Parched California

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Greg Dalton: I'm Greg Dalton. And today on Climate One, we'll peer into the future of fresh water in California. Droughts have long been part of California's history but 2013 could be the driest year on record. Rain will come but experts say water supplies will be more volatile and less predictable than it has been in our lifetimes. The carbon pollution wafting from our cars, homes and dinner plates is disrupting the earth's climate and that's impacting snow and rainfall. Over the next hour, we'll wade into California's rivers and aquifers with our live audience at the Commonwealth Club in San Francisco. This program is underwritten by the Steven D. Bechtel Fund and the Pisces Foundation.

We're pleased to be joined by four water experts. Heather Cooley is the co-director of the water program at the Pacific Institute. Brandon Goshi is Manager of the Water Policy and Strategy at the Metropolitan Water District of Southern California. Bob Wilkinson is adjunct Associate Professor at the Bren School of Environmental Science and Management at UC Santa Barbara. And Lester Snow is Executive Director of the California Water Foundation and previously served as California secretary for natural resources under Governor Schwarzenegger. Please welcome them to Climate One.

[Applause]

Lester Snow, let's begin with you. How prepared is California for the impacts of climate change on its waters system?

Lester Snow: Better than almost any other state and not sufficiently. We pay a lot more attention to it here. It's getting a lot more planning studies, research and I think we're way behind the curve.

And in fact I would say that unless we change the way that we're doing things, we're going to continue to fall behind the changes that we're seeing in our water's resources.

Greg Dalton: We'll get into that more. Heather Cooley, would you agree, is California prepared?

Heather Cooley: I would agree that we are certainly doing more than we are in many places across the country but we could be doing a lot more. There are some water utilities in some parts of California, generally the larger, more well resourced agencies that are starting to try to understand what the impacts are starting to plan for it. There aren't many that are yet doing projects to begin to adapt to climate change.

Greg Dalton: Brandon Goshi, what is Southern California doing to prepare for climate impacts on water?
Brandon Goshi: I think it's a greater recognition that climate is one of the uncertainties that we face along with other uncertainties into the future. And it's a matter of looking at how those uncertainties can affect the water resources and the water reliability, particularly for our service area, and the approaches that we can take to try and address those.

Greg Dalton: Okay. Before we go any further, Bob Wilkinson, let's ask you to give a little bit of an explainer about how to connect the dots between climate change and water supply. How does

climate disruption affect water?

Bob Wilkinson: So some have said that climate change is essentially was all that increased temperatures, water is going to be the thing that translates it for people's real experience. So under warmer conditions, you have basically more action in the hydrologic cycle, more uptake, some more preset on a global average of what it really means for a place like California. We are still uncertain. We're not even clear on the signal, wetter or dryer, it could be some of both. It does look like more extreme precipitation is on the cards, and probably more prolonged droughts. So dryer dries, wetter wets, and that's a challenge.

As Lester has pointed out a number of times, this is something that water managers have been dealing with for a long time but extremes, exacerbating extremes is what climate change brings to this. On top of that, snow pack for California is a very important free storage system. So it's equivalent of roughly all of our surface storage combined what's stored in snow and ice in the mountains, and then released yet at a time in the year when it's very handy to have it. Lacking that, so losing that free storage that nature services, if you will, is a significant issue. And of course demand will go up because as you have increased temperatures, especially during the dryer cycles, for agriculture and for urban systems you're going to have people asking for more water, ecosystems needing more water and using more water through transpiration of plants. So increased demand, increased variability of supply.

And so to tag on to the previous question, water managers have actually have all the different professional groups than I think ought to head on this over the last 10-15 years thinking about modeling, discussing what will this mean. And part of that is building resilience, having a managed groundwater more effectively, how do you use water more efficiently so that you've got it when you need it. So we can talk more about that but I think that is an important dimension of the discussion is this is not new for water managers but there are a lot of challenges ahead.

Greg Dalton: Lester Snow, let's about 2013, could be one of, if not, the driest calendar year on record for California. Water is measured in different cycles but most consumers are thinking calendar years. Where are we in the calendar year for water in California?

