Rising Seas, Rising Costs

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Greg Dalton: Tonight on Climate One, we're discussing rising seas in the San Francisco Bay Area, and what that means for our economy and communities. I'm Greg Dalton and this program is sponsored by the San Francisco Foundation. If the global economy stops spewing any carbon pollution today, the oceans would still rise at least a couple of feet this century because of the warming already baked into our atmosphere. Scientists debate how high the tides will rise and how fast but there's no debate about the direction the water line is going - up.

Over the next hour, we'll discuss what the Bay Area is doing to prepare for an expanding bay. How will we pay to protect shoreline roads, homes and businesses? And what will happen to San Francisco and Oakland airports. Joining our live audience at the Commonwealth Club in San Francisco we're pleased to welcome four leaders planning a new relationship with our beloved bay.

Alicia Aguirre is former Mayor of Redwood City and a member of the Metropolitan Transportation Commission; Larry Goldzband is Executive Director of the Bay Conservation and Development Commission; Julian Potter is Chief of Staff at San Francisco International Airport; and Laura Tam is Sustainable Development Policy Director at SPUR, the San Francisco Planning and Urban Research Association. Please welcome them to Climate One.

[Applause]

Greg Dalton: So Larry Goldzband, sea level rise happens slowly. Sea has risen eight inches in the last century. What's the big deal? Why should we care since it's just slowly rising seas?

Larry Goldzband: Well, I think what we really need to think about when we think about time is chunks. We can always look at the guidance that says, by the end of the century, it may rise as much as 55 inches. But how many of us are going to be around at the end of the century? Probably not many. And so what we are trying to figure out is how we can communicate the issues surrounding rising sea level by actually asking people to look at it in time chunks. What's going to happen during the next 10 years and what shall we do about say the 30 years after that? What would then happen in the 30 years after that and how would we think about say the next 50 years? Because if we try to imagine from now to the end of the century, much less beyond that, we're all going to just be paralyzed.

Greg Dalton: Laura Tam, what is the governments and companies in the Bay Area preparing to not be paralyzed by this?

Laura Tam: Well, we've seen a lot of activity in just the last five years in terms of people becoming more aware of the issue of rising sea levels. We've seen a lot of local governments preparing climate action plans that include adaptation activities, so not just trying to stop climate change which, of course, is extremely important but preparing for its effects, of which sea level rise is a big one for the Bay Area as you all know. So we've seen a lot of projects popping up around the Bay Area trying to look at the challenges of rising sea levels, where will they be in the next 50 years to the next 100 years, what can we do about preparing to build resilience into the shoreline, how can we protect ecosystems that are out there in the bay that are worthy of protection as well.

And you're seeing a lot of people really wrestling with, I think, what the biggest challenge of sea level rise presents which is how are we going to make decisions about this? There's no governance precedent for dealing with sea level rise. So it's a vexing climate challenge that I think you're starting to see that conversation building and growing around the Bay Area, and it's encouraging to see the dialogue.

Greg Dalton: Alicia Aguirre, you're on the frontlines. Redwood City right through in the bay, there's a port. San Mateo has the most property of any county in the state, most at risk. So what is Redwood City doing to get ready for this?

Alicia Aguirre: I think you mentioned it. San Mateo County has probably the most amount of money to lose, or the biggest losses in any of the counties in the Bay Area. Think about what's in San Mateo County when you have the airports, when you have all of the infrastructure, all the housing, the cities like Foster City, like Redwood Shores, when you have the Googles, the Facebooks, everything that's around the area. What are we doing in order to take care of that? Because it's still a -- as was mentioned before, it's still an unknown. So the people that are there or the infrastructure or the companies are still battling with this idea.

So I think what cities need to do, not only in my role on the council but also in Metropolitan Transportation Commission, but how are we actually preparing for that, what kind of structures are we allowing to be built, what are the size of the levees, how much investment can we put and get from companies that are already there? Because when you look at the maps, it's going to go past the 101. And when you look at everything that's going to happen in that area, it's kind of scary and it takes San Mateo County quite it flips halfway into the ocean. And you know, it’s a regional issue, so it's working with all of the cities. We have a lot of flooding in certain parts of Redwood City and so we have to work with all the cities that contribute to that flooding that ends in Redwood City.

So it's working on a regional issue because it's not just fixing what's happening in Redwood City, it's fixing what's happening all along the bay and along the coast as well. And how do you work with developers and politicians and county government in order to look at the different pieces and say, "This is what we can do and we can add to that piece." And at what level are we going to do it?

Greg Dalton: Let's talk about San Francisco Airport. A lot of people fly in and out of there. It's a huge economic engine. Julian Potter, those runways are very close to the bay, what are you doing to protect them from sea level rise?

E. Julian Potter: Thanks, Greg. Yes, the runways are close to the bay. They have been for the last 85 years since the airport has been there. So we've been well aware of the positioning and we've been building barriers along the shoreline for the last 30 years, some concrete barriers, rock and fill, other vinyl barriers. To date, no flooding has occurred on the runways due to the tidal "surges" but although not being the scientist, we are taking this all very seriously. And so we are in the middle of a two-year $500,000 coastal adaptation study, a structural engineering study. We're looking at the 8.1 miles of shoreline and we're going to plan for three events: the mid-century, the end of the century but most importantly, probably to us, is the 1% chance that we could have a storm event similar to Hurricane Sandy. That's in our sights right now.

Greg Dalton: And what happens if right now if that happens at SFO? Power goes out, runways underwater.

E. Julian Potter: Right now, we have our own waste water treatment plants and industrial waste water plant and we have underground storm drains and we have pumps. So we could flush the

runway. Runways are built -- a lot of the systems on a runway obviously are waterproof so we will be able to clear the runways fairly quickly but that doesn't mean that we're not looking at it. Because today, we do have some gaps in the shoreline and so I think we would be operational fairly quickly, as was La Guardia. But they did sustain damage there and we want to make sure that we put in place plans now so that we don't sustain the kind of damage that they did.

