they are human, they are community. So at the end there are human elements that influence nature. So it's very important the collaboration bi-nationally tri-nationally or multiculturally, to come and understand nature and see how can we work towards nature, not towards my country, or towards your country. It is towards nature. So it makes total sense for me to have binational, tri-national, multicultural collaborations when we talk about nature.

Elia Tapia:

Well as I mentioned before, there's no study for warm water management and this framework that we have is entitled to assessment only. But the principles of agreement and the successful collaboration efforts in these priority aquifers have proven this to be a useful tool for promoting collaboration between the two countries. So what happened? It's a good example that says we can work together, we should keep going and we should work more together. Improving the understanding of these shared aquifer systems is an essential step towards the development of future water management agreements between the US and Mexico.

Joaquin-Murrieta Saldivar:

The benefit is the exchange of experience. Every group has a different experience, have a different way to work and it's always beneficial to be able to know what the other group is doing, and how they are solving problems that we may have in the future, or probably the other group that's working next to me found a better solution for a problem that I am also having. So that's always very useful, to work together and to exchange information.

Susan Washko:

Third, I wanted to know what sorts of barriers there were for successful binational projects, or for project completion?

Claire Zugmeyer:

Well, for the work along the Santa Cruz, there's a few different challenges. Data is sometimes limited so we can't always have the level of detail that we'd want, and the access can be challenging cause much of the river is privately owned. But at the same time, there's a lot of interest and energy towards doing

additional research and understanding river conditions. Just this last fall at our annual Santa Cruz River Research Days we facilitated a research agenda, and so identified a lot of research priorities. So there's always more to learn. We are identifying the things that we need to do.

Joaquin-Murrieta Saldivar:

Yes, sometimes the barriers that we had where we needed to have permits, permits to travel to the other country, because we in Mexico had to have special permits to come to the US, just for a meeting, or to provide information to other agency, we needed to have permits, and sometimes that takes a long time. It depends on how the situation is. Currently, it may take a week, or it may take three months just to get a permit done. So I think that's one of the main barriers.

Miguel Grageda-García:

For me, and this might be too philosophical, but for me one of the biggest barriers that exists for successful collaboration is the barriers that we as human beings create in our heads. It doesn't need to be political. So the barriers that we create because of the background we have, because the education we have, because the relations we have, because the position I have. Those create mental barriers in our heads and sometimes that brings a lot of friction to collaboration.

Miguel Grageda-García:

So it's all those mental barriers that we have in our head, and they come down to nature. So it's very frustrating to see those political, educational, cultural barriers that we have in our head being reflected in nature. So for me that's a huge challenge. The other one is, for us people that work in those boundaries of different political borders, is to be more efficient, I think, in the way we present things. How do we present information that we know is going to create an impact on nature? We need to find better ways for us scientists, for us managers to present information in the general, more touchy, more spiritual way, I think.

Elia Tapia:

Well, we faced many, many barriers when trying to complete this project. The first one, that is the most basic one is language. We speak different languages. It was really good to have bilingual members of the team, that helped a lot. Other type of challenges for the development of the reports? They're as basic as measurement units. For example, one of the major challenges we had was the development of a binational geology map. So we had information from one side of the border, and from other side, from GIS, geographic information system. We tried to put it together, and it seemed like we were talking about different things. Like different units, different everything. So there was a lot of work that was required for harmonizing geology maps, and at the end we were able to make it. We have a binational geology map that's really cool.

Elia Tapia:

I invite you all to go to the Water Resources Research Center webpage for the Transboundary Aquifer Assessment Program, and you can see the report in there, and other things that are important. I wouldn't call it a barrier, but I will call it a challenge. The biggest challenge for this study is to develop a relationship of trust between the members of the team. So it was hard, it wasn't easy, the first meeting. We usually go to binational technical meetings every six months. We just go to a place, we sit and we talk about the project. So the first one, we're like, "Okay, here's the things that we have to do. Let's do

them." And okay, fine. So, it was hard. But after several years of working together, we can say that we even develop a friendship between the members that work on the project.

Susan Washko:

Oh, that's great.

Elia Tapia:

Mm-hmm (affirmative).

Susan Washko:

Lastly, as a fun question to end the episode, I asked each person what was the one thing that they wish everyone knew about binational watersheds or aquifers. This is what they had to say.

Claire Zugmeyer:

So, our border is just this arbitrary line drawn, you know ... not drawn, but you know, through the landscape and it doesn't follow our watershed boundaries. So the river is cut in two, and the watershed is cut in half, and the Santa Cruz is actually the only river that crosses the US-Mexico border twice. So that's a cool designation though-

Susan Washko:

That's a good fact.

Claire Zugmeyer:

... it actually, it can make river management and watershed management challenging for that respect because it starts in the US, flows into Mexico, and then comes back, and the border does not recognize watershed boundaries.

Miguel Grageda-García:

Water goes downhill and rivers are taking our mountains to the ocean, and nature is going to find its way to bring mountains to the ocean and rivers is the means to do that. What I want people to know is that collaboration exist. We need to elevate that. We need to empower that because at the end, nature, it will find its way. And if it is our role as managers and scientists to elevate nature, or to restore nature, or to help nature to bring mountains into the ocean, we can certainly enhance that.

Elia Tapia:

Well, people need to understand that the natural systems aren't ruled by the political divisions that we create as humans. They don't know about international borders, they don't know about walls. They just follow their path. So, that's important to know, and also it's important to know that any action that you do in each side of the border is going to have a repercussion on the other side. So we have to be careful with everything we do, and we have to take into account that there are no barriers or borders between nature.

Joaquin-Murrieta Saldivar:

Well, I think one thing that everybody should know is that rivers and most of the species that live there were here before that any human. So they were there and sometimes we try to develop activities and

use the water that is there, and we change the way how the habitat is, or the way how the water is flowing. But we need to understand that not only humans depend on it, but also lot of species, many, many species because we are in the desert. Pretty much all the border is in the desert and pretty much all the areas along the border, wildlife depend on this water to survive. There is a lot of aquatic species, fish, aquatic reptiles, birds that depend on this water, and if we overuse this water fonts that may really affect the biodiversity that we have in Mexico and the US.

Susan Washko:

I had so much fun meeting Elia's aquatic researchers here in the Sonoran desert and learning about what they do and how they work in a region characterized by political boundaries. As freshwater scientists, we try to understand freshwater ecosystems, which may be bisected by borders. To understand these ecosystems as deeply as possible, we work with our fellow freshwater scientists on the other side of the border. This episode highlights our importance as an international society, and as we strive to be more diverse and inclusive, we will become stronger and more successful. Here's to continued future collaboration. Thanks to all those interviewed for your fresh perspectives, and thank you for listening. This is Susan Washko for Making Waves.

Outro:

You've been listening to the Making Waves podcast. For more info- For more info- For more info, please- ... visit us online- ... at the Society for Freshwater Science webpage. Tune in next time- [crosstalk 00:26:54]. ... for another fresh idea in freshwater science.