

WEBVTT

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00:01:10.920 --> 00:01:22.410

Sarah Atkinson / SPUR: Okay, we're going to get started. Hi, everyone. My name is Sarah Atkinson, and I am the earthquake resilience policy manager at spur. Thank you so much for joining this digital discourse today.

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00:01:22.440 --> 00:01:41.480

Sarah Atkinson / SPUR: Many of you are for members. So thank you for your support. If you are not a member, I encourage you to join to support for ongoing work and using education, policy, analysis, and advocacy to make our cities and region more prosperous, sustainable, and equitable. Your financial support enables us to continue our work, including the hosting of programs like today's.

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00:01:41.480 --> 00:01:45.440

Sarah Atkinson / SPUR: You can find more info about membership online@spread.org slash. Join

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00:01:46.290 --> 00:02:02.980

Sarah Atkinson / SPUR: our next digital discourse is scheduled for tomorrow at 1230 Pm. It is titled instead of paving Paradise, can we share it? This event will discuss recent changes in parking laws as well as a new State bill that would create shareable parking spaces in private lots and garages.

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00:02:03.250 --> 00:02:21.980

Sarah Atkinson / SPUR: Today's digital discourse, co-presented by Baycan the bay area climate, adaptation network is groundwater rise adaptation insights from Miami and San Rafael. as sea level rises salt water pushes shallow groundwater up through the soil, leaving to higher Groundwater tables in low-lying coastal communities along the San Francisco bay shore.

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00:02:22.080 --> 00:02:29.920

Sarah Atkinson / SPUR: groundwater rise can lead to increase flood and liquor. Fraction risks the mobilization of contaminants and soils, and the disruption and degradation.

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00:02:29.960 --> 00:02:46.420

Sarah Atkinson / SPUR: But both below ground and above ground infrastructure, such as roads, building foundations, utility lines, and underground pipe systems. Over the past few years a coalition of researchers, led by Chris may from path to his Climate Institute, Ellen Plain, from the San Francisco Estuary Institute

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00:02:46.420 --> 00:02:58.100

and Professor Christina Hill from Uc. Berkeley have been monitoring groundwater levels modeling future conditions, and working with local jurisdictions to assess risk to human health. Ecological health and coastal infrastructure.

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00:02:58.110 --> 00:03:17.040

Sarah Atkinson / SPUR: Researchers from Usgs have also studied the impact of sea level rise and groundwater rise on liquefaction risk. Finding that the saturation of sediment by groundwater can increase liquefaction potential, especially in the bay area's. Community in bay area communities built on reclaim marshland and wetlands, or artificial fill

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00:03:17.620 --> 00:03:29.130

Sarah Atkinson / SPUR: with the work of researchers, Government staff, and advocates. More attention has recently been placed on the impacts of groundwater rise. Oakland, Alameda, and San Francisco have an incorporated groundwater rise into their safety elements.

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00:03:29.130 --> 00:03:49.360

Sarah Atkinson / SPUR: The part of San Francisco has included ground authorized in the development of their waterfront resilience program. And this week one shoreline, the San Mateo County, fled, and sea Level rise. Resiliency District released their climate resilience planning guidance calling for a 100 foot buffer zone for shoreline development. Considering both sea, level and groundwater rise risk.

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00:03:50.090 --> 00:03:58.270

Sarah Atkinson / SPUR: Still, we have a lot more to learn about the impacts of groundwater rise, and more jurisdictions need to incorporate groundwater risk into their kind of adaptation planning.

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00:03:58.320 --> 00:04:03.690

Today we will have a panel discussion with representatives from San Rafael, California, in Miami, Florida.

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00:04:03.700 --> 00:04:20.839

Sarah Atkinson / SPUR: which is grappled with high high water tables for decades to discuss strategies for living with groundwater and sea level rise before we get started. Today's digital discourse has been generously sponsored by San Jose water, so I will hand it over to Leanne Willorsky, who, to talk briefly about Why, this topic is important.

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00:04:22.510 --> 00:04:38.240

Liann Walborsky / San Jose Water: Thanks. Sarah and San Jose Water has been a member of spur for many years, and we greatly appreciate all the work that you advance in key areas which impact the communities where we all live, work and serve.

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00:04:38.520 --> 00:04:47.020

Liann Walborsky / San Jose Water: We are specially a proud to have contributed to spurs, past work on water supply, sustainability and on water affordability.

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00:04:47.040 --> 00:04:52.550

Liann Walborsky / San Jose Water: San Jose Water is one of the oldest and largest water companies in the State of California.

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00:04:52.580 --> 00:05:02.460

Liann Walborsky / San Jose Water: We have over 150 years of experience in delivering clean, reliable drinking water. Even during extreme weather patterns or natural disasters.

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00:05:02.840 --> 00:05:07.600

Liann Walborsky / San Jose Water: Today we are challenged by unprecedented changes in our climate.

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00:05:07.680 --> 00:05:17.250

Liann Walborsky / San Jose Water: causing our weather to become increasingly variable and extreme. We're always planning for future cycles of drought and increasingly heavy rain.

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00:05:17.370 --> 00:05:25.610

Liann Walborsky / San Jose Water: Very interested to hear what your panel has to say. We're very pleased to sponsor this important conversation about groundwater and sea levels rising. Thanks.

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00:05:26.840 --> 00:05:32.890

Sarah Atkinson / SPUR: Thank you, Leanne. So today's panelists are Michael Sokop and Kate Hegeman.

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00:05:32.990 --> 00:05:46.460

Sarah Atkinson / SPUR: Michael Sukop is a professor of hydrology at Florida International University. He completed his Ms. At Washington State University in 1,989, where his research was on geostatistics and solute transport

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00:05:46.480 --> 00:06:03.550

Sarah Atkinson / SPUR: in partially saturated materials. He practiced hydro geology at Ch. 2 M. Pilla in California for 8 years, and earned professional licenses in geology and hydro geology. He has been a professor in Earth and environment at Florida International University since 2,003.

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00:06:03.550 --> 00:06:13.870

Sarah Atkinson / SPUR: Dr. Sukop has published 2 books, nearly 60 papers, and numerous government reports, and he is a Fellow of the Geological Society of America. Welcome, Michael.

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00:06:14.450 --> 00:06:16.560

Michael Sukop / Florida International University: Thank you so much. It's pleasure to be here.

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00:06:17.560 --> 00:06:31.150

Sarah Atkinson / SPUR: Kate Hegeman recently joined the city of San Rafael as the climate, adaptation, and resilience. Planner. She was previously the resilience program manager for adaptation with Florida's Miami Day

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00:06:31.250 --> 00:06:45.610

Sarah Atkinson / SPUR: County's Office of Resilience. There she led the implementation of the county Sea Level Rise strategy, and including incorporating sea levelized considerations into capital, planning, water management systems and management of natural areas.

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00:06:45.680 --> 00:06:54.400

She led the vulnerability assessment of the county's critical infrastructure to future flood and integrated resilience in the county policies and programs.

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00:06:54.460 --> 00:07:14.010

Sarah Atkinson / SPUR: Before Miami she worked on climate adaptation during the Post, Sandy rebuild by design and national disaster, resilience, competitions. She and her earned her masters of environmental science from the Yale School forestry, where she studied how cities can use a hybrid of green infrastructure to adapt to rising sea levels. Welcome, Kate.

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00:07:15.100 --> 00:07:16.790

Kate Hagemann / City of San Rafael: Hey, everybody. Thanks for having me

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00:07:17.620 --> 00:07:29.460

Sarah Atkinson / SPUR: great. So we want this to be an interactive conversation. We're basically going to start with some panel questions with some images.

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00:07:29.460 --> 00:07:47.230

Sarah Atkinson / SPUR: and we really want to engage everyone in the audience as well. So I encourage you to use the chat box to share your thoughts with each other and the speakers. I know we have some other experts on this call, too, so please feel free to share your expertise in the chat or any other comments you have.

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00:07:47.230 --> 00:08:02.560

Sarah Atkinson / SPUR: And please submit your questions by using the Q. A. Panel. It should appear as a button at the bottom of your screen, or at the top of your screen on mobile app. And as a friendly reminder, we'll be sharing a copy of the Transcript chat and recording of this digital discourse over the next few days.

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00:08:02.880 --> 00:08:07.410

Sarah Atkinson / SPUR: So with that I will

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00:08:07.420 --> 00:08:09.770

Sarah Atkinson / SPUR: start off with some

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00:08:09.780 --> 00:08:20.100

Sarah Atkinson / SPUR: questions for our speakers. I'm also going to drop some resources in the chat based off some of the things that I mentioned in my intro.