Greg Dalton: So you could make SFO a fortress but it's no good if people can't get there on the 101, because the 101 is underwater. So Alicia Aguirre, you're on the Metropolitan Transportation Commission, this is one of the hardest parts of this problem is no jurisdiction can solve this themselves, people have to work together. That's hard for people and humans.

[Laughter]

Alicia Aguirre: One of the things that we did is the Plan Bay Area and that's been a huge effort with nine Bay Area counties that put together this plan on what we are building today is actually in-fill. It's high density. It's in transportation. But yes, the 101, there are improvements happening in different parts of it but it would be a catastrophe if that roadway -- and as you mentioned, a bridge to the airport or to other areas, wouldn't happen. So the whole plan is about infrastructure and is about high density and its in-fill and it's away from all of what we call the bay and, of course, the gulf and the ocean.

Greg Dalton: Does Caltrans get this? Because we've had a lot of the headlines recently about Caltrans and the Bay Bridge, I mean do they get climate change over at Caltrans?

Alicia Aguirre: Caltrans, yes, definitely. Caltrans is part of the MTC and we have been working with them. They were part of this plan. They were part of all the work that we've been doing on the Plan Bay Area. This was a plan that took us nine hours - nineyears. And so they are part of it but its groups like MTC and other transportation organization that are actually having MOUs to work on these kinds of issues. So MTC is working with Caltrans with working with others in order to mitigate some of the issues and to look at how we address the issues.

Greg Dalton: Larry Goldzband, you look at the entire bay. You work for a state agency. What are the greatest risk areas? Who's most at risk around the bay from storm surge sea level rise?

Larry Goldzband: Well, it really depends upon how you define who is. Alicia is totally correct. If you take a look at the bay, San Mateo County sort of has this target right on it. Because simply the way the topography works, if a storm comes, if levees break, no matter what happens, the bay waters rise. San Mateo from essentially the airport south is ~~definitely~~probably - is more at risk in terms of dollar value and in terms of people than just about anybody else. On the other hand, when you look at the bay, one of the great things about the Bay Area is that there are different topographies, different demographics, different geologies and no place is exactly the same.

And so if you go north to Sonoma and Napa, you have a fundamentally different appreciation of the bay than if you say head south to San Mateo or even over say to Newark because it's a very different kind of place. Napa has done an amazing job with its Napa River project to try to work with the water so instead of fighting the water and it's something that we can learn. And in San Mateo County, I should add, the San Francisquito Creek project is trying to do basically the same thing to account for water flow, to account for storm surge and to ensure that we can live with water up to a certain extent, instead of simply putting a seawall up there and trying to fight it.

Greg Dalton: So how do we need to think about change our relationship with the bay and the

water? There's the ocean and it doesn't change much. But what we're hearing about is going to change a lot. We don't know how much or how fast so we have to change our mindset and that's a hard thing to do. So Larry Goldzband, how are we going to change our concept of living near the water which is a large reason why we are all here?

Larry Goldzband: We don't live in the ridge area. We don't live in the valley area. We live in the bay area and I know that may sound really simple but it's something that probably most of the people just take for granted. Well, we're not going to just simply take the bay for granted after the next 10, 20, 50 years, because it's obviously going to change. And from the way we tend to think about it as a state agency with regional jurisdiction, we are the first people to tell you that we don't exactly know what it's going to look like, but we can tell you how we need to get there.And the way we need to get there is, as Alicia says, regionally and sub-regionally. It's not simply the cities that are going to decide what the city is going to look like. The city is going to work with the cities next to it and the county is going to work with the county next to it.

We have nine counties that touch the bay and over 40 cities that touch the bay, and we're not going to be able to have one city work in a way that endangers another city. And so that's why regional agencies such as MTC, BCDC and ABAG and all that alphabet soup of regional agencies have to learn to work together in not only a coordinated fashion but a partnership to ensure that we can figure out the regional approach.

Greg Dalton: Laura Tam, are there any specific projects or cities that come to mind that are doing a good job on this? Is there anything built today where you can say, "That's what our future is going to look like"?

Laura Tam: I can think of quite a few actually but I'll start with our own town here in San Francisco. We've been working on a project on Ocean Beach, where there've been erosion events happening during major storms over the last, well, 20, 50 years, some of which have taken out the infrastructure and important things that are assets to the community. At Ocean Beach, we've worked with a lot of different city agencies and federal and state agencies as well, to try to come up with a long-term vision for how that beach could be maintained as an asset, as a recreational place, as a home to endangered species considering sea level rise and erosive events. So we've come up with sort of a design vision for what we could do.

We're also, this year, starting a project looking at a section of the waterfront on the eastern side of San Francisco. Alameda County has really stepped up and done a lot of work with BCDC actually to look at what are the assets on their shoreline and what things are at risk and how can those things be protected in a way that's coordinated. Lots of different city and county agencies are working together on that project. There's an effort going on in Silicon Valley, in Santa Clara County right now. Larry mentioned the San Francisquito Creek which is in San Mateo County, San Mateo and Santa Clara County, and they're managing a project looking at not just sea level rise but a river that flows into the bay that suffers from pluvial flooding. So when it pours, there's a lot of backup and a lot of flooding both on the flood plain as well as in the bay.

So there's a lot of exciting -- Napa River, the Corte Madera Creek in Marin, there's a lot going on and all these projects are sort of in the nascent design phase. I don't know if you could point to any of them and say this is how we adapt and actually you probably wouldn't want to do that anyway because every shoreline is different. Not anyone strategy is a one size fits all kind of strategy, but we have a lot of things in the works that I think we'll be able to look to in five, ten years and say, "This is a good model for planning. This is a good model for making a resilient shoreline."

