

Episode 1: A Vision of Water Management

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California, water, groundwater, dams, water supply, streams, climate change, salmon habitat, demands, supplies, ecosystems, stories, resources, system

SPEAKERS

JC Giraldo

Vishal Mehta

Brian Joyce

Chuck Young

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

0:51

Hello, everyone, I am Juan Carlos Giraldo. Welcome to Water Stories, where you will learn topics related to water management from the Stockholm Environment Institute experts here in the US. My co-host for this episode is Vishal Mehta. Vishal is an environmental scientist with more than 15 years of experience in water resource research, forest conservation and sustainable development. He's based in Davis, California, and works at the Stockholm Environment Institute. Hello, Vishal, how are you and welcome to Water Stories. I'm so happy to have you today as a co-host.

Vishal

1:26

I'm good, JC. Thank you, JC. It's my pleasure. And likewise, I'm glad to be here.

JC

1:30

Likewise. Vishal, we will discuss in this episode interesting and challenging topics related to water management, pretty much in California. Stockholm Environment Institute knows how to do it.

Vishal

1:41

Yes, you know, JC, California has one of the most complex water management systems in the world and is increasingly facing climate change and many other challenges. We have had several continuous droughts, for example, in recent decades, and you must have heard about the massive fires this year and last year. Today, we have two guests, my colleagues, Brian Joyce and Chuck Young. They've worked on many different aspects of California's water management for 20 years. So they're joining us today to tell us more about this topic.

JC

2:11

Brian, Chuck, How're you guys today? We are so glad to have you today as guests. How are you, Brian?

Brian

2:18

Very good. It's nice to be here.

JC

2:19

Chuck?

Chuck

2:20

Yeah, very good. Thanks for having me.

JC

2:22

As Vishal mentioned, California probably is one of the regions around the world, at least in the United States, with enormous water supply issues, right? I would like to start this conversation by asking you about how good water management plays an

essential role for millions of people and farmlands in the US. Let's talk about California. California State Water Resources Control Board was charged with creating a plan to balance both society and ecosystems. How does Stockholm Environment Institute help in this plan? Can you guys elaborate a little bit about that?

Chuck

2:55

Yeah, sure. So for starters, the California State Water Resources Control Board is the public agency that's responsible for balancing the competing needs for water within California. And we've been working with them for over six years.

Now, mostly, we create computer programs or computer models that can be used to compare the supplies of water and the demands for water. Supplies are things like, you know, you have rainfall occurring over California. and you'll have what we call runoff, which works its way into streams. We have snow and snow melt. And in California, of course, we get most of our precipitation during the winter months. That water needs to be stored in reservoirs, so that it's available during the warm summer months. And then we also have groundwater, which is a supply of water that can be used, as well.

Then demands include things like irrigation, of course. California's agricultural industry is very important to the US food supply. There are demands for cities and towns, for residential uses, and also for businesses. And of course, there's water that's needed for the environment to protect the aquatic species that rely on water within the rivers and streams.

So these computer programs that we design take all that information and basically step through time and compare supplies and demands and can help the users determine when and where shortages may occur. And so the State Water Resources Control Board is using these computer programs to weigh the trade-offs between keeping water in streams for ecosystem needs and meeting the other uses of water such as irrigation and supplies for cities and towns.

Vishal

4:48

Chuck, you were talking about the different uses and users of water. And I know that you work a lot in the realm of water rights in California. I was wondering if you could tell our listeners a little more about California's water rights system, and also about how they are affected by climate variability and climate change?

Chuck

5:11

Yeah, so California's water rights, really, first were developed back in the 1800s as settlers and miners were entering the state. The first step was to work on surface water rights. So that's water that occurs in streams and rivers and comes out of springs. And the rule was, if you own land that had a stream on it, or some source of surface water, you could utilize that water. That's called a riparian right.

Beyond that, a system that the miners started developing for uses that were away from the streams was "first in time, first in right." So that basically meant the first person who declared that they needed to take water from a stream for a certain use, they had the most senior right, and then all rights come after that. So the more recent your right was declared, the lower down you are in the priority list when it comes to a shortage.

Another key part of this is that the state requires all waters be put to a beneficial use. So you can't just waste it, it needs to be used for some, you know, economical or ecosystem use, for instance. And recently – past couple decades – there's been a real recognition that the use of water in-stream for protecting our ecosystems is very important. And that has received more attention in the recent decades.

Finally, in groundwater, much less regulation in groundwater until recently. Basically, the rule kind of was if you own land, then you were allowed to use the water that occurred underground on that land with not a lot of restriction.

JC

7:05

Chuck, following Vishal's question, speaking about climate change, and the situation that we are having right now in the planet, there is a term that always is related to climate change, or global warming or the weather itself. And it's about sustainability. We know that sustainable water systems should provide the right water – quantity of water and most importantly the quality of water. So speaking about that, I would like to ask to Brian if he can share with us about sustainability and water? And what is groundwater and why is it so important in this time in California?

