Episode 2: The Voice of Freshwater Ecosystems

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SUMMARY KEYWORDS

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SPEAKERS

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Doug Chalmers

JC
0:21
Water is fundamental to human development, from drinking water and sanitation to agriculture and more. You are listening to Water Stories, a podcast series where you will learn everything about securing water, energy and food security for all of us.

JC
0:50
Hello, everyone, I am Juan Carlos Giraldo, and welcome to Water Stories. I would like to start this episode by saying that ecosystems such as forests, wetlands and grasslands are a critical part of the global water cycle. All freshwater now mostly depends on the continued healthy functioning of ecosystems and it's important to know that the water cycle as a geophysical process is essential to achieve sustainable water management.

Our episode today is about freshwater ecosystems. To discuss this fascinating topic, we have two guests with us. Marisa Escobar: Marisa is the Water Program director at Stockholm Environment Institute in the United States based in Davis, California. Her focus is on creating links between physical processes and socioecological systems. Her expertise includes engineering, hydrology, ecology.

Hello, Marissa, how are you and welcome to Water Stories.

Marisa
1:45
Juan Carlos, I wanted to thank you for putting together this podcast. I am very excited about us, my team from the Stockholm Environment Institute Water Program at SEI US, to be able to share what we do and the information that we have on water in this format so we can take our technical work and make it more accessible for a broader audience.

I heard the first episode and I think it was a very nice combination of technical work and explanation for people about what's happening with the drought in California and implications for other parts of the world.

And now I'm very excited about talking about the work I do on ecosystems and water with my colleague, Doug Chalmers. Recently, I've been listening to a book, it's called, *Water: A Biography* by [Guilio] Boccaletti, and he has a beautiful quote. It says, “It's important that we recognize water’s hidden; it's hidden physically, it's hidden institutionally, it’s hidden historically. One of the most important things we can do is bring it up to surface and make sure that people pay attention.” And I think that's what we are doing with this type of podcast on telling the stories that we know about water, and how that takes shape in different parts of the world and find solutions to really find water security. Thank you.

JC
3:10
Thank you. Our second guest is Doug Chalmers. Doug is an associate scientist in Stockholm Environment Institute. He works on water resource modeling and planning in California and helps to build water allocations models using water rights from the California State Water Resources Control Board. Now he's in Seattle.

Hello Doug, how are you? Happy to have you today as a guest.

Doug
3:33
Hey Juan Carlos. Thanks for having me. I'm doing well. Thanks.

JC
3:36
Thank you both. As I mentioned in the intro, ecosystems are a critical part of the global water cycle. So I would like to start this conversation by asking you Marisa: Aquatic species in California, especially salmon, face threats that are increasing day by day because of climate change. Do you think that actions to protect these species can help it against this threat?

Marisa
4:04
Well, that's the gist of the problem, right? And there are many things that are happening. We need to try to create action before some of the climate effects are more extreme.

We've seen a lot of those effects happening already. But climate change occurs somehow gradually, right? And we have some mechanisms through governance and through action that can bring some positive change in management. And I have an example of what I've seen here over the 20 years that I've been in California, where I've noticed how the organizations, the institutions, the citizens as well, are more aware of these issues and are creating more action. I came from another country, right, where ecosystems are more like an afterthought still. And here I feel like this consciousness about trying to bring ecosystems to the table in water planning is very central.

So I've seen that change in the last 20 years I've been here. And I'm excited to implement some of the actions that water planners have been promoting for many years. And it does feel like now is the moment. We just came out of the Glasgow [COP26] meeting a couple of weeks ago. And there's a lot of talk about the pressing needs. We also have the infrastructure bill happening right now. So all of these coming together, I think is the right time, to move from ideas to action, and to really bring in some of the solutions to the table.

JC
5:54
And it's true Marisa, I am very glad that you mentioned COP26, because during the conference, the leaders discussed the importance of good water management in the world. Marisa, before the second question, will you mind sharing with us briefly about the project, you were a part of – Butte Creek – about spring run Chinook salmon, please?

Marisa
6:17
So this is a system in the northern part of California and they have one species of salmon, the spring run Chinook salmon, which is very threatened by high temperatures in the summer because they migrate in the spring and they live in the stream through the summer before they spawn in the fall. So they need the right temperatures throughout the summer so they can be you know, in shape and alive to spawn in the fall.

In this particular example, and this was you know, over 10 years ago, there was some hydropower generation. Through the analysis that we were able to do, we could demonstrate how this hydropower was diverting water at a critical part of the river where the fish needed the water to be there to reduce the temperatures. So in addition to our analysis, there were other processes that are happening that I think are very positive to maintain, and that we need to take advantage of, such as the FERC [Federal Energy Regulatory Commission] relicensing, which is the relicensing for hydropower plants. And through that mechanism, it was possible to demonstrate that, you know, that the benefits of having this hydropower, this whole hydropower plant, were outweighed by the importance of keeping these conditions for the fish.

So that's, for example, one positive story I have to tell, all the changes that can happen that requires, you know, some knowledge and analysis but also the intention and picking the right time in the processes so the action can happen.