Lester Snow: We're not on a good spot. I guess I would back up. People might remember last year, especially if you're a skier, it was great skiing in December. I mean, wonderful snowpack, 138 percent of normal, I think, by the time you hit the first-second week of January. The system absolutely shut down in January and there was no appreciable snowfall or precipitation after that. Now, as a result of that, playing off what Bob said, not only do we not have the big reservoir snow pack, then we proceeded over the summer in order to meet demands to pull down our reservoirs. So we go into the new snowfall season where the reservoir is way below normal. What that sets up is a potential of, even if it's an average year or especially a below average year, we will be in a very serious draught conditions next year.

Greg Dalton: California it's used to being in serious draught conditions but is this different somewhere. Of any one who grew up in California as I did, we're used to winter come and they go and some are worse than others but is this fundamentally different now?

Lester Snow: Yes. I think it plays off of Bob's point, what climate change has already brought. So this is not something off in the future to argue about are greater extremes or having higher peek flows in the rivers meaning greater flood risk, and then the draughts are coming more frequently.

And then the other thing that plays into this is that we have systematically drawn down some of our

great reserves like groundwater. So if you paid attention to the press this year, we've seen more press on groundwater problems in California this year than we've seen in the last 10 years. So groundwater is a natural buffer but we have over-drafted our groundwater basins in the Central Valley of California by the amount of Lake Tahoe. And so we've pulled down massive reservoirs. So it's an accumulation of issues that now is being exacerbated by climate change.

Greg Dalton: Brandon Goshi, is this recognized in Southern California that we're entering a new chapter in California's water history and are people grappling with that reality?

Brandon Goshi: I think it's more of an evolving future than a new future. We've looked at uncertainty, again, and tried to deal with that in Southern California in a number of ways. The last big draught, the famous draught of the 1990's was really, if you want to have a wake-up call for Southern California, that showed that there was a need to diversify the resources that we had to invest more money into water use sufficiency measures, conservation, recycled water, storage. So over the last 20 years we've tried to build a system that's diversified and more resilient. And so when we see this challenge coming, I think in addition to the climate challenges, I think it's new because there's also additional regulatory challenges and environmental challenges as well that's been there in the past. So new, no. Challenging, definitely. And we're working towards trying to stay in line with that.

Greg Dalton: Let's talk about that a little bit because it's actually a success story that is not that well known. Southern California has more people and using about the same water. So tell us what you've learned and what you did as a result of that 1990s draught?

Brandon Goshi: Well, I think it was a recognition that reliance on imported water supplies which for Southern California had comprised sometimes more than half of the water supplies that were needed in particular year. Since 1990 the water use sufficiency measures like conservation that have been put in place, water recycling, groundwater clean up, all of those resources, we've been able to generate an equivalent of over a million acre feet. And when you think about — an acre-foot for Southern California anyways is enough water for two families per year.

We've generated over a million acre feet of water use sufficiency base savings that reduces our demands for supplies on the imported systems. So by reducing our reliance on those supplies, we've now made ourselves more resilient to the challenges that we're talking about tonight.

Greg Dalton: So Southern California used to have a pretty bad reputation for water management. As a college kid I went down and remember watching water their sidewalks in the middle of the day. That's no longer valid. Bob Wilkinson, is that true?

Bob Wilkinson: Well, another way to say what Brandon just said is within his service area, and there are 19-20 million people, they've added about 2 million people and they're using less water with an additional 2 million people than there were a couple of decades ago, and there are a lot of things that went into that but I think it's – and I believe we have a long way to go. We still have a lot of opportunities to use water more efficiency, fix the leaks, change the plumbing, a big one for urban Southern California's landscape but a lot of those same issues are very much the case in this area, the urban San Francisco Bay area. And a lot of great work going on here with some of the projects, East Bay MUD, Sonoma County Water Agency and [00:11:19], you go around the Bay Area, a lot of opportunities.

Greg Dalton: Some people say San Francisco is not as efficient with its water because they've got Hetch Hetchy locked up there in this area and they don't have the same incentives or stress. Is that

fair, Heather Cooley, or not?

Heather Cooley: No. San Francisco has made a lot of investments and in fact has among the lowest per capita water use in California. Part of that is driven by the climate. It's a relatively cool climate. You also have dense urban areas that people don't have a lot of landscaping. You have multifamily housing. Multifamily housing tends to use less water than single family. So all of those sort of factors are working in San Francisco's favor but on that top of that, they've made huge investments in water conservation and efficiency and have done a great job.

I agree with Bob, there's a lot more than can be done here in San Francisco, Central California, Southern California, and we have a long way to go to be efficient but we are moving in that direction.