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00:08:20.140 --> 00:08:39.169

Sarah Atkinson / SPUR: But first i'm going to post a question to both of you, but I think Kate will get us started. I gave a little background of what groundwater rise is, but would you be willing to kind of describe it in more detail, and also how it is currently, and might in the future affect the bay area and specifically, San Rafael.

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00:08:40.110 --> 00:08:55.650

Kate Hagemann / City of San Rafael: Yeah, i'd be happy, and i'll share just a couple of images. That might be that might be helpful as well. So, as mentioned, i'm new to San Francisco and California in general. Hopefully, you can see that, Sarah, that looks good.

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00:08:55.650 --> 00:09:03.380

Kate Hagemann / City of San Rafael: So in center for it's a a coastal community in the bay in in Marin, and we have

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00:09:03.860 --> 00:09:16.680

Kate Hagemann / City of San Rafael: a lot of vulnerability to sea level rise. So when we have the king tides, it's relatively visible. So you can see here is From earlier this year the water comes up, and we see that kind of direct inundation

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00:09:16.680 --> 00:09:29.990

Kate Hagemann / City of San Rafael: of the of the area very visible, very noticeable, hard to miss across the community, and we can see also impacts to, you know, infrastructure and utility boxes and things like that from the King tides

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00:09:30.030 --> 00:09:59.660

Kate Hagemann / City of San Rafael: A. But I think one of the issues it's probably less physical is the issue of groundwater rise. So fortunately everybody from Usgs and at Uc. Berkeley, and Pathways and Sbi have done incredible work. Kind of mapping out. Where are these areas where the groundwater is expected to be? Close to the surface. Now and then with sea level rise is a map of Sandra phone. You can see a lot of these areas lighting up in different colors, basically showing that

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00:09:59.670 --> 00:10:10.790

Kate Hagemann / City of San Rafael: the groundwater table is expected to be very close to the surface here in Santa Fe, even under the current situation, with without sea level rise or storms.

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00:10:11.070 --> 00:10:31.620

Kate Hagemann / City of San Rafael: And so i'm just a quick intro, although i'm embarrassed to do in front of Mike and Christine Hail and other people. But my understanding of groundwater basically is that at a certain depth below the surface we have the water table, or where the ground is saturated, where that groundwater is not draining away, and so the depth of that

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Kate Hagemann / City of San Rafael: can change over time. So like in Florida, for example, during the dry season the depth to the groundwater is

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00:10:38.770 --> 00:11:07.130

Kate Hagemann / City of San Rafael: is more, and then the wet season it changes. And I think similarly, here in in California we have really wet winters that changes. But there are other things

that can drive that change which Mike and others could speak to more. But one of the concerns is that there's a lot of infrastructure under the ground, and so, as the sea levels push up the groundwater might affect things like septic systems and other underground infrastructure. So when you look at San Francisco, it's a really large area

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00:11:07.130 --> 00:11:22.140

Kate Hagemann / City of San Rafael: that would be affected that could you know, that's probably being affected right now by shallow ground water. But these maps are really helpful and obviously highlight. A lot of kind of work to be done that

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00:11:22.140 --> 00:11:38.930

Kate Hagemann / City of San Rafael: purple areas are where the groundwater is expected to be basically at the surface and the deep orange colors are. It's really close, and we have one of 12,000 people that live in this area a lot of jobs, a lot of industry, and also some historic industry as well. Mostly.

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00:11:38.930 --> 00:11:57.110

Kate Hagemann / City of San Rafael: you know, garages and auto shops and things, but it's a concern, because how the groundwater will be changing. We really don't know too well in a lot of fine detail. And so what that means for things like soil, contaminants, or the underground infrastructure are kind of unknown here.

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00:11:57.340 --> 00:12:11.390

Kate Hagemann / City of San Rafael: One of the reasons that it's more unknown is that we have a lot of the eastern part of the city is built on landfill, and some of that was formal, I think, like other communities in the bay, one area of

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00:12:11.390 --> 00:12:24.640

Kate Hagemann / City of San Rafael: this shoreline was filled in with a with a dump, with construction, waste, and and other parts were for, filled in with formal structural fill and clean materials and things like that. But it's really kind of a hodgepodge

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00:12:24.640 --> 00:12:44.920

Kate Hagemann / City of San Rafael: of different soil conditions, building on top of wetlands, or, you know, different codes and requirements in place at different times. So that means that we don't exactly know the soil conditions, but also that hodgepodge is leading to subsidence, which is kind of accelerating some of the other issues

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00:12:44.920 --> 00:12:58.580

Kate Hagemann / City of San Rafael: We look at where things are subsiding, and these colors show you the dark reds or places where it's subsiding quicker. You can see kind of as a shape that matches the parcels, which probably indicates that we have different types of fill materials

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00:12:58.580 --> 00:13:22.080

Kate Hagemann / City of San Rafael: and fill materials reacting in different ways to the changing groundwater and to the changing conditions. So it's like just to highlight. It's a really manipulated environment. It's not a very natural environment. So that kind of leads to a lot of unknowns about our site specific conditions. You know how close is the ground water to the surface! How sensitive is it to the tides right now?

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00:13:22.080 --> 00:13:27.610

Kate Hagemann / City of San Rafael: How is it affecting our sewer lines or other things that are under the ground.

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00:13:28.030 --> 00:13:45.440

Kate Hagemann / City of San Rafael: and then you know how sensitive will be to the changes in the future. We can obviously see without any instrumentation, that the the water is really close to the surface right now, so it's not a future question. It's really a a short term question to how are things being affected under the current conditions.

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00:13:45.520 --> 00:13:51.020

Kate Hagemann / City of San Rafael: And with that i'll just. I'll stop sharing. We can just pivot to

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00:13:51.250 --> 00:13:53.560

Kate Hagemann / City of San Rafael: to Sarah Mike next.

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00:13:54.940 --> 00:14:02.440

Sarah Atkinson / SPUR: Yeah, Mike, do you have any follow up comments about. You know what is groundwater? Rise. how it how it might affect.

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00:14:04.230 --> 00:14:05.220

Michael Sukop / Florida International University: Yeah.

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00:14:05.470 --> 00:14:10.140

Michael Sukop / Florida International University: And I have a couple of slides to show right now. Can you see this one?

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00:14:10.950 --> 00:14:12.050

Sarah Atkinson / SPUR: Yes.

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00:14:12.460 --> 00:14:13.100

Michael Sukop / Florida International University: okay.

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00:14:13.110 --> 00:14:21.420

Michael Sukop / Florida International University: I just wanted to put this. I want to show you one. Well basically that it's like Katie and I first worked on this together in Arch Creek, which was

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00:14:21.560 --> 00:14:24.730

Michael Sukop / Florida International University: on Florida's first adaptation action areas.

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00:14:25.170 --> 00:14:35.600

Michael Sukop / Florida International University: and this well is about a mile inland, and it's been reported in it for a very long time. So that's why i'm highlighting it here, and i'll put this more into our regional context in a couple of minutes. But

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00:14:35.630 --> 00:14:41.420

Michael Sukop / Florida International University: the Well, it's right here on the side of the road in somebody's front yard, basically and the data from it.

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00:14:43.020 --> 00:14:44.130

Michael Sukop / Florida International University: Yeah.

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00:14:46.740 --> 00:14:51.090

Michael Sukop / Florida International University: here we go back to, You know older than I am back to 1,959.

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00:14:51.400 --> 00:15:09.070

Michael Sukop / Florida International University: So we looked at the the rate of rise in this Well, and it was about 2.8 mm per year of at least since 1,974, 2,017, and then we've compared this to what we've observed in sea level rise at the Key West, which is also a long term title record. And so

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00:15:09.240 --> 00:15:19.680

Michael Sukop / Florida International University: it's actually a little bit higher than that, and that's not a completely unexpected for for the groundwater. And there are different kinds of conditions. I think we'll touch on that later, when we talk more about saltwater intrusion.

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00:15:20.250 --> 00:15:36.090

Michael Sukop / Florida International University: But yeah, so monitoring and modeling are 2 of the most important things that we have available to try to understand what's going on. The longer that monitoring is in place, the better it is, and we're trying to improve our models continuously. I think we'll touch on some more of these things as we go forward.

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00:15:37.660 --> 00:16:04.300

Sarah Atkinson / SPUR: Great: yeah, Thank you, Michael. I I think that's a really important point like we are, You know, the modeling for the bay area. And and this type of like groundwater monitoring is really this data is kind of like now being pulled together. And I think, Kate, what you mentioned about like the different soil types.

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00:16:04.390 --> 00:16:06.480

Sarah Atkinson / SPUR: Yeah. So that was great.