JC
7:51
Thank you, Marisa. And you mentioned the words, “positive change.” To get this positive change and get the goals and California water systems that we are talking right now, we need a specific way to manage a kind of framework and Stockholm Environment Institute knows perfectly how to do it. Let's talk about managing aquatic species. What specific management change do you support to improve ecosystem and habitat condition for this species?

Marisa
8:17
In the last few years, what I've noticed is this direction towards an approach that we call functional flow, here in California in particular. There are other approaches, there are environmental flows, there are other types of conditions that people discussed. But I think that functional flows really bring in the concept of, we need to keep watering the system, but we can keep the amounts of water for fish for freshwater ecosystems, the amounts of water that maintain the habitat, so it doesn't have to be a constant amount of flow, it doesn't have to be high levels of flow, it just needs to be the amount of water that the fish and the species need for habitat at particular moments of their life stages.

So that really shifts a little bit the thinking on, you know, fixed amount of flow that we need to keep for the ecosystems all the time, to more flexible amounts of water, that we can provide the system with enough forecasting and enough infrastructure also to manage that water that way, but maintaining the water for the habitat and for the life stages.

So it's a very targeted approach, and I think it resonates very well with functional habitats, functional flows, functional ecosystems, and that's what we are promoting.

JC
9:41
It's great, an interesting answer, Marisa. There are many opportunities to develop these strategies, but we also have challenges. Speaking about challenges, and if the functional flows work perfectly, which is great, what kind of barriers exist to implement the solutions in California, I would like to ask you, Doug?

Doug
10:03
Well, if you've ever driven down I-5, you can see that water is pretty contentious in California. And one of the big challenges that we see in the water sector is that water is what's called a “zero-sum property,” meaning that there's only a finite amount of it, and if you give water to one party, it means taking it away from another one.

So when we think about allocating water for environmental flows in California, we can't do that without thinking about trying to balance it with the agriculture and urban sectors. And with growing cities, and some of the most productive agriculture on the

planet, all in a place with a semi-arid climate, water is scarce, and water is valuable, so nobody is fully going to get what they want. And the best thing we can aim for, then, is to find the most acceptable set of trade-offs for everyone. And it's been finding these trade-offs that has been central to a lot of our work here at SEI. And the functional flows approach that Marissa was mentioning does have a series of tools, which can help us to identify and achieve this balance of the human and ecosystem uses of water.

JC
11:17
Doug, you just mentioned a term the “zero-sum property” in water systems. What exactly does this term mean?

Doug
11:27
We can find different ways to try to trap water with reservoirs. And we can pump groundwater, but ultimately, we're limited by the water that really comes into our reservoirs and comes into the groundwater, you know, essentially, that falls from the sky and becomes snow melt.

So there's only so much water. And what I guess what I mean by “zero-sum property” is that, for example, if we give all the water to agriculture, then we would have none left for cities and for fish. There's concepts like recycled water, … but to some extent, if you allocate it to one party, you can't allocate it to the other. It's kind of one or the other, unfortunately.

JC
12:13
Oh, okay, thank you for clarifying this term.

To get these goals to allocate water for environmental flows, and help, of course, agriculture, urban sectors and some species that just Marisa mentioned, we need tools. If we go back to COP26 and Glasgow, technology was part of a topic and using technology properly will help to solve some problems. What are these tools, though, in your opinion?

Doug
12:42
Yeah, of course. And I'll take, uh, I'll take one more step to the mutually exclusive definition. So what I mean by water is a “zero-sum property” is that there's only a finite amount of it. And if you allocate the water to one party, that unfortunately means that it's coming at the expense of another party. So giving water to agriculture or to urban uses takes away from the others, and the same with environmental.

In terms of tools that we're applying here at SEI, and kind of using the latest and greatest – combining the philosophies and the frameworks and the sort of the academic ideas, I guess, with technology we have here at SEI, we call ourselves, “connecting science and policy.” And I think in terms of the water group that Marisa and I are part of, what we do is apply our tools that kind of connect the modelling side of water systems in California with decision-making and policy-making.

So two of the large projects that we've been working on have been with the California State Water Resources Control Board and with a water utility around San Jose called the Santa Clara Valley Water District. And in both of these, we have built water allocation models using our proprietary platform called WEAP. That's W-E-A-P, for Water Evaluation and Planning. And what that model does is we plug in all the different sectors that want water, and all the different sources that have water, and then we run simulations that say, “Okay, if we have this much total water, you will get water, you will get water, but you may not.”

And what we do with it is that these models, they're really used to kind of paint a picture of the common reality that everyone shares, the reality of shortages and the reality that trade-offs are needed and that not everyone will get everything that they want, because it's impossible. And so what we can do with WEAP, with our water allocation models, is test some of the environmental flows, or the in-stream flow targets related to functional flows and say, “Okay, if we want to leave this much water in streams to protect the salmon and the steelhead and other aquatic species, then here's what it means for the human uses of water.” We can use that to kind of answer questions like, how much really can we protect the species, and how much of an impact will it have on some of the human uses, like cities and agriculture?