Greg Dalton: And the model for San Francisco, the west side of San Francisco, I believe I saw it at SPUR. The Pacific Coast Highway goes behind the zoo so the Pacific Coast Highway is going to change and go eastward, which raises the question of where we defend and where we retreat. So what are the places we're going to say, "Okay, we got to protect this. But what are some other places where we're going to sort of pull back from the coast and some people are going to lose their homes or businesses. Larry Goldzband, how are we going to make that decision?

Larry Goldzband: The decision is going to be made regionally. It's not going to be made city by city. Because the only way you can try to create a pareto-optimal solution, that is a solution which ensures that those disadvantaged communities that are say, next to the bay, East Palo Alto, for example, are not disadvantaged, is to look at it regionally. And from my perspective, one of the great examples of how a city can actually start thinking about real projects in real time is actually the port of Redwood City. Because BCDC permitted a new seawall there as the first time we've actually permitted by using the bay plan amendments that were passed a few years ago that talked about sea level rise and how we needed to actually work through it through a permitting process. And it was a success and it is a success. So we can demonstrate that we can actually do this.

Greg Dalton: Julian Potter, do you want to --

E. Julian Potter: Yes. Just I think you've hit on the points on the jurisdictionally. So as I spoke earlier, we're looking at the bay side, the eight miles, right? But behind us is 101 and the San Bruno mountains, so we've partnered with San Mateo County and we just got a grant with the state coastal conservancy working with Dave Pine, a supervisor down there, and we're looking at the alluvial flow off the mountains into the creeks that run north and south of SFO.

Greg Dalton: So that's rainfall for those of us who are not water experts?

Larry Goldzband: Yes.

E. Julian Potter: And yes, as the rain comes down. Because we realize that it can come from all sides. The idea of the jurisdiction, the waters, they see no boundaries. So that's starting that partnership with San Mateo County, we know that we need to continue our outreach with the transportation linkages, the egress in and out of the airport is going to be - But also the partnership, we have the coast guard sits on the airport and it has an exposure to the bay. So working together with them on what they want to address. We have South San Francisco, San Bruno, Millbrae, Burlingame, all kind of touch a little bit of the airport. So we're beginning that work. So we start with what we know, the airport, and we're moving out and gaining partnerships and coming together to address this holistically.

Greg Dalton: Alicia Aguirre, was it possible that some people will need to retreat or pull back in Redwood City, and how do you think we're going to make this decision about what places to protect if you say that we can't afford to protect everywhere? There's going to be some tough choices and some pressures on places where there's lower property values, lower-income areas.

Alicia Aguirre: I can give you a perfect example of what's happening right now. We have an area that we're studying at Precise Plan, it's the Inner Harbor Plan, and we have liveaboards. We have a dock town. We have a Marine Science Institute. We have Bair Island Aquatic Center. We have rowing, Stanford rows there, Palo Alto Club rows there. We have all of that happening plus you have the port nearby and development and cargo. So you're looking at all of these things happening and this is a great opportunity where we're involving all the stakeholders.

And as what's mentioned, it's not only the stakeholders in Redwood City or San Mateo County, but also regionally that would benefit from this and deciding what does that inner harbor want going to look like? Is it going to be recreational? Are the liveaboards still going to be there? Is it similar to Sausalito? Is that what we want?

Because of affordable housing so they're screaming and yelling affordable housing or the recreation area wants to keep it open. Do we do more wetlands? There's all these decisions to be made and developers are part of the conversation as well as the county. So there's a perfect opportunity there to say, "Do we need to retrieve or do we need to protect or what is it that we're going to do?" Because it's an opportunity, very few opportunities that we have left in the Bay Area to do something that's a forward-moving and that will benefit the region.

Greg Dalton: So it sounds like people want to do more development. We have a basketball team that wants to do a big new pier arena on the waterfront in San Francisco. Larry Goldzband, are we going to see more big money development on the coast? And if so, what's that setting us up for?

Larry Goldzband: One of the things that we all have to recognize is that people believe that if an asset is placed close to the bay, it has greater value. And candidly, we can all agree with that because we love the bay. But one of the things that BCDC staff and BCDC commissioners recite as a mantra is that that should not be seen as simply what you do, that is, the bay is not a lost opportunity for what you can do on land. And so the public policy process, which is pretty difficult and pretty hazardous to get through, basically says that there are special conditions that you have to meet in order to build within BCDC's jurisdiction.

The short answer is people will always want to build near the water. I think that's probably just part of our DNA after thousands of years, and they will want to live near the water. The question that we have at BCDC and the regional agencies have to figure out is, how do we ensure that as the water rises, economic vitality and our community's vitality continues to grow albeit in a way that we can't forecast. Because we don't know what this place is going to look like in 100 years, much less 200 years, when our grandkids and great grandkids and so on are there. But the water will always be something that we want to be next to.

Greg Dalton: Laura Tam, I heard someone who's an expert in this area talk about waterfront development would be permanently temporary. That is the idea that goes to like there was Will Travis, who used to be at BCDC, the idea that this sort of permanence along the waterfront is more of a campground thing. I'd like to have your thought about our relationship with the water and whether we ought to be still building near it. Laura Tam?

Laura Tam: I think we've think that things that -- there's a lot of things that are already right next to the water that are worthy of protection. We're going to have limited resources for protection, right? We can't protect everything. We have to kind of have this regional conversation play out about what are the things that are important to us a region to protect. Maybe they are the airport, maybe they're some wetlands that are otherwise getting drowned. We have to figure out where those resources are going to come from.