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00:16:07.530 --> 00:16:11.530

Sarah Atkinson / SPUR: Pete I. We have a a quick question in the chat, which is just

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00:16:11.640 --> 00:16:17.140

Sarah Atkinson / SPUR: where did? Where is the land subsidence data from, and is that publicly available.

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00:16:18.910 --> 00:16:30.210

Kate Hagemann / City of San Rafael: I I can share the in the and subsidize data with anyone who's curious. It was kindly shared to me by the basically like, the Usgs equivalent, and

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00:16:30.240 --> 00:16:49.040

Kate Hagemann / City of San Rafael: in Norway they they have the satellite drive data so remote sense data of of subsidize, and and they have that really handy viewer where you can kind of zoom in and out and click on different points. So i'm happy to share that with anyone, but we. We also have other sources of that data as well

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00:16:49.040 --> 00:17:04.990

Kate Hagemann / City of San Rafael: with experts at Virginia Tech, and who who who make that available. I think it's also integrated into the Usgs, the Oakov website. So that's part of the underpinning assumptions that go into that. See that where I you, or if anyone uses that

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00:17:05.910 --> 00:17:06.589

Sarah Atkinson / SPUR: great.

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00:17:07.290 --> 00:17:14.920

Sarah Atkinson / SPUR: Thank you. Okay. So our my next question, which is gonna go more to to Michael

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00:17:14.920 --> 00:17:31.870

Sarah Atkinson / SPUR: is, you know, Miami's context is obviously different from the bay areas. But I I think this is. It's really great to have you, because I think that there's still a lot that we can learn from Miami, especially the fact that you know you've been dealing with groundwater and groundwater rise for a long time.

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00:17:31.870 --> 00:17:40.890

Sarah Atkinson / SPUR: so I would love if you could give some context on Miami, and if you, you know, if you have any understanding of like

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00:17:41.120 --> 00:17:46.410

Sarah Atkinson / SPUR: how Miami differs from the bay area, and and Kate and I can also jump in for that part as well

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00:17:46.830 --> 00:17:48.520

Michael Sukop / Florida International University: That' be helpful. Thank you.

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00:17:48.620 --> 00:17:56.500

Michael Sukop / Florida International University: Yeah. I've been working here for about 20 years, and you know we have some things that make it a lot simpler. Not a lot of subsidence, fortunately.

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00:17:56.600 --> 00:17:59.390

Michael Sukop / Florida International University: And our you know, our bedrock is generally a

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00:17:59.590 --> 00:18:09.630

Michael Sukop / Florida International University: rather uniform compared to the types of materials you have at the surface in San Francisco, which is actually kind of helpful, too. But on the flip side, and i'll show you some photos of this in a few seconds.

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00:18:09.720 --> 00:18:22.190

Michael Sukop / Florida International University: It's an incredibly permeable material, unlike a bay mode, let's say, or certain types of fill. I recognize that the construction materials may be similar or or worse in their permeability. But

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00:18:22.610 --> 00:18:24.580

Michael Sukop / Florida International University: that's a difference. Certainly.

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00:18:24.830 --> 00:18:44.310

Michael Sukop / Florida International University: So here is kind of our regional context. The elevations are shown here. We have an Atlantic coastal bridge, and some particularly high areas here. and then these are cut by what we call transverse glades, where we now mostly have canals that we're used to drain the the Everglades behind.

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00:18:44.490 --> 00:18:45.640

Michael Sukop / Florida International University: and

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00:18:46.410 --> 00:18:56.770

Michael Sukop / Florida International University: this Arch Creek area is up here that we just looked at the well data from. And so we've been using models to make projections about the future. This is a

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00:18:56.880 --> 00:19:03.890

Michael Sukop / Florida International University: 2,010 view, but we can advance this to a 2,070, and you can. If you look, you'll see the

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00:19:03.960 --> 00:19:06.080

Michael Sukop / Florida International University: The red colors are

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00:19:06.200 --> 00:19:19.260

Michael Sukop / Florida International University: less depth to water, and you'll see that the the red areas expand, and the blue, and the yellow is a retreat when I flip to the next time here. Basically and this is primarily due to sea level rise, or maybe some

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00:19:19.490 --> 00:19:26.530

Michael Sukop / Florida International University: additional. We have a high rainfall scenario here, too, which contributes also to some a water table rise.

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00:19:27.940 --> 00:19:34.610

Michael Sukop / Florida International University: So what I was talking about with this rock it's an incredibly permeable rock kind of off the charts. Really.

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00:19:34.780 --> 00:19:37.710

Michael Sukop / Florida International University: that just forms our aquifer, and if you

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00:19:37.790 --> 00:19:48.320

Michael Sukop / Florida International University: you can see through the holes if you hold a piece of it up basically And so this has our big impact on how things operate around here. We have some smaller caves that the water can move around it, too.

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00:19:48.600 --> 00:19:54.340

Michael Sukop / Florida International University: And so the water moves very freely, almost basically like waves in many cases.

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00:19:54.530 --> 00:20:04.790

Michael Sukop / Florida International University: and we have a serious issues with king tide flooding as Well, we have a very dramatic October Ish King! Time it comes, and you can see this is right up

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00:20:05.180 --> 00:20:07.070

Michael Sukop / Florida International University: the lip of the curve here.

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00:20:07.380 --> 00:20:11.450

Michael Sukop / Florida International University: and this is in Ford water. Now this is a Usgs person

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00:20:11.560 --> 00:20:16.000

Michael Sukop / Florida International University: looking at the the water taxis, but the water is coming over the sea walls here.

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00:20:17.200 --> 00:20:21.800

Michael Sukop / Florida International University: and this do you think we have time to plan it, Sarah? You've seen it before? Is it worth showing?

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00:20:22.460 --> 00:20:24.840

Sarah Atkinson / SPUR: Yeah, yeah, I I think you can play that.

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00:20:25.390 --> 00:20:32.190

Michael Sukop / Florida International University: So we have a you know, a lot of drainage infrastructure, Naturally, because we got very intensive grades. What like you've been experiencing

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00:20:32.340 --> 00:20:35.860

Michael Sukop / Florida International University: this year, but actually probably still worse in terms of their intensity

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00:20:35.990 --> 00:20:38.110

Michael Sukop / Florida International University: over the short duration.

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00:20:38.120 --> 00:20:39.440

Michael Sukop / Florida International University: This is a

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00:20:39.660 --> 00:20:48.040

Michael Sukop / Florida International University: a storm that's owned by the Bar Department of Transportation, and the water is actually flowing out of it, and this water is salty.

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00:20:48.420 --> 00:20:51.540

Michael Sukop / Florida International University: and you'll i'll put this in contact here of the streets

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00:20:58.290 --> 00:21:05.680

Michael Sukop / Florida International University: and sort of ironically. It's right across this tree from a a fire department. and this flows down through a nearby

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00:21:06.600 --> 00:21:14.290

Michael Sukop / Florida International University: stream. Little river. It's essentially a canal. and this water, as I said, is salty. So if you drive through it, it doesn't have a

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00:21:14.300 --> 00:21:18.220

Michael Sukop / Florida International University: very deleterious effect on your vehicle. and so forth.

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00:21:19.640 --> 00:21:22.920

Michael Sukop / Florida International University: and I think i'll move on from there now.

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00:21:24.520 --> 00:21:25.240

and

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00:21:27.460 --> 00:21:42.650

Michael Sukop / Florida International University: and so we've been looking at some of these I see. Change photography. This is from a flood last last June that was quite dramatic, that we had quite a bit of rain, not as bad as it wasn't for a lot of the most recent time, but

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00:21:42.800 --> 00:21:51.880

Michael Sukop / Florida International University: quite a bit of flooding, and it gets blamed on various things like sewer clogging. And then on top of this, as you know, one of our subsurface infrastructure things is

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00:21:52.300 --> 00:21:57.220

Michael Sukop / Florida International University: septic system. We have about a 100,000 of them in the Miami-date area. So

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00:21:57.350 --> 00:22:07.850

Michael Sukop / Florida International University: when the water comes up, and especially if the water table comes up, which has been documented now, in many cases, you know, after a big storm comes all the way to the surface, so that water can be expected to

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00:22:07.940 --> 00:22:09.290

Michael Sukop / Florida International University: to come to the surface.

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00:22:10.280 --> 00:22:14.550

Michael Sukop / Florida International University: and I think this is for later. Well, this if you want me to.

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00:22:16.120 --> 00:22:23.280

Michael Sukop / Florida International University: But let's yeah, this has to do about salinity and water table rise. Let's get back to that later.

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00:22:23.350 --> 00:22:30.750

Sarah Atkinson / SPUR: Great Kate, do you have any things that you want to add about the value?

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00:22:31.040 --> 00:22:35.720

Sarah Atkinson / SPUR: Do a flirting from Miami, or kind of the context locations.