Greg Dalton: Heather Cooley, what are some other success stories, places around the state that have really done — Southern California has done where they're really are on the cutting edge of managing water wisely?

Heather Cooler: Well, I think on the conservation and efficiency side certainly in Southern California and there are many metropolitans, member agencies that have done great things. In Long Beach, for example, Irvine Ranch, they've done some really innovative practices, policies, looking at their rate structures and other sorts of efficiency investments. You also, in addition to efficiency, you have a lot of communities that are looking at water reuse and that becoming a significant sort of component of what they're doing. In Orange County you have a very innovative program where they're treating wastewater and using that and recharging groundwater. They too had over-drafted their groundwater and are using that draw down as a sort of storage and sort of an underground reservoir. So there are a lot of really innovative tings going on there as well.

Greg Dalton: Then does Mother Nature clean up the water?

Heather Cooley: Well, they treat the water to a very high quality and they inject it underground. Ironically what they then pull up and treat and put back into the portable water system, what they're pulling up is lesser quality than when they originally injected it. So they do treat that water very high quality and it is used by many people in Orange County and they're very happy with that investment that they made. They've been doing it for decades and they're continuing and are planning to even do more in the future.

Greg Dalton: Lester Snow, I learned a fun term researching for this program; showers to flowers. So tell us about recycling that is going politically — it might be smart water policy but, politically, that can be a tough sell. So do you see more recycling in our future?

Lester Snow: I don't think there's any question about it. First, to just play off of what Heather said, I'm kind of critical about how fast, I'll call it, the water industry is moving in California, yet if you can think of an innovative approach to deal with climate change, it's happening somewhere in California. And so the challenge becomes how do you take this innovation and progressive management and spread it so as the norm, not the exception. And one of those issues is wastewater recycling.

You'll hear people in the business talk about the purple pipe approach. And so that means cleaning up water, putting it in a distinct pipe that's not for portable use, and running it out to large landscape area. That ends up being very expensive and there's only so far that you can go. And so the next frontier is much more widespread acceptance of indirect and direct portable reuse and you

get it back into the drinking water supply.

I don’t think there's any question from a technical standpoint that it is safe and needs to be done. You have perception issues and sometimes what we call the lack of political leadership to move things forward. There was, 10 years ago in San Diego, an effort to go to portable and run water into a reservoir upstream, very highly treated water. And I think one day the paper ran an editorial showing the dog drinking out of the toilet and the owner saying, “Move over, Fido. It's my turn.” And the politics in that community turned on a dime. They're back at it now because they need to develop that water supply.

Greg Dalton: And these days and age of social media, one image or picture on Facebook and Twitter can really, yes, wreak a lot of havoc. Do we need more surface storage more concrete, Bob Wilkinson, to store water for our future?

Bob Wilkinson: I'm not sure. It's obviously a very volatile question. Surface storage is a — we have a lot of surface storage. One thing in the context of climate change, one of the issues is with greater uncertainty and greater variability, we’re inevitable be going to need to reserve more storage space and existing surface storage or anything new that we would build to deal with flood. So if you've got potentially more coming down less predictably and we’re worried about flood control, and most of our reservoirs deal with flood as well as water storage and hydropower, then you're going to need to hold more space in reserve for flood control. That means a cost for water supply and for hydro.

So given all that, we need to be brutally honest, I would say, about the accounting on these things. And if it does pencil out and it makes sense, then I think we might build some more. If it doesn’t and if, as Lester points out, if groundwater management, which provides the same type of storage function, it's a different place to park the water but there's a lot of opportunity, then we need to compare the two very carefully.

Greg Dalton: With warmer temperatures, isn’t there more evaporation from reservoirs?

Bob Wilkinson: It depends on where they are. In some cases, yes. Certainly the big ones in the dry areas, you're going to get an increase in evaporation.

Greg Dalton: Lester, do we need more dams, more concrete in California to secure our water in the future?

Lester Snow: I don’t think so. I'm not a big fan of adding a lot of surface storage to address this problem. I am a big fan of getting more water back in the groundwater where you can leave it for longer periods of time. You have contamination issues that need to be dealt with. You’ll hear some people talk about we need to use our surface storage facilities as fore-base for groundwater recharge meaning that you saw the flow of the flood flows and you let the water out and get it back into groundwater basins.