And then in terms of thinking about things that we may choose to put on the waterfront that don't exist there now, ~~we have to think about~~ those things have to have a design or financial strategy for dealing with sea level rise. Because if they anticipate being there for the next 30 years, next 100 years, they have to anticipate that they need to do some planning around projected future sea level rise. I don't think we, as a public, should stand for any project that wants to be near the water that isn't planning to protect itself in some way, because there is limited dollars to go around for the

things we already have.So that's one thing. And I also think you can think about planning and how much effort you're going to put in to design and financial strategy to protect yourself, depending on what kind of thing you're building.

If you're building an airport runway, you want to build something that's really tight. You want to make sure that that's going to be around. You're planning for the 1%, as Julian said, the 1% event. If you're building a park interpretive center, maybe it's something that could be moved inland in a few decades maybe it's something that's temporary so you should be adopting the sort of design strategies and the cost profile that best suits the type of thing you're trying to build.

Greg Dalton: Laura Tam is Sustainable Development Policy Director at SPUR. Our other guests today at Climate One are Julian Potter, Chief of Staff at San Francisco International Airport; Larry Goldzband from the Bay Conservation and Development Commission; and Alicia Aguirre, member of the city council in Redwood City. I'm Greg Dalton.

Alicia Aguirre, let's talk about paying for this. Where the money is going to come from? You're someone who has to look to the voters and say, "Look, this is going to cost more to protect Redwood City." What are the ways that we're going to come up with money to protect the shoreline and a political environment where people don't like taxes? How are we going to do it?

Alicia Aguirre: We're already doing that in Redwood Shores which many people don't know is Redwood City, and they've already self-assessed themselves a parcel tax in order to not only create but maintain the levees in that area. So that's one idea is if you have construction, you have housing near the water, then you are going to pay for making sure that you're sustaining it. We don't even know the amount that it will cost. The billions that were -- if we lose what we have or in order to protect.

And so in speaking with the engineers, in speaking with the builders, the developers, the same question, it could be billions. We have no idea what it will cost to protect what we want to build or what we want to add. And so those are the unknowns. But when you do have something like Redwood Shores, where you have the residents there saying, "You know what? We want to protect this. We're willing to tax ourselves." So that will be -- it has parcel tax that has to be organizations and like Metropolitan Transportation Commission that has a lot of funding to work with areas of transportation and infrastructure. And now they've added housing and that's a very important aspect. So we have to look at all of those pieces. I don't think it's just taxing ourselves, I think it's also looking at what all of these organizations can do together, and I'm just talking about one but that has MOUs with many others.

Greg Dalton: So that's one example in contrast with what happened up in Belvedere, where some people said, "You're on the flood zone, you got to buy insurance." They kind of think people went crazy up there. "No, we don't want to pay for it. We want government to do it, et cetera." Larry Goldzband, what are some of the funding mechanisms where this money going to come from, these unknown billons?

Larry Goldzband: Well, not only do we not know where the money is going to come from but I think we also have to take one step back because that money is going to pay for a bunch of different kinds of things. And one of the things that I want to make sure that the audience recognizes is that we can talk about levees, which are made of concrete. We can also talk about levees that are made of dirt, and we can talk about marshland, and we can talk about increasing the amount of wetlands within the bay at specific places which can, in the near-term, actually absorb much of the energy and in the near-term help prevent the storm surge and so on.

But that's really expensive. And one of the things that we have to learn how to do better as a society is place a value on natural ways to do things, which is candidly not very easy to do. And one of the things that I'm excited by is that, for example, at Black Rock, they're this very large investment firm, right? Well, they have a very much a growing practice of natural capital. That is they have clients who want to invest in fixed assets and get a fixed return but want to do so by investing in projects which are environmentally friendly. So I think that there are ways to think about this beyond the simple discounted cash flow of passing a bond measure and throwing cement into the water.

Greg Dalton: So some of this capital may come from the private sector not just taxing government?

Larry Goldzband: I think that it's going to end up being a mélange of forces that are going to ultimately ensure that the communities are protected and it's going to be private, it's going to be public and it's going to be inventive.

Greg Dalton: Julian Potter, you have the situation where you can basically just tax airlines and passengers, right? You have a revenue stream to --

E. Julian Potter: Not exactly.

[Laughter]

Greg Dalton: These people who use the airport are willing to pay for the airport presumably.

E. Julian Potter: Somewhat.

[Laughter]

E. Julian Potter: One thing, I think, you have to and we have to think about is the airport as part of a national aviation system, right? We have 45 million passengers a year that's 175,000 people a day go through the airport, 30,000 people work there. It's a big operation and it's connected worldwide, right. So this is not a problem for San Mateo County because of its geographic location where we are, nor is it for San Francisco because they own us. This is a national asset and we need national leadership and I know we seek that on many issues.

But one area that I can point to is the runway safety areas. Congress passed and said that every airport shall have a runway with sufficient distance to accommodate any aircraft that might slide off the end of the runway. We're in the middle of that construction. It's a $200 million program. Well, Congress mandated it and the FAA funded it, 70-30. We are paying 30. So I think there has to be some sort of a partnership because if you look across the country and you have New Orleans, you have JFK, you have La Guardia, Miami, Fort Lauderdale, L.A., San Francisco, we're all in the same boat here and these are assets that are worth protecting. And so we're not waiting for the federal government, as I told you, we're investing now and we're reaching out with partnership. But I think we call on Congress to help protect these assets.

Greg Dalton: Is that realistic in this political environment?

E. Julian Potter: Well, I think if they were willing to invest in these runway safety areas, yes. I think it's going to take time, as all government processes do, but I think because it's an aviation system, if SFO has a problem, that's a problem all over the country. I mean planes go down in airports everywhere so the economic impact is not singular to any one side, so everybody gets impacted by it,

whether or not you're near water. Chicago will be impacted by it, any of these hub cities, worldwide you are. So I think because of the disparate impact, a lot of people are going to feel the pain if they feel that these assets aren't protected. So I think we meet with our trade association and it's something we have put on the map and we started with -- I think you mentioned earlier -- first with looking at carbon mitigation and how can we reduce carbon and the airports, we're working hard on that but that's not going to solve the problem we know.