133

00:22:38.040 --> 00:23:08.040

Kate Hagemann / City of San Rafael: I'm sorry. I think I think, that one of the things that as might show the groundwater is so close to the surface that it really kind of permeates a lot of a lot of activities. So in terms, but it also is embedded into a number of code. So because Florida has this history of sort of training the swamp and reclaiming the Everglades for urbanization. Early on in that history there were a lot of like land speculators who are unscrupulous, and sold on

134

00:23:08.040 --> 00:23:26.530

Kate Hagemann / City of San Rafael: lands to unsuspecting Northerners. And so, as a consequence of of some of the worst kind of boom land speculation practices, there was a lot of codes that were put in place to try and address flooding, and some of those relate to the groundwater. So, for example, Miami County has

135

00:23:26.530 --> 00:23:31.250

Kate Hagemann / City of San Rafael: a requirement that all land needs to be a certain height above

136

00:23:31.590 --> 00:23:51.430

Kate Hagemann / City of San Rafael: the groundwater table, the wet season, groundwater table, and recently they kind of just went through a process of updating that to account for sea level rise in the future groundwater table. And similarly, septic systems have to be a certain high above that water table, but so do roads and sea walls and other things. You know that that kind of help.

137

00:23:51.430 --> 00:24:04.870

Kate Hagemann / City of San Rafael: so that and I want to say I don't know gloss over it. There's a lot of funny in Florida, but at least in the code there is a requirement to be, you know, a certain high above the groundwater table in a lot of aspects.

138

00:24:04.870 --> 00:24:11.600

Kate Hagemann / City of San Rafael: The other thing, I think, like the work that Mike and his colleagues also have done in terms of creating groundwater models have

139

00:24:11.600 --> 00:24:28.270

Kate Hagemann / City of San Rafael: then fed into direct vulnerability studies for infrastructure. So a big vulnerability study, looking at where our septic systems most at risk, and then using that modeling to prioritize investments in taking some of those septic systems offline

140

00:24:28.500 --> 00:24:47.200

Kate Hagemann / City of San Rafael: and putting in the sewer system. Similarly, that model, that that groundwater model. It was also used for the water utility to model. Where is the intrusion into the wastewater system, most likely. And then to prioritize the retrofits.

141

00:24:47.460 --> 00:24:52.160

Kate Hagemann / City of San Rafael: what we call I and I are inflow and infiltration, and to sort of

142

00:24:52.300 --> 00:25:05.860

Kate Hagemann / City of San Rafael: also look with a climate change. Lens. How much is that infiltration and inflow going to increase with sea level rise and with climate change. So I think those are 2, I think useful examples. But

143

00:25:05.920 --> 00:25:07.320

Kate Hagemann / City of San Rafael: I'll I'll pause there.

144

00:25:07.960 --> 00:25:22.800

Sarah Atkinson / SPUR: Yeah. Great. Thank you, Kate. you know, taking off of that note. Our next question is about underground infrastructure and kind of the challenges that occur with groundwater rise and underground infrastructure.

145

00:25:22.860 --> 00:25:33.250

Sarah Atkinson / SPUR: and Michael. I wanted to see if you wanted to show some of some more of that kind of context in Miami, and then we can again bring it back to the Bay area.

146

00:25:36.300 --> 00:25:39.220

Michael Sukop / Florida International University: That that sounds good. Thanks. So

147

00:25:39.420 --> 00:25:42.980

Michael Sukop / Florida International University: so let's see. You know we

148

00:25:43.020 --> 00:25:50.380

Michael Sukop / Florida International University: this is the limestone I was talking about before, but you can see this is one of the the Miami River, actually, and it's essentially a canal. Now it's been dug out, but

149

00:25:50.440 --> 00:26:05.910

Michael Sukop / Florida International University: we have very intimate contact between the very permeable aquifer and the surface water so. and you can see it's not very deep below the surface, so there's a lot of interaction going on with the infrastructure. And let's see here, You know we have tides

150

00:26:05.980 --> 00:26:08.110

Michael Sukop / Florida International University: kind of training into the land.

151

00:26:08.190 --> 00:26:17.760

Michael Sukop / Florida International University: and this can certainly affect the infrastructure in terms of, you know, alternate running and drying, which may be the worst circumstance for lots of types of infrastructure, especially if it's

152

00:26:17.840 --> 00:26:19.390

Michael Sukop / Florida International University: salty water.

153

00:26:19.490 --> 00:26:31.460

Michael Sukop / Florida International University: And so we have a lot of things on the ground, as as all cities do, and one of them, you know, given since the search side building collapse, we're particularly interested in

154

00:26:31.700 --> 00:26:34.710

Michael Sukop / Florida International University: building foundations and deep piles that are

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00:26:34.750 --> 00:26:41.670

Michael Sukop / Florida International University: steel reinforced concrete basically when those occur and the Internet potential corrosion problems.

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00:26:41.920 --> 00:26:51.120

Michael Sukop / Florida International University: we also have a lot of injection. Wells so basically got rid of the water right off our roofs from the large buildings and from the streets.

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00:26:51.340 --> 00:27:01.660

Michael Sukop / Florida International University: So let's see. And then, you know, we have production whales back further, that we need to keep safe from solar intrusion. This would be the salt water, intrusion.

158

00:27:02.360 --> 00:27:06.600

Michael Sukop / Florida International University: saltwater, freshwater interface here, and could move inland as

159

00:27:06.640 --> 00:27:10.420

Michael Sukop / Florida International University: as there's more water demand, or the sea levels rise and so forth.

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00:27:11.000 --> 00:27:18.420

Michael Sukop / Florida International University: Let's see. And then we have septic systems or cars creating plumes back here that can potentially be sucked into the

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00:27:18.970 --> 00:27:21.220

Michael Sukop / Florida International University: the water supply system.

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00:27:22.170 --> 00:27:38.180

Michael Sukop / Florida International University: And, you know, looking even at a more of street scale here than we have in particular interest for us. We don't have really a combined sewers here, fortunately. but you know the as Kitty was just mentioning the infiltration of inflow, and then corrosion of

163

00:27:38.480 --> 00:27:53.240

Michael Sukop / Florida International University: or steel. Reinforced concrete pipe is something that can happen, and you know there's everything else down here. Telephone, cable, electrical lines, natural gas and water supply. Things are all buried under here, too, and all

164

00:27:53.430 --> 00:27:58.570

Michael Sukop / Florida International University: subject to corrosion, and possibly deleterious effects of

165

00:27:58.610 --> 00:28:01.530

Michael Sukop / Florida International University: rising and falling, and water levels

166

00:28:01.900 --> 00:28:07.880

Michael Sukop / Florida International University: and streets themselves. They don't do Well, if the water table is right up to the the base of the

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00:28:07.960 --> 00:28:10.560

Michael Sukop / Florida International University: street or the base course, I guess, as they call it.

168

00:28:11.950 --> 00:28:19.450

Michael Sukop / Florida International University: And then just lastly, on the septic systems. You know, we have done some modeling, as candy was mentioning to identify where

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00:28:19.580 --> 00:28:35.840

Michael Sukop / Florida International University: these are all the high, you know the density of septic systems in these areas, and they we've tracked the flows, basically using the models that are available and where they discharge through and the amount of discharge, and how long it takes to discharge. So this can be used for

170

00:28:35.900 --> 00:28:39.600

Michael Sukop / Florida International University: prioritization of septic toure conversions.

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00:28:40.430 --> 00:28:44.430

Michael Sukop / Florida International University: I think that's the last one on this, too, unless we

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00:28:44.660 --> 00:28:54.750

Michael Sukop / Florida International University: Yeah, I think you can talk about, serve silent. And I think there's a question Chat. That sort of relates to that, too. So I can ask that after.

173

00:28:54.930 --> 00:28:55.610

Michael Sukop / Florida International University: Okay.