The other thing is just kind of a practical issue. Those that came before us or the last 150 years didn’t pick all the bad sites for building reservoirs. They picked the good sites. And so that means there are a limited number of good sites. And you see more and more — when people consider surface storage, this happened in Southern California, you go to what's called an off-stream reservoir. You're not actually damming up a river. It's like building a swimming pool somewhere to move water into to use for emergencies or draughts. There are some of those that are viable; one was built east of here that is useful for those purposes recently, an off-stream reservoir, largely off-stream reservoir. So those, I think there's a — people probably won’t like this. I'll call those boutique

applications for those. If we want to address the loss of snow pack and large amounts of storage to be held for the next draught, we need to get groundwater under control.

Greg Dalton: There's a bias in Sacramento for things that are kind of — unions get lots of concrete, there's jobs, there's sort of a political and visual bias for concrete and projects versus can't see underground. Okay. It's good. It's there but there's some optics in political problems I think.

Lester Snow: I think we can figure out a way to have a breast plaque somewhere near the groundwater basin.

Greg Dalton: Send some of the politicians down underground. Yes, okay. Brandon Goshi, what do you think about more storage for Southern California's water needs?

Brandon Goshi: I tend of think of more storage as being part of the puzzle, not being the silver bullet, definitely not the silver bullet. So this more storage makes sense, maybe not today but if some of the issues in the California Bay Delta are addressed in terms of that ecosystem, the ability to make that system more efficient, additional conveyance to changes, that system so that it's more functional, then perhaps storage becomes a more viable piece of that solution.

But storage by itself, I don't think is going to make sense without those types — addressing more of the big picture because, as Lester said, storage won't work that much if there's no water to put in it.

Greg Dalton: I want to get to the Bay Delta but first the idea of collecting water near where it's used. In energy, we have this idea of people putting solar on their rooftop; you generate energy close to where it's used. In San Francisco and other cities have encouraged people to put big barrels our there to collect your rainwater, the idea of collecting rain water close to where it's used. Brandon Goshi, is that something that you're doing in Southern California to try to have residential collection more, professionals distributed of water capture?

Brandon Goshi: Yes. California is a very diverse place. I think applications that are good ideas in some areas may not pass a lot in other areas. And that's not to say that it wouldn't work in Southern California but you'll often hear Southern California is a desert. Putting rainwater capture in a desert doesn't tend to pay off as much as putting rainwater capture where it rains. So it's…

Greg Dalton: So we'll do it up here but it won't happen down south.

Brandon Goshi: I'm not saying it won't happen. I'm saying that it might look different or the — whether you go in a single site or a collective sites, I think those are tings that need to be looked at to make sure that it makes sense to all the areas that you're putting them in.

Greg Dalton: Lester Snow.

Lester Snow: Well, adding on that point, I mean there is this desire for people to do something there is often this rush to rain barrels. There is some anecdotal information in some areas that a rain barrel can result an increasing water use. And the reason is your rain barrel fills early in the rain season.

You got this wonderful garden and now the rain barrel is empty. And so what do you do? You now use water from your city system to keep the green that you didn't have before you had the rain barrel. So you just have to be very careful. Some of these things sound great and they're not really universally applicable everywhere.

Greg Dalton: If you're just joining us on the radio, Lester Snow is Executive Director of the California Water Foundation. Our other guests today at Climate One are Bob Wilkinson, Professor at the University of California in Santa Barbara. Brandon Goshi is a manager with the Metropolitan Water District of Southern California. And Heather Cooley is with the Pacific Institute. I'm Greg Dalton. Heather Cooley, let's talk about the Bay Delta. That's often seen as the hub of the state's water system. Getting that right, it's a very contentious issue but what needs to be done there to secure California's water future.

Heather Cooley: Well, you're absolutely right. The Bay Delta is probably one of the most controversial issues in California water today. There are issues around the amount of water that's being taken out. There are issues with invasive species or issues around the integrity of the levies, concerns about climate change and sea lever rise and seawater intrusion. So there are a lot of challenges there. There are proposals to sort of move where we're taking water out of the Delta, very, very controversial. And that's been an issue in California going back to the 1980s when there was the proposals for the peripheral canal. So those issues are challenging and they're ones, I think, that are playing out today. Likelihood, the solutions are going to be as equally challenging and complex, and there is no single solution. It's going to be partially looking at developing local supplies, reducing import, reducing exports from the Delta, and looking at issues around flood management and how we manage some of the areas in the Delta.