Larry Goldzband: Can I add an example to Julian's example? We, in California, have a tendency to look at California as at least a couple of states, the coastal state and the Central Valley. What many people don't recognize is that a startlingly large percentage of the crops that are grown north of Bakersfield that are exported, are exported through the port of Oakland. So those ships you see in the bay, carting to and from, docking at the port of Oakland, many times carry product that employs people in Redding or employs people in Tulare County.

In addition, something like 98% of the fertilizer that's used in the Central Valley comes through the bay and goes up the Stockton channel. So, it is in the best interest of all of California, whether you touch the bay, whether you see the bay on a daily basis, to actually invest in the bay for economic and environmental reasons.

Alicia Aguirre: Good point.

Greg Dalton: Let's talk about seismic because we haven't talked about earthquakes. Some people would say earthquake is a more immediate and real risk to us than sea level rise or climate change, which is ephemeral and abstracted and apparently slow-moving. So I looked up some statistics recently, about quarter of the people in the Bay Area are prepared as the Red Cross says they should be. So Larry Goldzband, adding to seismic to this, how does that factor into it?

Larry Goldzband: Well, there are a couple of ways you can look at scenarios in the bay. There are probably many more than a couple. We've been talking about the combination of the Great Sandy, our version of Sandy. The big storm that comes in, it comes in on a king tide in January so the whole place floods and the water is coming from both directions. But there's another just as perhaps likely, if not, more likely scenario, which is that the next Loma Prieta, which is larger than the last Loma Prieta, comes on by.

And all of sudden you have wreckage where there were once earthen berms, which means that the South Bay gets flooded. And lo and behold the same thing happens in the Delta, so all of a sudden you lose a key levy or two in the Delta, which means the valley gets flooded. You have water flowing wherever you can imagine and so there's a scenario you really have to look at as well. And so when we take a look at scenario planning and we take a look at how we envision the bay, what we really need to do is make sure that we take into account all the different types of hazards that can come right beneath us.

Greg Dalton: Laura Tam, San Francisco recently upgraded their Hetch Hetchy water system that was largely seismically driven because of earthquakes. Now, San Francisco is reminded by the signs in the buses that they're going to soon upgrade the sewer system in San Francisco. How is that going to be done in a way anticipating sea level rise? Are they doing a good job?

Laura Tam: Yes. I would say our water and sewer agency, the San Francisco Public Utilities Commission, has been really thinking about climate change in many dimensions as it has to, thinking about sea level rise with respect to the sewer system and will we be able to keep --

Greg Dalton: Keep it flowing.

[Laughter]

Laura Tam: Thanks. And as well thinking about the impacts to our water supply because, of course, with climate change, we're expecting to see warmer winters, potentially less water like the historic drought we're having right now. We expect that maybe we'll have something like 70% less snowpack by the end of the century on a regular basis. So the PUC and other water agencies in the Bay Area, I might add, have been doing a lot of work to model the potential changes to snowpack and rainfall and what will that do to our water supply, as well as starting to think about how can we upgrade this, the infrastructure we have in the ground to be prepared for not only earthquakes but sea level rise.

Greg Dalton: So if San Francisco is doing a good job on its sewers and Hetch Hetchy, help me understand Mission Bay where it's liquefaction landfill right on the water, billions of dollars of new buildings being put right in flood zones and is anyone thinking about sea level rise? Laura Tam?

Laura Tam: I would say that they're aware of sea level rise. Sea level rise is ~~not something that we~~ -- it takes 20 years to plan and build anything in San Francisco, so we weren't thinking about sea level rise 20 years ago when we planned and permitted Mission Bay.

So that said, Mission Bay has a lot of qualities about it that enable it to be readily protected. They have a lot of new property owners, a lot of new tenants, so there's the ability to do what Alicia was speaking about earlier, the infrastructure financing districts or people taxing themselves to pay for protection. There is also a pretty clear area of waterfront where Mission Bay is potentially exposed that could be protected with a levee or something else. So I think it's an opportunity more than a risk and it's definitely important for San Francisco with the housing situation that we have right now. It's a lot more affordable. [Crosstalk]

Larry Goldzband: And let me say that -- I apologize. Let me say that, just in defense of Mission Bay to some extent, the City of San Francisco is working with BCDC and a couple of outside partners on a special study with regard to Mission Creek and that whole southern area there to try to figure out how it can best adapt as a community. And that's really the important thing to think about as a community.

Greg Dalton: One contrast -- just one second -- is Hunters Point where now we know about sea level rise and Hunters Point is being built at 55 inches and they're planning all sorts of storm drains, and sea level rise is very much on the radar from the beginning at Hunters Point, whereas it clearly wasn't at Mission Bay. Julian Potter?

E. Julian Potter: Yes. I was just -- you kind of brought up an interesting note when looking at earthquake preparation, right, for the seismic stability and have we finished that, right? I mean, that's a big problem that we know is real and we still have a lot of investment to do there. And, in fact, at the airport, we're just finishing, it'd be another year, a year and a half, air traffic control tower and the reason being it wasn't seismically stable. You'll see it as you go out to SFO now, two towers out there, one under construction. It'll be another 40 feet higher that costs about 100 million. We're also underway of building Terminal 1, which is the oldest terminal out there now, and it is sinking with the liquefaction. And so that will be a huge multi-billion dollar project. So at the same time, I think you have to know that there is still significant investment that we're doing in terms of being in an earthquake zone, so don't jump too fast to the rising tide.