174

00:28:55.830 --> 00:29:01.070

Michael Sukop / Florida International University: So you know, there was a lot of speculation after that power collapse, and

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00:29:01.340 --> 00:29:12.880

Michael Sukop / Florida International University: you know that it's right on the coast, and there's a potential, for, you know, likelihood of salt water intrusion beneath the the building basically. But when we went to look for data, we weren't able to really find much

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00:29:14.340 --> 00:29:20.880

Michael Sukop / Florida International University: Now, when they looked at this, this is just a month after the collapse these photos were taken. If they had already cleaned it up

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00:29:21.000 --> 00:29:34.420

Michael Sukop / Florida International University: you you could see that there's a lot of corrosion and some of the structural members, and so forth. Now, you know, NIST is working on this, and they will come to their appropriate conclusions when they do. But it's just something that we

178

00:29:34.580 --> 00:29:38.510

Michael Sukop / Florida International University: you know we're interested in and and thinking about As a

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00:29:38.620 --> 00:29:45.640

Michael Sukop / Florida International University: this was unfolding, and one of the things in particular, and many of you probably appreciate this. But there's a guy in Hartsburg principal that

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00:29:45.650 --> 00:29:55.060

Michael Sukop / Florida International University: you know, if you're pumping water out of your basement, and you reduce the water table by one foot at that location. Then the salt water interface will actually rise up

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00:29:55.240 --> 00:30:02.390

Michael Sukop / Florida International University: 40 feet. There's a 40 to one ratio there, so it can be pretty devastating. This is actually what happens to a lot of

182

00:30:02.570 --> 00:30:04.950

Michael Sukop / Florida International University: water supply. Wells

183

00:30:05.240 --> 00:30:08.880

Michael Sukop / Florida International University: that our production wells that

184

00:30:09.120 --> 00:30:14.500

Michael Sukop / Florida International University: bring water for municipalities and so forth. So if they get to contaminated by salt water.

185

00:30:15.930 --> 00:30:31.390

Sarah Atkinson / SPUR: Yeah, I I add something to that. So yeah, to put this this image in context. The city of Alameda, you know there's a lot of there, Very. Their groundwater tables are very high.

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00:30:31.390 --> 00:30:41.070

Sarah Atkinson / SPUR: and there are a lot of homes that have some pumps in their basement, and and there also are a number of groundwater wells.

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00:30:41.110 --> 00:30:50.770

Sarah Atkinson / SPUR: So this you know very. It's very likely to be happening in Alameda. I don't, I don't know for sure, but it's likely that this is the case.

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00:30:51.400 --> 00:30:53.730

Sarah Atkinson / SPUR: So just just putting that in context.

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00:30:53.850 --> 00:30:54.620

No.

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00:30:54.920 --> 00:31:07.840

Michael Sukop / Florida International University: and I guess so. Then I might do the plug for my new project, and then we'll move on, because you know it's about monitoring right. And so,

you know, we were fortunate. We just got about 10 million dollars from a Congressional appropriation to do

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00:31:07.920 --> 00:31:15.660

Michael Sukop / Florida International University: a monitoring specifically, to look at the impacts on postal infrastructure, and you know, maybe this will be sort of a pilot thing that can be

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00:31:15.680 --> 00:31:17.690

Michael Sukop / Florida International University: roll down elsewhere in the future.

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00:31:20.020 --> 00:31:24.160

Sarah Atkinson / SPUR: Great? Okay, Any additional comments.

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00:31:26.050 --> 00:31:49.050

Kate Hagemann / City of San Rafael: I just say the search side example, for during and the aftermath of that we were asked by the local elected officials to look at underground basement, and whether underground parking was, should even be permitted in in the Miami environment. And I think one of the things that in the research for that that came up for me was talking to folks that design the underground basin. They mentioned that basically like

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00:31:49.050 --> 00:32:06.080

Kate Hagemann / City of San Rafael: it's a lot easier to waterproof something as you construct it once the waterproofing fails and the corrosion starts is very difficult to go back and retrofit, and I think the challenge of groundwater and kind of underground corrosion and things of infrastructure is a good example of how

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00:32:06.080 --> 00:32:31.960

Kate Hagemann / City of San Rafael: you know it's hard to track something like that as it progresses over time, it's hard to see it, and it's not really someone's job necessarily accepting the utilities, you know, to check on something like that. So if a some pump starts running 24 h a day as opposed to 3 h a day. It's probably not going to register necessarily, but it maybe should. So. I think that's one of the bigger challenges with like this facet of adaptation is

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00:32:31.960 --> 00:32:38.410

obviously like in the Bay area accepted. There's a lot of expertise and a lot of visibility that that

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00:32:38.620 --> 00:32:52.270

Kate Hagemann / City of San Rafael: folks are bringing to it. But how to translate that back into kind of on the ground in the city for building managers, and you know folks that have to manage the infrastructure. I think that's a little bit tricky.

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00:32:53.690 --> 00:32:59.810

Sarah Atkinson / SPUR: Yeah. And that that made me think of just anecdotally. I have talked to

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00:33:00.550 --> 00:33:11.510

Sarah Atkinson / SPUR: construction construction groups who are doing seismic retrofits and and looking at foundations of buildings, and are seeing this kind of like

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00:33:11.650 --> 00:33:18.240

Sarah Atkinson / SPUR: corrosion of the foundations. And so there should be some sort of like mix of like

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00:33:18.770 --> 00:33:29.520

Sarah Atkinson / SPUR: doing seismic retrofits, but also preparing for flooding. And, you know, groundwater solidity changes, and trying to make those updates at the same time, because it's, you know

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00:33:29.610 --> 00:33:36.180

Sarah Atkinson / SPUR: It's a great moment to do it, since you already have the building open, but I think that those those kinds of

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00:33:36.460 --> 00:33:47.340

Sarah Atkinson / SPUR: adaptation and resilience like projects, don't end up cooperating with one another, and there could be a lot of benefits from seeing that cooperation

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00:33:48.040 --> 00:33:52.370

Sarah Atkinson / SPUR: great. So my next question is

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00:33:52.790 --> 00:33:54.540

Sarah Atkinson / SPUR: what you know.

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00:33:54.890 --> 00:34:11.010

Sarah Atkinson / SPUR: There's this is in the Bay area. At least this is pretty new. And, Kate, you started to talk about some of the guidance and codes in Miami for dealing with groundwater rise and flooding. But in the bay area I guess what do you see as

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00:34:11.080 --> 00:34:27.610

Sarah Atkinson / SPUR: the potential gaps in adaptation, planning, and then also in Miami. What? What? What are the challenges right now? What are you all trying to deal with? And and how is it changing as sea levels are rising? And this is becoming like, maybe an even bigger issue.

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00:34:27.830 --> 00:34:30.300

Sarah Atkinson / SPUR: And either of you can jump in first.

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00:34:30.659 --> 00:35:00.610

Kate Hagemann / City of San Rafael: Mike, if you want, I can just go first and say, here, I think you know again. I wanted to see a huge Thank you to like Professor Hill and folks from us. Yes, and everybody's been really helpful in sharing this technical expertise. But for me one of the main questions you think about a place like the canal built on. Fill with that high risk of local faction. There's so many unknowns about the building conditions, and how serious of a risk is this kind of compounding hazard of groundwater rise and the existing seismic risk? I think

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00:35:00.610 --> 00:35:09.890

Kate Hagemann / City of San Rafael: that's one of the things I would say that I feel like. Let's say I just don't feel like I have enough information really to think about. And there are a lot of

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00:35:10.100 --> 00:35:21.550

Kate Hagemann / City of San Rafael: implications obviously, for given the broader context of such a housing shortage and affordable housing shortage. In particular, I think that's one area that

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00:35:22.010 --> 00:35:28.430

Kate Hagemann / City of San Rafael: for me the adaptation discussion could really benefit from maybe more.

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00:35:28.490 --> 00:35:39.520

Kate Hagemann / City of San Rafael: I don't know if it's bringing in different voices, or different research, or or what but kind of helping to think through those those things at once in a more comprehensive way, that would be really helpful.

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00:35:42.660 --> 00:35:44.260

Sarah Atkinson / SPUR: Hey, Michael.

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00:35:46.990 --> 00:35:55.200

Michael Sukop / Florida International University: I don't think I really have anything to add right now, but it's a challenging problem of what candy is just pointed out and trying to link those things to be important.

217

00:35:58.760 --> 00:36:08.350

Sarah Atkinson / SPUR: Great? Yeah, I think we have some great questions from our audience. So maybe i'll switch to asking some of those.

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00:36:10.670 --> 00:36:29.210

Sarah Atkinson / SPUR: So from David. What strategies do you recommend for foundations of mid-rise buildings and areas with subsidence interest due to high water tables. Do you have any? Have you seen anything that works, or do you have any suggestions of places to look for that kind of information.

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00:36:30.640 --> 00:36:42.340

Michael Sukop / Florida International University: I am definitely not a foundation or a Geo technical engineer, and i'm hoping to learn more about this. I mean, I work with a corrosion engineer, and you know, protection can be important to.

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00:36:42.670 --> 00:36:47.930

Michael Sukop / Florida International University: But yeah, these are things I need to learn and find the right people to work with personally.