Brian

7:38

Yeah, sure. Thanks for the question. Well, groundwater is, is a large part of the overall water picture for California. Groundwater represents about 40% of the total water usage in any given year. And that can go up to about 60% in dry years. About 85% or so of all people living in California receive some part of their water supply from groundwater. The water resources that are encompassed within the groundwater represents about three times or so the amount of water that is stored in surface water reservoirs. So it's a critical piece of the overall picture.

And as Chuck mentioned, you know, it's been largely unregulated up until the passage of the Sustainable Groundwater Management Act, or as better known Sigma, which was back in 2014. And leading up to that, for several decades there's been a serious problem with overdraft or overpumping of the groundwater basins. And in fact, there are 21 groundwater basins throughout California that have been identified as critically overdrafted aquifers, and those are largely in the San Joaquin and Tulare basin. So it's the southern part of the Central Valley, which is very intensely cropped or irrigated.

The significance of that is that with that overdraft, there's several things that that have occurred, there's a significant land subsidence over past 100 years, the elevation of the land surface has actually decreased in some places by dozens of feet (several meters), and that has significant impacts on infrastructure, the roads and bridges and so forth. So there's a significant cost there.

Also equally important is that it has led to many private wells going dry. And in fact, in this last drought that we experienced in California, about 3500 domestic wells went dry. So Sigma represents a significant effort to reverse hopefully some of those trends. It's certainly to stabilize groundwater levels and storage in some places. And hopefully, as I mentioned, to reverse that by better coordination of aquifer recharge, and more closely monitoring the pumping, and use of those resources.

Vishal

10:23

Thanks, Brian. You've just told us in some detail about a striking feature of water use in California being how dependent we are on groundwater. At the same time, I was thinking to myself how invisible a resource it usually is. I was just wondering, can we move back to water above the ground? Surface water in rivers and dams? I've been thinking about how California has so many dams, like more than 1500 dams. Brian, can

you tell us about the role and the importance of dams in California, in its history of development, and also for its future, about its future? Do you think there is still a movement to create more dams or demand for it? Where do we stand on that?

Brian

11:09

I think that there is. Yeah, I mean, there was a pretty intense period of development for dams, back in the '40s, '50s '60s, that period for a variety of reasons for water supply for municipalities and agriculture and to protect against flooding, as well as for hydropower generation, and recreation. So really, several uses for these dams.

Because the majority of rainfall occurs from October to March or April, there's a real need to have that storage to regulate the release of that water to meet water demands for agriculture and for domestic supplies and for environmental purposes, as well, throughout the year. And considering the future and climate change and the vulnerability and sustainability of groundwater resources, I think it's critical that we find ways to better manage the surface water resources.

So climate change poses a threat or risks simultaneously for storing water for droughts, to manage flood risk, and to protect for ecosystems. So I think there's a real need to prioritize how we operate the existing infrastructure and enhanced infrastructure so that we repair dams where they're needed and improve the integration of operations to provide more flexibility in how water is moved throughout the system to meet all of these competing demands.

And then as for the linkage to groundwater management, I think there is also a need to operate these surface water supplies to promote better, more strategic recharging of groundwater systems, as well. So as we augment that groundwater system, it will simultaneously relieve the pressure that's experienced on the surface water.

Vishal

13:13

Thanks, Brian. I was also thinking about something I've been reading recently about how some dams are actually also being taken down to restore and recover salmon habitat and livelihoods that depend on it. So that's also a part of the story that you described so well.

Brian

13:28

Yeah, I'm not familiar with much of that happening within California. But that's certainly a trend that we see in other parts of the country to various degrees of success. So hopefully, that, you know, we can see recovery of salmon habitat and salmon runs in California.

Vishal

13:48

So I guess I'm really happy that you two could join us. And I was wondering, I know we've published your work in different places. I wonder if you can share to our listeners, where can people get more information about these topics that we've talked about? Where should they go to find them?

Chuck

14:06

I find two great sources are the California Water Education Foundation. They have a nice webpage and they create a lot of information about California water. And the Water Policy Center at the Public Policy Institute of California. They also have a lot of great resources and articles about water issues.

Brian

14:26

Yeah, a good compilation of news items related to water in California is Maven's Notebook. I think that is kind of the go-to for a lot of water practitioners throughout California.

JC

14:40

Thank you, Chuck. Thank you, Brian. Vishal, is there anything that you would like to add to this conversation? Or maybe you can add, I don't know, as a scientist, maybe how the society is perceiving this progress? Anything that you would like to add, feel free.

Vishal

14:53

Yeah, JC. I just want to say that we at SEI, we work in many countries. And what I've learned is that California's water story is an important one for both Californians as well

as people outside California who are interested in water management really anywhere. Thanks for making this conversation happen, JC, and to Chuck and Brian.

JC

15:14

Thank you so much, Brian. Thank you so much, Chuck for all this information.

Chuck

Thank you.

Brian

Thank you.

JC

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