Greg Dalton: Well, this is a matter of personal interest. The Commonwealth Club just bought a building on The Embarcadero. We're going to move there next year, so we want to know. My office is on the third floor. [Laughter] We're talking about sea level rise in the Bay Area with Alicia Aguirre, former mayor and councilmember in Redwood City; Larry Goldzband from BCDC; Julian Potter from San Francisco International Airport; and Laura Tam from SPUR. I'm Greg Dalton. Larry Goldzband, tell us about Goldilocks. Tell us the story of Goldilocks.

Larry Goldzband: Well, there are these two little kids -- one of the great things that BCDC did under the great leadership of Will Travis, who's in the audience, was to really start the discussion about the rising bay. And one of the great things that was part of that was the creativity that was associated with it, and BCDC held a competition that was international, about what are the really interesting, even if they're not realistic at this point, ways that we can deal with the rising bay. Well, of course, that happened a few years ago and their talk has continued, and one of the ways that this talk has continued has been manifested in the idea of putting a series of locks underneath the Golden Gate Bridge, therefore, Goldilocks. Yeah, there you go. Well, my last name is Goldzband and I've been called Goldilocks for how long and I don't have any hair; that's just the way it goes, so I figure it's just being named after me. But one of the things that really needs to be seriously discussed in the Bay Area is whether it is possible, much less wise, to actually stop the water from coming in to begin with in some way, in an engineering solution, underneath or near the Golden Gate.

There are huge issues with regard to this, not the least of which are the fact that doing something like that would alter the biological functions of the bay. But as we look at the bay and as we look at what's going to happen over the next hundred years, much less thousand years, it's going to change no matter what. And so we have to figure out what the alternatives are and one of those alternatives that we have to always look at is doing nothing because that costs us as well.

Greg Dalton: I want to ask a personal question of each of you, starting with Alicia Aguirre. What are you personally doing in your lifestyle to plan or adapt to severe weather, sea level rise, resilience in your own life?

Alicia Aguirre: Well, I really enjoy the bay and so I'm enjoying it as much as I can. In my personal life, to prepare, I think I am one of the percentage that is prepared for an earthquake and prepared for what can change. I'm also very aware of how we grow things in our backyards and what type of systems we use. We have a recycle water plant in Redwood City and how we built that and how it affects the schools and the playgrounds and -- so those are the things that I'm part of. And just to jump off of what you were saying earlier, if we had the Goldilocks, and I just want to end that --

Greg Dalton: Yes, because it would impact San Mateo in a big way, so please --

Alicia Aguirre: Well, I'm a rower in the bay and so there are times when we get stuck in the mud, and you know that most of the bay -- I think it's 60% to 80% -- is not lower than 12 feet. I mean, you can literally get stuck if you don't know the canals to go in on the bay. So the bay is very shallow and so imagine what would happen if we had Goldilocks and we're just going to be on sand in all of San Mateo because it's going to take all the water away. Right.

Greg Dalton: She’s going to whack you with the paddle. Okay. Laura Tam, how about resilience in your own life?

Laura Tam: Resilience in my own life. Well, I try to focus on the fact that we both need to be prepared as well as do what we can to minimize our own environmental footprints. And so I'm a

transit rider and a cyclist, and so are my kids and they're learning about the importance of conserving water, especially now, conserving energy, about the value of habitat in the bay and the ocean. And we take field trips with them to show them the great environment that we were blessed to inherit and that we hope to pass on in a sustainable way. So I guess sort of teaching the new generation as well as trying to minimize our own footprint as much as possible.

Greg Dalton: Get them in the Boy Scouts and Girl Scouts, those skills are going to be useful coming ahead. Larry Goldzband?

Larry Goldzband: We have a 10-year-old whose favorite thing to do is go to zoos or go on expeditions in which he can see wildlife, and so we're doing very much the same thing that you are. We're basically teaching him that this is great as it is now, but it's all different depending upon where you go. And as a 10-year-old, that's sort of an easy thing to get because we don't look like where, say, Vancouver is in some respects, although we do in others. And he's learning that the wildlife there is different than the wildlife here. And he loves riding BART, and it's a great thing to be able to take your kid to work on BART and have him look at 24, where we live, and see the backlog of cars and say, "Gosh, we're going 60 miles an hour faster than they are."

Greg Dalton: Julian Potter?

E. Julian Potter: I'll be honest, I'm happy I have my earthquake bag prepared at work and at home.

But most of my effort falls in my professional life. I can't say that I've changed a lot of my personal actions. I try to ride to work on ride-to-work day, ride my bike down to the airport; that's pretty tough. [Crosstalk] But really it's growing awareness within professional associations, working the airports, the trade associations, our elected leaders, and our employees, we're trying to always do new initiatives to move people on to transit. We actually pay for the BART transit surcharge, the $8 to go in and out of the airport, for any of the employees there, especially the wage workers. We're pushing a transit initiative so that we can give $130 to employees to use transit instead of taking their own personal car. So I'll admit I don't personally --

Greg Dalton: Personal resilience is tough because it relies on system, so you can be on a hill, but where's your food come from? Or you can stash some food or water, but how long is that going to last? So it really relies on communities and I just wanted to get that in there.

Let's go to audience questions. Welcome to Climate One.

Female Participant: Last year, we had a similar talk about the sea level rise where you talked about the levee system and the marshlands, so is that plan still on and how has it progressed? Is there any hope we see with that?

Greg Dalton: I think that's Larry Goldzband. Delta levees.

Larry Goldzband: Well, it's not just Delta levees. I mean, it's really when you look at the bay, what we have the ability to do in various places is to have what I would say is a real win-win situation. I apologize for the jargon. But one of the things that we have to do to make sure that the bay is productive is to dredge and we have to make sure that there are great navigation channels to allow the ships to get where they need to go. Well, what should we do with that dredged material? Historically, it's all gone out to the Pacific or even dumped at Alcatraz. Well, that has lessened, thankfully. What we really need to do is use that dredged material and place it where it can be used to accrete and to ensure that we have more and better marshland which can help with the rising

bay. So we're working with the U.S. Army Corps of Engineers and a host of folks who are involved in dredging to maximize the amount of dredged materials which are reused.