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00:36:49.540 --> 00:36:55.140

Kate Hagemann / City of San Rafael: Yeah, just echo that as well, I will. I will say that speaking to some

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00:36:55.140 --> 00:37:22.180

Kate Hagemann / City of San Rafael: folks that work in the field, Some have mentioned that some of the best practices, like, let's say, like zinc coating on rebar. And this is not my area. But I have heard that some of the best practices aren't necessarily embedded into the building code, and so they're optional, and that sometimes things that are optional get edited out in the cost engineering phase, so that might be an area to explore for people that are in that field of you know, or any of those best practices

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00:37:22.410 --> 00:37:25.820

Kate Hagemann / City of San Rafael: not yet in the building code, and perhaps it can be folded in

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00:37:27.950 --> 00:37:30.120

Sarah Atkinson / SPUR: great

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00:37:31.800 --> 00:37:46.900

Sarah Atkinson / SPUR: Laura Feinstein, as when when you mentioned Kate building an infrastructure codes requiring certain elevation above what season Grammar level Why, haven't those codes protected Miami from frequent flooding?

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00:37:46.900 --> 00:37:54.830

Sarah Atkinson / SPUR: Is it that some infrastructure was built prior to these codes, or the codes need updating to account for sea level rise, or or is it something else?

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00:37:55.320 --> 00:38:23.440

Kate Hagemann / City of San Rafael: Yeah. So that the it was the county flood criteria and basically the is it old code? I think i'm not sure exactly when it was started. But sixties, maybe, but the it hadn't been updated since the eighties until last year. It was just updated last year, but that process took like 10 plus years of research. And so i'd say, probably speaking that the codes are. We're a little bit out outdated. But the other piece is that

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00:38:24.650 --> 00:38:31.390

Kate Hagemann / City of San Rafael: the codes specify that you need it to be 2 and a half feet above the wet. Season ground, or table and when you get

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00:38:31.460 --> 00:38:47.980

Kate Hagemann / City of San Rafael: 24 inches of rain in a day. You know this is a lot of water, so it I would see that those codes are kind of like a minimum, and not, you know they weren't intended to keep everybody dry all the time. It's kind of the difference, I think, if that's right, mine came.

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00:38:48.270 --> 00:39:06.740

Michael Sukop / Florida International University: it does, you know, and we we have a lot of water to get rid of, and I have some pretty dramatic pictures I can show real quick. You know our canals are not draining by gravity anymore. Basically, some of them and more of them are are likely to start, not being able to be drained by gravity

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00:39:06.890 --> 00:39:11.650

Michael Sukop / Florida International University: because of sea level rise under certain conditions that I can't high-end King ties.

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00:39:11.800 --> 00:39:14.990

Michael Sukop / Florida International University: and so we actually have to pump the water out to to see.

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00:39:15.290 --> 00:39:18.520

Michael Sukop / Florida International University: And you know this has been a big concern of mine. Just that

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00:39:18.880 --> 00:39:31.670

Michael Sukop / Florida International University: I think many. We we're going to talk about New Orleans a little bit. They've been doing on the Netherlands have been doing it forever. But in a place like Miami, where there's a very permeable material below, there's so much water to pump to

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00:39:32.040 --> 00:39:33.430

Michael Sukop / Florida International University: keep it dry.

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00:39:33.960 --> 00:39:41.020

Michael Sukop / Florida International University: And you know there's at the same time in Miami we have this problem with the saltwater intrusion, and if we

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00:39:41.110 --> 00:39:55.470

Michael Sukop / Florida International University: lower the water tables inland. Too much will exacerbate. See some water intrusion, and then put our our wells more at risk than they already are. So I thought. We're on this knife edge basically of

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00:39:55.480 --> 00:40:01.980

Michael Sukop / Florida International University: keeping the water levels inland high enough to protect the wells, but low enough to prevent flooding.

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00:40:02.160 --> 00:40:05.370

Michael Sukop / Florida International University: and they try to anticipate when we're going to get a lot of rain, and

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00:40:05.390 --> 00:40:10.420

Michael Sukop / Florida International University: you know, lower the canal levels by pumping them out if they need to, and then

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00:40:10.850 --> 00:40:18.490

Michael Sukop / Florida International University: trying to lower the water table basically and be able to hold more of the rainfall that comes without flooding everyone. But

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00:40:18.650 --> 00:40:22.680

Michael Sukop / Florida International University: it's a constant struggle between these 2 objectives.

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00:40:24.970 --> 00:40:37.520

Sarah Atkinson / SPUR: Yeah, I think the the humping question is a really interesting one. And and yeah, maybe, Kate, would you be able to mention what you said about New Orleans

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00:40:37.560 --> 00:40:55.860

Kate Hagemann / City of San Rafael: and pumping. Yeah, I mean, I think I think with the let's see a community like the canal where it is right now the ground is already subsided, so that it's lower than the high tide. I think obviously, an intuitive solution is to create a wall or levy, or something to bring around that area and keep the water out.

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00:40:55.860 --> 00:41:05.420

Kate Hagemann / City of San Rafael: But as Mike is mentioning, you know, the Netherlands is a few 100 years down the road, and and New Orleans a 100 years down the road, and that kind of

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00:41:05.420 --> 00:41:32.170

Kate Hagemann / City of San Rafael: system ex can exacerbate this subsidence, but also requires constant pumping of the groundwater as well. So I think that's an unknown for us here in Santa Fe. If we went with a strategy to try and block the water, would that require constant pumping of the ground water. We'd i'd i'd say, I don't know. I'm sure there are people that do know, but that's one of the kind of unknowns for the adaptation process right now.

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00:41:35.130 --> 00:41:37.680

Sarah Atkinson / SPUR: Great and

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00:41:37.760 --> 00:41:48.920

Sarah Atkinson / SPUR: yeah, I guess someone asked. Apart from updating building codes that you mentioned, Kate, are there other policy solutions that the bay area

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00:41:48.950 --> 00:41:54.410

needs to effectively address groundwater rise. And have you Have you heard of any of those?

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00:41:58.250 --> 00:42:13.220

Kate Hagemann / City of San Rafael: I guess I would. I guess you would say that I think there are probably several one, but maybe a context that's different between Miami and here is that in Miami the potential to use walls is not there. It's not really that feasible, although people try.

251

00:42:13.220 --> 00:42:25.070

Kate Hagemann / City of San Rafael: but it's not really there. So you have to adapt every every asset, so that means the codes. Therefore apply to each asset. So this road has to be this high. This bridge has to be this high

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00:42:25.170 --> 00:42:41.530

Kate Hagemann / City of San Rafael: here. I've observed that there's a thought. Well, maybe down the road will have a wall, so we Won't need to raise this asset, and we don't need to worry about the bridge. Height necessarily, because perhaps a bigger solution will will mean we don't have to worry about sea level rise.

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00:42:41.530 --> 00:42:55.440

Kate Hagemann / City of San Rafael: So it's kind of interesting that the contrast and approaches. But I think there is some value in the codes that specify a minimum height for a road, or, you know, bridge being a certain clearance above the groundwater table.

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00:42:55.830 --> 00:43:04.870

Kate Hagemann / City of San Rafael: although, like I said, Those codes are hard to keep updated and clients changing quickly. So that's has a limitation. But I think maybe something to look at.

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00:43:06.120 --> 00:43:25.580

Sarah Atkinson / SPUR: Yeah, and i'll, i'll add, I think the our current, like projections for sea level rise. We hadn't really been. We hadn't been considering groundwater rise, and so just readjusting like how we are thinking about what is actually going to happen over the next

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00:43:25.600 --> 00:43:27.160

Sarah Atkinson / SPUR: 50 years.

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00:43:27.190 --> 00:43:32.770

Sarah Atkinson / SPUR: I i'll. I'll mention back to one shorelines planning guidance, which is

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00:43:32.780 --> 00:43:46.100

Sarah Atkinson / SPUR: suggesting, it's not requiring, but suggesting that new developments are planned a 100 feet away from the shoreline to kind of incorporate that

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00:43:46.360 --> 00:43:51.420

Sarah Atkinson / SPUR: those projections and and how kind of groundwater could interface with that.

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00:43:51.460 --> 00:44:03.260

Sarah Atkinson / SPUR: I think there's more that can be done like that could be adopted as a a mandatory requirement for new developments rather than just guidance. There's also.

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00:44:03.770 --> 00:44:19.320

Sarah Atkinson / SPUR: you know, requirements around like maintenance of underground infrastructure. I think that could be updated, and making sure that, as we are, you know it takes a long time to to upgrade our infrastructure, and if we are starting now, we can

262

00:44:19.580 --> 00:44:32.310

Sarah Atkinson / SPUR: make that infrastructure more resilient to groundwater rise, not have as many opportunities for that groundwater to infiltrate those systems cause corrosion like break them down. But then also.