Greg Dalton: Lester Snow, does the Delta get too much attention?

Lester Snow: That's difficult. Here's what I'll say that would be a yes on that part and then I'll change to a no.

Greg Dalton: You've been in Sacramento too long.

[Laughter]

Lester Snow: What we often say is that the Bay Delta debates sucks all the oxygen out of the water discussion, that it's hard to get people's attention on all of these other things. But the reason I kind of hesitate, maybe playing word games, the Delta has to be fixed. And I don't at care what your definition of fixed is but we've got to stabilize that system. The issue is fixing it is essential to California's future but it's not sufficient. You built the tunnels that the water guys want or you build the strategy that some of the environmentalist want. You still need to do all the conservation, waste water recycling, storm water capture that we're talking about. It doesn't fix California's long-term problems. It fixes a very specific water supply and ecosystem problem.

Greg Dalton: Brandon Goshi, how important is it to Southern California that the Delta get fixed?

Brandon Goshi: Well, again, it's along the same thing. The Delta is part of how we look at future water reliability for Southern California but Lester is right, because it's so big and so important on a statewide level, it does take a great deal of the attention away from the fact that Southern California is looking at, and not just looking at, has been developing over the last 20 years, reducing its reliance on those imported supplies by doing the water use sufficiency measures by investing in local supplies, by augmenting its other supplies so that the reliance on that Delta water system isn't as high. And I think — so I think it's fair…

Greg Dalton: Does that mean there can be smaller tunnels?

Brandon Goshi: Well, I think the process has to be going through to see what is the best size, what is the most appropriate ecosystem restoration program and coordinated use of facilities.

And I think that's what's being done today. That process is designed to try and find the solution for what is really an important hub for over 60 percent of California's water use.

Greg Dalton: Sixty percent of the state's water goes to the Delta at some point.

Brandon Goshi: Right.

Greg Dalton: So when do you think there'll be something — there'll be action on that or there'll be a solution?

Brandon Goshi: Well, I mean I think there's a track towards — working towards a solution now. I mean there's definitely work on the environmental impact side. And there's a lot of progress, I think, through that Bay Delta conservation plan approach. And so there's a great deal of the state's effort and the stakeholder's efforts and moving that plan forward probably more today than we've seen in the last 20 years.

Greg Dalton: Lester Snow, part of this is there are bonds on the state ballot. They've been haunted down the roads for the last, what, three or four election cycles, $11 billion bond. Initially Governor Schwarzenegger is formally on the ballot for 2014 but there are some other competing bond measures that might be in the $6 billion range. How do you think that a dry 2013 will play into the bond politics of 2014?

Lester Snow: Yes. I think — as you probably know, last year, before the end of the session, there ended up being two competing bills or compatible bills, depending on how you look at it to restructure the bond. As you said, the original 2010 bond is now on the 2014 ballot. There's actually some talk that it should be the 2016 bond. I think what will happen with the draught, especially severe draught or even a modest draught, there'll be a lot of highly increased attention on the bond. And my guess would be the current 2014 bond will be pulled off and replace with a retool.

But I would expect the numbers to go up from the current drafts, probably moving from the five that's in the draft bills closer to the 11 that was on the ballot now.

Greg Dalton: Because people are — after a dry 2013, people are going to say, "Gosh, we got to spend some money on water because we're in a tight spot here."

Lester Snow: Yes. I think both draught and flood are the kind of things that are in people's face immediately. And as soon as it changes, they forget about it. But when they're in a flood, they want people to take action right now to deal with flooding. And when you're in a draught, you want people to deal with supply. And so I think there'll be great pressure to fund a wide variety of projects to try to help buffer the next draught.

Greg Dalton: Bob Wilkinson, are some advocates of the bond or some water people praying for draught?

Bob Wilkinson: Undoubtedly. And this is something that goes back over the century in California water history. If you want to for people allocating money, it helps a lot of you've got a dry condition and people perceive that. So undoubtedly that's the case.