Greg Dalton: Let's have our next question. Welcome to Climate One.

Male Participant: Yes, thank you. ABAG and MTC recently produced Plan Bay Area and it seeks to put development into planned development areas, but a number of those planned development areas, if you overlay the ABAG map for what's going to get wiped out with sea level rise, are in areas that will be wiped out by sea level rise, doesn't say a word about that. A number of those planned development areas are in areas that are subject to liquefaction, doesn't say a word about that. How can a fairly sophisticated regional agency screw it up so badly?

[Laughter]

Laura Tam: I would say that they didn't really screw it up so badly. I think we have a lot of priority development areas, to use ABAG and MTC language, are areas that we already inhabit. There ~~are places where we -- or there~~ are places like Downtown San Francisco, Downtown Oakland, there are places that are already good candidates for protection and there are places where there's a whole lot of existing infrastructure and people's houses and jobs where we're going to figure out as a region, and perhaps the cities themselves, ways to protect themselves. And so in some ways, if we can concentrate growth in areas where we are already likely to be able to try to fund additional protection, it's a smart strategy, rather than sprawling into areas that will require new protection, new infrastructure, a bunch of other expensive stuff, in addition to sea level rise protection. So I would say that it's a much smarter strategy, and actually it was a recommendation of SPUR several years ago to concentrate development and plan for taking regional resources that become available for sea level rise planning and focus them on protecting priority development areas because these are the places that we can contribute to reducing emissions as well because people are more likely to ride transit and things like that.

Larry Goldzband: Let me add to what Laura said in two ways. Number one, BCDC is actually working with MTC and a number of different organizations to actually look at those priority development areas and do the risk analysis and the vulnerability analysis because we think we have to. The second thing I'd say is that the next Plan Bay Area, whatever it's called, in 2017 will actually include information from BCDC with regard to how we can have resilient shorelines.

Greg Dalton: Let's have our next question. Welcome to Climate One.

Female Participant 2: I heard that San Francisquito Creek, the gentleman that's proposing the plan, is planning on spending billions of dollars for earth and levees, which if he -- just to Dumbarton Bridge in East Palo Alto, that doesn't consider the other eight counties around yet. Are you considering -- if you're going to continue bringing in people to this area in times of drought and sea level rise, are you thinking, like we are in Redwood City, about perhaps floating homes for development instead of permanent things? And are you looking at more than 30 years which is just a small amount of time because it's going to continue for hundreds of years.

Greg Dalton: Thank you. Alicia Aguirre?

Alicia Aguirre: I think she asked if other areas are doing things like -- other than Redwood City. But I think the planning does go on. In fact, I mentioned earlier the developers are developing at 2070 levels and so they're already planning on that.

Greg Dalton: Laura Tam, are we going to all turn into Sausalito?

Laura Tam: I mean, it's a possibility. That kind of development is also vulnerable in many ways. They can't handle a lot of wave action. The infrastructure isn't already there. You got to put stuff in the bay. I don't know if that's a good place to put a bunch of new people, but, yes, we do have a lot of people coming to the Bay Area in the next 30 years and there's going to be a lot of preparations needed on the water supply front as well as on the sea level rise front, as you mentioned.

Greg Dalton: Laura Tam works for SPUR. We're talking about sea level rise and climate change at Climate One. Let's have our next audience question. Welcome.

Jeff Potter: We have another threat of sea level rise which is tsunamis. The biggest source we've got right now is the Cascadia Subduction Zone off the coast of Oregon and Washington. That is a fault that's very similar geologically to the faults that let go recently in Japan and Sumatra.And the projections for sea level rise due to tsunamis on the north coast of the city is 12 to 14 feet and that would be lesser as the tsunamis make their way into the bay. But it's something that is part and parcel with what you folks are doing.

Greg Dalton: Are tsunamis on the radar?

E. Julian Potter: Absolutely. The studies have to contemplate any level of sea level rise through the projections, and so a tsunami, I think that level whether it'd be again the 100-year flood or the 15 inches or the 55 inches, I think the question really is the timing, right? So we have to plan for them. Whatever we build, we have to build contemplating that in the future they might need to build on top of. So it's really an understanding of the potential for the worst and what can we build now to protect today.

Laura Tam: Can I get additional comment on that, too?

Greg Dalton: Laura Tam.

Laura Tam: One of the most important things you can do to prepare for tsunamis is develop emergency plans. It's kind of in the field of warning people to get out of way and protecting human life. Tsunamis also go away. They recede. Sea level rise is something that is going to happen and remain high. It's going to just keep going up forever, so it's something -- it's a little bit of a different planning framework than planning for something that will happen and it's certainly horrifying and scary and we hope doesn't happen, but it's certainly a different sort of planning exercise to prepare for an emergency event versus a long-term emergency.

Greg Dalton: Let's have our next question about sea level rise at Climate One. Welcome.

Jade: My name is Jade. I'm an intern with San Francisco Office of Environmental Policy and Compliance with the Department of the Interior. We've recently been doing a lot of research on drought and so I was wondering what are your thoughts on the impact sea level rise could potentially have on droughts such as the flooding of deltas and other freshwater resources?

Greg Dalton: And also saltwater intrusion is a big concern. So who'd like to tackle that one? Laura Tam?