263

00:44:32.530 --> 00:44:42.810

Sarah Atkinson / SPUR: you know, for example, Michael mentioned, combined to your systems. That's something that we have in a lot of cities here, and if we are not

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00:44:42.850 --> 00:45:00.880

Sarah Atkinson / SPUR: paying attention to how groundwater will interact with those combined sewer systems. We're gonna see more overflows so soon. We're going into our waterways. During you know, high during rain events we're gonna see to our systems overflow which we have already seen, and having

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00:45:00.880 --> 00:45:08.370

Sarah Atkinson / SPUR: that's your water, like in neighborhoods which is really detrimental to human health. So I think there's a lot of potential

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00:45:08.860 --> 00:45:21.110

Sarah Atkinson / SPUR: policy opportunities for addressing groundwater rise. It's. It's just about getting those in the hands of the people of the right people to make those decisions. And and yeah, make this happen.

267

00:45:21.310 --> 00:45:24.100

Michael, do you have any follow up comments on that?

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00:45:25.640 --> 00:45:28.810

Michael Sukop / Florida International University: I I don't think so. Nothing comes in mind right now.

269

00:45:30.190 --> 00:45:57.080

Kate Hagemann / City of San Rafael: I you just add, I just also say, like I want it. It's it's also so helpful, and we really couldn't do without the partnership with universities like I called Mike all the time. My old job is, I appreciate. I'm still picking up the phone, but like here as well, I would say, like with a partnership, maybe with hex person in the field is really essential. I don't think that local governments can really tackle these issues without like that

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00:45:57.080 --> 00:45:59.460

Kate Hagemann / City of San Rafael: that expertise in that partnership.

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00:45:59.980 --> 00:46:01.320

Sarah Atkinson / SPUR: Yeah, definitely.

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00:46:01.750 --> 00:46:11.490

Sarah Atkinson / SPUR: Okay. So another question. At the port of Oakland we have a number of contaminated industrial properties right along the shoreline

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00:46:11.490 --> 00:46:24.760

Sarah Atkinson / SPUR: over the last few years we've started Having regulations require basic modeling through 2,100 to determine likely contaminant path. Slash impacts when sites are being proposed for closure.

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00:46:24.760 --> 00:46:36.000

Does Florida require similar sea level rise assessments as part of the routine regulatory review of contaminated sites gearing up for closure. I don't know if either of you have an answer to that.

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00:46:37.200 --> 00:46:49.730

Michael Sukop / Florida International University: I've heard it expressed as a concern numerous times. It's particularly my work in Broward County, just north and Fort Lauderdale. But, frankly, I don't know the answer to the question. I don't know that there's any

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00:46:49.930 --> 00:46:51.660

Michael Sukop / Florida International University: regulatory requirements.

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00:46:53.270 --> 00:47:13.240

Kate Hagemann / City of San Rafael: The only thing I can speak to. I I know firsthand when we have like a I work, for. It had landfills, close land phones, and that was not required. So it was something that we brought up internally, because the obviously would be affected. It was being tightly influenced by the because it's a coastal landfill, so

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00:47:13.240 --> 00:47:18.430

Kate Hagemann / City of San Rafael: I order to say, for my knowledge it's just concerned. But I don't think it's in the regulations.

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00:47:18.450 --> 00:47:19.270

Sarah Atkinson / SPUR: Hmm.

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00:47:19.670 --> 00:47:38.340

Sarah Atkinson / SPUR: Yeah. And the San Francisco what? San Francisco Bay Area Water Board has implemented new regulations around landfill sites. As well. I I can't remember the specifics of that, but definitely is is thinking about groundwater rise and sea level rise, and

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00:47:38.380 --> 00:47:43.470

Sarah Atkinson / SPUR: we have a lot of these landfill and contaminated sites along the shoreline in the bay area.

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00:47:45.410 --> 00:47:49.450

Sarah Atkinson / SPUR: Let's see another question.

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00:47:53.410 --> 00:47:57.760

Sarah Atkinson / SPUR: and let's see from

284

00:47:59.120 --> 00:48:13.170

Sarah Atkinson / SPUR: Oh, this is from David. This goes back to when you were talking about New Orleans, Kate, when you mentioned the canal with need for more information on conditions along with the need for housing. How could that play out on a practical basis?

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00:48:14.020 --> 00:48:17.760

Sarah Atkinson / SPUR: I'm not sure. I understand that question. Do you understand the question?

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00:48:18.890 --> 00:48:24.300

Kate Hagemann / City of San Rafael: I'm not sure. I understand either. But I guess there it

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00:48:25.250 --> 00:48:40.670

Kate Hagemann / City of San Rafael: If it maybe this, maybe the kernel of it is that we have these kind of twin challenges of the we have the housing shortage that has an affordability issue, a shortage of land, obviously, and sea level rise, creating these risks. I think

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00:48:40.930 --> 00:48:47.770

Kate Hagemann / City of San Rafael: if I don't know if that's what David is trying to ask. But I think that's definitely a challenge. So you know, and and I don't know what the

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00:48:47.790 --> 00:49:03.160

Kate Hagemann / City of San Rafael: practical solution is. I think that's something that again. It's like really helpful to have this partnership, and that can be practice that's for, and others are helping facilitate, because there's only so much land. So and and maybe from an environmental justice perspective, it's usually

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00:49:03.230 --> 00:49:14.370

Kate Hagemann / City of San Rafael: best to keep people in the community where they're from and have strong connections and so retrofitting buildings, making them stronger and more resilient, would be a great option to explore.

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00:49:14.440 --> 00:49:21.680

Kate Hagemann / City of San Rafael: but also thinking about some of these challenges. Make that retrofitting, maybe a little bit harder, a little bit more

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00:49:21.720 --> 00:49:31.030

Kate Hagemann / City of San Rafael: expensive, or you know these are a couple of things I have to be explored, so I think I definitely don't have a good answer, but it's friend of mine

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00:49:32.480 --> 00:49:33.720

Sarah Atkinson / SPUR: Great. Thank you.

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00:49:33.870 --> 00:49:47.400

Sarah Atkinson / SPUR: So we have a question from Christina Hill. Is there any evidence in San Rafael or Miami that tidally influence. Groundwater is undermining water. Supply. Pipes, as we hear, is happening in Honolulu.

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00:49:49.130 --> 00:49:50.700

Sarah Atkinson / SPUR: and either of you can take that one.

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00:49:51.750 --> 00:49:54.520

Michael Sukop / Florida International University: I am not personally aware of it.

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00:49:57.300 --> 00:50:10.980

Kate Hagemann / City of San Rafael: Yeah, I definitely can't speak to it here in Santa Fe. I do know that in in Miami you had some residents who come who had issues with their t one that was really wet in places, but that was something that

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00:50:12.290 --> 00:50:29.850

Kate Hagemann / City of San Rafael: was likely to be on the private property side. So the public water supply system is pretty tight and pressurized. So at least that's what we were that saying. So that's what our the impression was that it wasn't impacting portable water, but that there

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00:50:29.850 --> 00:50:44.570

Kate Hagemann / City of San Rafael: it could be connections, maybe it to apartment buildings or to older structures that might have been a challenge. We did here anecdotally, some residents at issues with their tap in like the very, very low line areas where the crowd water was really close to the surface.

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00:50:46.310 --> 00:50:50.540

Sarah Atkinson / SPUR: and that another question from Christina Hill.

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00:50:50.690 --> 00:50:56.750

Sarah Atkinson / SPUR: Kate, Have you seen, or or has the city done any?

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00:50:57.090 --> 00:50:58.870

Sarah Atkinson / SPUR: Have any information on like

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00:50:59.200 --> 00:51:09.810

Sarah Atkinson / SPUR: building corrosion from salt water intrusion? Okay. And I I know that you mentioned liquefaction. Is the city thinking about

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00:51:09.850 --> 00:51:18.350

Sarah Atkinson / SPUR: liquefaction potential in these areas, and have there been conversations of, you know. maybe, what could be a solution.

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00:51:19.320 --> 00:51:36.040

Kate Hagemann / City of San Rafael: We Haven't had conversations about the solution. It's definitely been a conversation about the the risk. I think one of the challenges as well for the canal. Like other places, I have to deal with it. But the soft, sorry retrofits, or any sort of new mandate to retrofit the building obviously comes to the cost.

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00:51:36.040 --> 00:51:49.660

Kate Hagemann / City of San Rafael: and there's a very like short term and acute risk of people getting evicted or just placed. And so the city is very sensitive towards making, you know, prioritizing, housing, and making sure that

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00:51:49.800 --> 00:51:51.520

Kate Hagemann / City of San Rafael: to infer and like

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00:51:51.550 --> 00:52:11.400

Kate Hagemann / City of San Rafael: and tribute to that. So that's something that I would say been talked about, but not pursued yet, but also a question, I think, for everybody like you know. How do we retrofit when a place with really liquifiable soils, and and how liquefi will. Are the soils because we got hodgepodge of different fill materials that I think those are still questions that probably should be answered

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00:52:12.420 --> 00:52:13.270

Kate Hagemann / City of San Rafael: first.