Let me jump back though, if I can, on the question of storm water and distribution because I think the support they put in context, if urban Southern California, that 19 or 20 million in the service area of urban Southern California, about half the water supply in that whole area is local water, and that is rainwater. And so you got rainwater tanks but you also have groundwater recharge, which is tremendously important in that system. And recycling, I think about 60 percent of the water that are used in all the refineries in Southern California is already recycled water. So there's a lot of work going on and a lot more — so when we think about bonds, we think about where money goes. It's not just how big they are. This $11 billion bond is the biggest that's ever been put before the California voters and taken and off and put on again and taken off. As Lester says, we'll see on the next draught.

Questionably, if it's dry or wet, that will have some influence. The other big question is what would the money be used for, and there are big debates about that. Should it be surface storage? Should it be recycling? Should it be storm water strategies, groundwater clean up? Lots of different ways to spend that money. And I think that's a key part of the debate as well.

Greg Dalton: Thank you. If you're just joining us, we're talking about water at Climate One. I'm Greg Dalton. There's an elephant in the room and we haven't talk yet about agriculture. Bob Wilkinson, about 80 percent of water in the state goes to agriculture. Agriculture is 2 percent of the state economy. What should agriculture do about water?

Bob Wilkinson: So my friends in the ag said would be grateful for my first saying that's 80 percent of the developed water supply which is about half the water total in California. So that's 80 percent of the…

Greg Dalton: Developed means what?

Bob Wilkinson: Means water that we pull out of the ground or take out of surface systems in some fashion.

Greg Dalton: Not just rainfall that goes somewhere.

Bob Wilkinson: So what actually flows down the rivers to the ocean, what comes down through the water supply system, through the Delta and into the San Francisco Bay is the total water system. So take about half the water right now of the natural hydrologic cycle on average. And of that, about 80 percent is agriculture, about 20 percent is urban. And ag is about $40 billion something right now.

Greg Dalton: It's a $2 trillion economy.

Bob Wilkinson: It's about a $2 trillion, so that works out to about 2 percent. But if you look at it, the value of ag production in California has gone up, about $10 billion in the last five years or so. It's gone from the 30's up to the 40's. And the water use has been declining because of the various issues including dry conditions. What that tells us is that ag in California, and this is not new but it's a steady pattern, as with the urban sector, we've got increasing value, increasing productivity in ag sector using letter, using it more efficiently, shifting crops to more valuable crops.

So Heather and the Pacific student from a number of studies on this — I think that the trend is greater value, greater diversity of crops in many cases, and improved water use sufficiency overall. I would say we probably still have a good long way to go in terms of maintaining a viable, profitable agricultural sector and using in ways in that would result in less of it necessarily being put on the fields.

Greg Dalton: Heather Cooley, there's also some movements away from fruits and nuts to pistachios, almonds which I love and eat in great, vast quantities, but they are very water-intensive. So in some key areas California ag is moving towards more water intensity rather than less.

Heather Cooley: Yes. To some degree, we're seeing more planting of tree crops. They tend to use more water. They tend to be higher value crops. So you are getting an economic boost from that. But they do also require water every year. So one of the benefits of some of the field crops, some of the annual crops was that if it was a dry year and we needed that water, we could not grow those crops for that year. Of course, there's an economic impact associated with it but that was an option. When you put in more three crops, those plants require water every year. And so there are some risks associated with that. There are some benefits. They're higher value crops certainly but there's a downside as well. And that's something I think we need to think about seriously in California.

Greg Dalton: And how much of the irrigation in the state is flood irrigation where they just flood fields with cheaper — close to free water versus other more efficient uses of water?

Heather Cooley: Well, flood irrigation is still practiced, I would estimate on around 30 to 40 percent of the crop acreage in California.

So certainly a significant amount but it is declining. We are seeing more sprinkler, including micro-sprinkler, which is very efficient, and we're seeing more, much more drip irrigation especially on these three crops. That's something because of the high value. There's more sort of opportunity to put in drip irrigation. So we're certainly seeing a move away from flood irrigation. In addition, we're seeing more irrigation scheduling; so better management of when you apply water and how much you apply. I agree with Bob, they've made some major and tremendous improvements on the agriculture side but there is a lot of potential there that remains.

Greg Dalton: Lester Snow, what else should agriculture do to use water more wisely?

Lester Snow: Well, I think, just playing off of Heather. There is a steady progress on improving irrigation systems. And I think we just have to keep going in that direction.

Greg Dalton: So there'll be more policy pressure to do so?