Laura Tam: I could take a little bit, yes. I mean, I haven't really thought too much about the impact of sea level rise on drought issues, but certainly we talked earlier about levees in the Bay Delta and

how they protect - there's a series of islands and levees that sort of protect some of the most important water conveyance infrastructure in all of California. If those levees, which are extremely seismically vulnerable, were to fail and saltwater, which gets further into the Delta and will continue to as sea level rises, if that stuff is able to enter the water intakes right now that supplies so much of not only Southern California but the entire Bay Area -- much of the Bay Area as well, the water supply could be interrupted to those customers for a year and a half before it's restored. So it's a significant imminent catastrophe in the Delta that we have to prepare for and there's a bunch of work going on right now. I urge you all to check out something called The Bay Delta Conservation Plan. It's a strategy to try to deal with that problem before it arises. However, I should also say that it wouldn't be totally effective for 10 to 20 years, so hopefully the big earthquake doesn't hit before then.

Larry Goldzband: And I would add to that because I think Laura is right on target. The Bay Delta Conservation Plan, which is now being promoted by the administration, is an incredibly important thing for all of us who drink water in the state, which is everybody, to really understand because the Delta is a very fragile place. And one of the things that we always have to remember is that the Delta really should not simply be called the Delta. It is the Bay Delta. And so remember that the freshwater flows from the Delta that aren't captured, say, from the aqueduct or don't stay in the Central Valley, come right through here and end heading out to the Pacific at some point, right?

And so at the next BCDC meeting in a couple of weeks, we'll have the BDCP people in. How's that for jargon, Greg? BCDC and BDCP. So that we can understand how those freshwater flows will actually be effective so that we can have a better understanding about how that will affect the Bay.

Greg Dalton: Larry Goldzband is executive director of the Bay Conservation and Development Commission. Let's have our next question on sea level rise here at Climate One.

Male Participant 2: Thank you. I was living in New York when Hurricane Sandy hit and one of the things that stood out was that there was only one building in downtown Manhattan that get their lights on because they have their cogeneration plant. My question is that how did the utilities prepare. I mean, if all of our preparations fail and the grid goes down, how does the utility prepare for that? And are there any buildings here in the Bay Area that would be able to continue to operate and get their lights on?

Greg Dalton: Sorry, Larry, but you used to work at PG&E, so that one's got your name on it.

Larry Goldzband: We actually at BCDC have PG&E and Chevron and a number of other private entities in to talk to us about their preparations. And it's more than just keep the lights on from the idea of a storm. Climate change is going to have tremendous effects on heat and so how can PG&E understand and prepare for more hotter days? PG&E has a tremendously intensive program that they're going through right now to do just that. Here is my question back to you. If you were to have a storm surge and one of the other things that happened in New York was the fact that the subways got flooded. Well, we've had BART in one of the things that BART said that was really interesting is that two-thirds of all trips on BART either begin or end between Embarcadero and the Civic Center on Market Street. So how is BART trying to prepare?

And they have a tremendous program now trying to figure that out and they have done something which I think is very, very commendable. They have decided that anytime they do a capital improvement project, basically, no matter how large or small it is, they throw in the analysis of sea level rise and climate change, and try to figure out how they can, over the long term with that project, help better their system.

Alicia Aguirre: And to add to that, what cities need to do and are doing is looking at their infrastructure and the investment of that and make sure that not only it meets the requirements of sea level rise but all the seismic activity. I know that's what we're doing because a lot of our infrastructure goes through we have a lot of creeks in Redwood City that we need to end. Sometimes with development you have to kind of move things a little bit. I mean, most of the cities' infrastructure and sewers are more than 50 years old and so you have all of the issues and all of the leakage and all of the water running out. So as cities look at their budgets and look at their infrastructure, they have to now look at not only seismic precautions but also sea level rise. And that's part of that big regional picture.

Greg Dalton: Alicia Aguirre is a member of the Redwood City Council. Let's have our last question at Climate One. Welcome.

Steve Lynch: Good evening. My name is Steve Lynch. I drove down from Davis. As I drove down, I listened to a podcast called Sea Level Rise that had John Englander in it. John Englander talks about whole cities disappearing. Miami will become an island. And that.

And the feeling I got from that one was that a lot of these measures we're talking about tonight will be too little too late. So, Greg, you're quite involved in this. I'd like to hear what your opinion is in contrasting tonight's program with that one.

Greg Dalton: Well, John Englander is in the audience, so, John -- we're going to ask him. He was here recently, so thank you for being here, John. If the question is being science-based, we have lots of different programs, lots of different guests over time. If the question is that we're not thinking dark enough here, that if you buy into some of Dr. Hansen's research, et cetera, that the sea level rise is going to be a lot greater and faster than we've been talking about tonight, there are some very credible people who think that those scenarios are plausible and that we're not thinking bold enough, fast enough if that Greenland ice sheet goes, we're going to see some -- and Richard Alley, who was another Climate One guest here, works on abrupt climate change, we may not be thinking big enough. I'd like to know -- close here, by -- oh, boy, we can go dark or we can go light. Let's go light [laughter] and think about some up notes here -- let's end on an upbeat note here so we don't send people off to drink in depression here tonight. So, Julian Potter, let's think of an optimistic note to end on .

E. Julian Potter: Optimistic note. We're ready. [Laughter] No, no, really. In looking at the runways and in looking at the airport, we are doing things today to help prevent, but we're also planning for the future. You sometimes see maps where the airport is underwater and I'm here to tell you that has not happened. We do have the walls up and we are putting steps in place now. And we're looking at what can we immediately do to clean and to resume operations. I think that's what's most important about an airport. It is an outdoor site. We are used to weather and how do you get operations back up and going? We might be down, but as you said, the water will recede and trust that we'll get the operation going.

Greg Dalton: We have to end it there and I guess what we just heard is that when the bad one happens, you can get to the airport and get out of town. [Laughter] So we have to end it there. Our thanks to Alicia Aguirre, former mayor of Redwood City; Larry Goldzband, executive director of the Bay Conservation and Development Commission; Julian Potter, chief of staff at San Francisco International Airport; and Laura Tam with the San Francisco Planning and Urban Research Association. I'm Greg Dalton. Thank you all for coming and listening to Climate One today.

[Applause]

[END]