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00:52:14.880 --> 00:52:17.960

Sarah Atkinson / SPUR: Great? Yeah.

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00:52:18.120 --> 00:52:31.810

Sarah Atkinson / SPUR: I. We have about 8 min left, and I just wanted to see if there were any final images that you wanted to show, or anything else you wanted to share with the group. Maybe we can also take one more question before then.

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00:52:32.190 --> 00:52:34.600

Sarah Atkinson / SPUR: Michael, did you have some more images?

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00:52:34.710 --> 00:52:35.640

Michael Sukop / Florida International University: I not?

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00:52:35.690 --> 00:52:42.700

Michael Sukop / Florida International University: I believe I do. Yeah, let's see. I know just for touching on this issue of having to pump our canals out

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00:52:43.320 --> 00:52:53.990

Michael Sukop / Florida International University: and looking forward to more of this in the future is pretty dramatic. I would say right. We're basically creating our own rivers here. It looks like the the Sierra right?

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00:52:55.980 --> 00:53:00.110

Michael Sukop / Florida International University: I won't be. And then I just had one that was just a

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00:53:00.790 --> 00:53:05.800

Michael Sukop / Florida International University: I was amazed by this. This is on our campus, just feet from where I am right now.

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00:53:06.010 --> 00:53:11.310

Michael Sukop / Florida International University: and this is the size of the hole, and I don't think they need it to drop the water table very much, but

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00:53:11.480 --> 00:53:18.410

Michael Sukop / Florida International University: the size of the pumps and piping that were required to do that, and a whole of this size was just mind boggling to me.

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00:53:19.590 --> 00:53:25.400

Michael Sukop / Florida International University: I think this is pretty common in a lot of our areas, and as the water temperature gets fires we get more and more difficult to do

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00:53:27.030 --> 00:53:30.960

It's unfortunate, I guess that might be the last one I have to

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00:53:34.680 --> 00:53:35.390

Sarah Atkinson / SPUR: great.

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00:53:35.660 --> 00:53:54.630

Sarah Atkinson / SPUR: So let's see there's some final questions and thank you. Everyone in the audience for posting questions and for commenting in the chat. I also want to recognize.

Professor Christina Hill has been adding a lot of great information and background in the chat as well.

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00:53:56.100 --> 00:54:14.240

Sarah Atkinson / SPUR: Let's see a final question when comparing Florida and the bay area where more resources we're more resources dedicated to studying and planning for groundwater and sea level rise in Florida. Are there particular programs or studies that have been done in Florida that should be replicated here.

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00:54:18.010 --> 00:54:36.640

Kate Hagemann / City of San Rafael: But I could just come in that, you know. So where I was for Miami County. There was a a a, a formal funding agreement between the Government and the Usgs for groundwater monitoring and modeling, and I think it might be related to that, partly because this the whole region's drinking water

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00:54:36.640 --> 00:54:49.930

Kate Hagemann / City of San Rafael: comes from the groundwater immediately under the city, so protecting the drinking water was a really high priority. So but I know that there's a lot of, you know, similar resources going in across the State, but

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00:54:50.070 --> 00:55:04.670

Kate Hagemann / City of San Rafael: that's maybe one reason why there was. There is so much investment in in monitoring and modeling for groundwater in South Florida, and as well that it's just like a paper Thin difference between the ground surface and the groundwater table. That's the other thing, too.

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00:55:08.190 --> 00:55:10.540

Sarah Atkinson / SPUR: Michael, and the

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00:55:11.170 --> 00:55:23.310

Michael Sukop / Florida International University: well, you know it's been a phenomenal experience working in groundwork here. I didn't actually appreciate what I was getting into when I first came, you know, and the opportunities that have come, and the things I've learned have been just phenomenal.

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00:55:23.610 --> 00:55:34.080

Michael Sukop / Florida International University: but you know it's a it's a unique aquifer Here and there are amazing monitoring systems for solar intrusion regionally.

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00:55:35.420 --> 00:55:42.330

Michael Sukop / Florida International University: and the one that i'm proposing now is for you know really more for coastal infrastructure on a different scale than that. So

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00:55:42.570 --> 00:55:43.940

Michael Sukop / Florida International University: I think

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00:55:43.970 --> 00:55:47.470

Michael Sukop / Florida International University: you know. Perhaps that type of monitoring will be useful

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00:55:47.630 --> 00:55:51.380

Michael Sukop / Florida International University: elsewhere, and more frequently as time goes forward.

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00:55:52.910 --> 00:55:58.810

Sarah Atkinson / SPUR: Yeah, definitely, I I think the as as we've said a couple of times like the partnerships.

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00:55:58.930 --> 00:56:06.740

Sarah Atkinson / SPUR: even though the context is different partnerships between. You know what's happening in Florida, and you might go with like

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00:56:06.780 --> 00:56:13.380

Sarah Atkinson / SPUR: the work that's happening here, is it's kind of emerging, and we're trying to figure out what we're supposed to do. I think there's a lot of

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00:56:13.600 --> 00:56:30.240

Sarah Atkinson / SPUR: you know chance for not having to reinvent the wheel, and I I also wanted to share in our last couple of minutes. Spur and Bacon and a number of other partners have applied for

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00:56:30.250 --> 00:56:39.170

Sarah Atkinson / SPUR: Grant to try to host, As Kate mentioned earlier, a community of practice to really talk more about groundwater rise. And

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00:56:39.210 --> 00:56:43.300

Sarah Atkinson / SPUR: yeah, the adaptation issues that we are.

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00:56:43.580 --> 00:56:49.730

you know, being faced with right now. And I think a lot of these questions are really getting out what we want to come out of that

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00:56:50.030 --> 00:56:56.870

Sarah Atkinson / SPUR: community of practice. We want to figure out what are the policies that need to be put in place. Who needs to be engaged in this?

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00:56:58.200 --> 00:57:04.990

Sarah Atkinson / SPUR: Yeah, how our community is going to be affected, especially by contaminant mobilization which you know we

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00:57:05.440 --> 00:57:19.020

Sarah Atkinson / SPUR: we didn't get in too much here, because I think it's it'd be a whole webinar in itself of what you do about that, and and what what the impacts are, and and maybe we will host the Webinar on that sometime in the future.

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00:57:19.020 --> 00:57:38.120

Sarah Atkinson / SPUR: But yeah, we were hoping to get that funding and hoping to start something in the next year to really continue this conversation. I know Kevin Beef is from Usgs mentioned that in the chat wanting to keep this conversation going. And, Michael, if you're interested in being part of some of those conversations, I think that would be great.

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00:57:38.120 --> 00:57:39.790

Sarah Atkinson / SPUR: Yeah.

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00:57:39.900 --> 00:57:46.300

And yeah, I I think i'll close it out. Do you? Either of you have like final comments you want to make.

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00:57:47.750 --> 00:57:48.540

Sarah Atkinson / SPUR: Okay.

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00:57:48.910 --> 00:57:59.650

Sarah Atkinson / SPUR: Great? Well, thank you. I just I'll say thank you to everybody and Kevin and and Christina Hill and and Ellen and Mike and everybody for sharing all that expertise. And thank you so much.

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00:58:00.730 --> 00:58:02.450

Michael Sukop / Florida International University: Yeah, Thank you for having me.

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00:58:03.040 --> 00:58:20.320

Sarah Atkinson / SPUR: Yeah, Thank you so much for being here. Yeah again. Thank you, Kate and Michael, for joining us and sharing your insights on groundwater rise, risk, and adaptation. I also want to say thank you to our senior associate for public engagement. Jack Jackson, who manage all the besides behind the scenes

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00:58:20.330 --> 00:58:35.480

can't speak today. Aspects of this event and our great public engagement team that hosts all of our events, remember to check out more of our events. We have, you know, probably like 3 a week, and on many different topics. So there's lots for you to learn.

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00:58:35.480 --> 00:58:54.630

Sarah Atkinson / SPUR: And finally, thanks to all of our attendees for joining today, posing, engaging questions, sharing resources and information in the chats, in the chat. And yeah, we hope to see you at more events, and if you are interested in, you know, engaging on these this topic more, please send me an email.

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00:58:54.630 --> 00:59:00.060

Sarah Atkinson / SPUR: and I will include you in any future conversations on groundwater rise, adaptation.

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00:59:00.070 --> 00:59:03.230

Sarah Atkinson / SPUR: And yeah. thanks so much

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00:59:03.660 --> 00:59:05.200

Michael Sukop / Florida International University: alright.