And so the clients, the State Water Resources Control Board and the Santa Clara Valley Water District, they use the results that we look at in these models to kind of initiate facilitation to kind of bring everyone together, again, with that painting a

picture of the common reality that we all share, and kind of come together and say, “Look, here's what we're working with, how can we all work together?” No one wants agriculture to go out of business. No one wants to leave our cities high and dry. And no one wants all the salmon to die. So we all, when we look at the results together, and we see that, “Oh, I take everything I'm asking for, you'll have nothing,” that kind of changes the conversation.

And so it's that type of facilitation where that connects the results of our models to the implementation of new policies for environmental flows to protect these aquatic species.

JC
16:13
That's an excellent explanation. And with these tools, you guys will have access to good data that will help redefine or improve some strategies. Marisa, would you like to add anything to Doug’s answer?

Marisa
16:29
So what Doug describes is really the state-of-the-art of these kinds of applications of allocation of water. I love that we can get the opportunity to do this work in California. And one of my favorite parts of my job is to be able to apply those lessons to other parts of the world.

Currently, we are working on an initiative that we call Water Beyond Boundaries. We try to identify where those boundaries are that don't let us really solve the water problems in the world. Some of them are physical, some of them institutional, some of them are technological, so we are trying to break those boundaries and bring this information and technology to other places. And we are taking some of these lessons from California and applying them in places like Colombia or Thailand or Africa, where we are bringing the concepts of ecosystems, in particular the functional flows, and the aquatic habitat assessment tools, so when they do the water planning, they bring the voices of these water needs for the in-stream ecosystems to the table. So that’s very exciting. And it's very nice to see how this is happening through the initiatives.

JC
17:43
Yeah. When initiatives are good, Marisa, why not implement them in another part of the world?

Doug, would you like to share something else, maybe some experience with allocating water that our listeners want to know about it?

Doug
17:58
Yeah. So the application of our work with the Santa Clara Valley Water District around San Jose connects back to a lot of the ideas that Marisa was talking about with the functional flows framework. And as a result of our ability to quantify the fish habitat and the reservoir operations at the same time, what we've seen now is that the district is going and is releasing recommendations to change their reservoir operations, “reservoir re-operations,” they call it, as a result of a lawsuit settlement.

And to paint it in broad strokes, which probably will apply to other places across California, really the world, some of the concepts from functional flows that we're putting in there, or that have emerged, have been that there's a need to re-operate our water systems so that they operate a little more naturally according to the conditions that aquatic species have adapted to in California.

So in California, we have a dry summer and a wet winter. But for humans, we have all our demands in the summer, and none in the winter. So there's a bit of a conflict there. And it's, it's been a bit one-sided in the past 100 years, so I think that we'll see a bit more of a reconciliation with the needs to provide winter flows at the times when the fish life stages are really critical.

JC
19:18
Where can people reach more information to understand more about these freshwater systems?

Doug
19:26
Yeah, a couple of good resources. To learn more about water management in California that'd be pretty approachable would be one called Maven’s Notebook.

Another is the California WaterBlog, run by Jay Lund out of UC Davis. There is the California Environmental Flows Framework website, which is also hosted on UC Davis. And then the California Data Exchange Center has information on how much reservoir storage we currently have compared to normal for this time of year.

JC
Marisa?

Marisa
19:58
I think that this is the moment where everyone needs to be involved on the management of our resources, water resources, land ecosystems. I think people need to start reading more and have their voices heard, as well, on their opinions on how these things need to happen and also to, to gear and to motivate decisions that are more beneficial for the purposes of maintaining a healthy ecosystem.

And although the work we do is very technical, we try to produce information that's kind of understandable for a broader audience. We try to process our data and digest and distill the information to the main two to three results that come from these analyses. And we publish that on our website. If you Google “SEI, Water for Ecosystems and Livelihoods,” you will see our site and you'll be able to see some of those outputs that we produce. And I think that would be very interesting for people to go and find out more.

We are also trying to partner with Amazon Web Services, because some of this information could be put more out there for people to look at it from their own computers and browsers and servers. So I feel like we hope that soon we'd be able to have that service available. And yeah, I'm going to stop there.

JC
21:21
Marisa, where people can contact you?

Marisa
21:25
My email is Marisa.Escobar@sei.org. And yes, people can just email me and we'll be happy to be in touch and to get people involved.

JC
21:35
Great. Doug, where people can reach you or contact you? And learn, of course, what you are doing.

Doug
21:42
Doug.Chalmers@sei.org

JC
21:46
Thank you, Doug. Marisa, I would like to say thank you for your time.

Marisa
21:49
Thank you so much. This was great.

JC
21:51
Doug, thank you so much for your time.

Doug
21:52
You're welcome. It was very enjoyable.

JC
21:55
Thank you for listening to Water Stories. Remember, you can find us on Spotify, Apple Podcasts and Google Podcasts. So stay tuned for our next episode.