Lester Snow: All kinds of incentives. I mean, some of the reason that they switched to higher return crops such as almonds which do harden the demand, is that they then can afford to pay for the drip systems when they use to flood irrigate Alfalfa, for example. So I think it's moving in that direction. I think we need to assist in both incentives, coercion, whatever it takes. We're also seeing agriculture move to higher irrigation efficiencies to minimize the threat of pollution from their nutrients. And we have places in the Central Valley where you have nitrate-contaminated ground water that clearly is a product of 60 years of irrigational leaching.

Now, I tend to resist strongly the comparison of 80 percent of the water, 2 percent of the economy. That's roughly the world statistics. It spews a little bit, little less of the water. And so if you go that far, we should eliminate agriculture in the world to preserve water. It doesn't work.

And in fact the IPCC report, the most recent one, it took, in my opinion, a bold step and started to sound the warning about agriculture and famine if we don't start doing something to preserve agriculture, increase efficiency, we're going to start having famine as a result of climate change. So I'm a big advocate of doing what we can to make California agriculture competitive in the global

market. And that means higher levels of efficiency and better crop choices.

Greg Dalton: NPR did a story recently on dry farming. And apparently they're some types of crops, tomatoes and others where they have more flavor but there's a lower yield. Is this kind of a boutique kind of thing where some places in Santa Cruz, Happy Boy Farm in Santa Cruz and others were reported on it in the same PR story but the yield is lower but perhaps the prices and the flavor might be higher? Lester Snow is that just a niche boutique thing or is that going to be something…

Lester Snow: That's a good question. I mean, I think there is a movement in that direction. There's also — if you read about some of the crops that they're growing in this fashion that tends to be healthier crops, there's a lot written about gluten and growing some of the older brands of the grains, I don't know where the lines cross on being able to produce enough to feed people so I think that's a great movement that should be encouraged. And I don't happen to have an opinion or a feel for how far it can go.

Greg Dalton: Brandon Goshi, as the representative of the biggest population center in the state, how do you look at the agricultural sector and are they doing enough to use water wisely given the strains we've been talking about?

Brandon Goshi: Well, I think it's fair to say and I think all of the other panelists touched on this already, there are making progress. And so the more they recognize the water use sufficiency needs, they look into some of the alternative technologies, that's the direction that I think they will go in, and that's going to be to the benefit of them and to the rest of the states economy.

Greg Dalton: Let's talk about desalinations. San Diego just plunked down a big pile of gold on a desalination plant. Is that something that we're going to see more of, Brandon Goshi, in California?

Brandon Goshi: Well, I think that's — again, when you talk about what are the different types of resources that can be invested in, different areas are going to make their choices based on what they think is best for their area and what they're looking for. San Diego County Water Authority is one of our member agencies. And they value the reliability that they thought an ocean desal plant could give them, Orange County, with the same company actually with the side of the resources is looking at a similar plant, and I think that's in various stages of permitting.

Will you see it? I think it's going to come down to whether or not a determination can be made, whether those things make sense for the areas. It's not a cheap proposition by any means. Coastal property is expensive. The operation and maintenance cost are expensive but I think resources like that should be evaluated for what they are and how they can be used to help meet reliability.

Greg Dalton: And, I know someone recently from San Diego who proposed floating offshore desal plants, which gets at the property — also some of the environmental consequences and concern. Bob Wilkinson, can desalination be done in an environmentally responsible way?

Bob Wilkinson: Desal works just fine. You can get high quality. It is expensive and it does take a lot of energy. So I think the question, really, from a policy standpoint is at what point is that a good option or what other option should be exhausted first.

And as you look through that — I've been doing quite a bit of work in Australia now. Most of the major cities in Australia built ocean desal plants. Only one of them is running. And these are big desal plants, some of the biggest in the world. You don't run it if you really don't need it. It's very expensive and it takes a lot of energy. So San Diego's price is around $2,000 an acre-foot. I know

that's an arcane metric but…

Greg Dalton: $1,000 per average, is that…

Bob Wilkinson: Well, the water that metropolis is providing I think is about half that, it's about $1,000, and that's expensive. A lot of agricultures are dealing with $100 and less. So we have huge price differences. One option is transfers. The metropolitan and others are doing a lot of these water transfers. Buy some from farmers in dry years when you need it. It's a lot cheaper. But there are issues with that. That's not a magic bullet. There are a lot of options with efficiency improvement that are much, much cheaper than ocean desal. So you certainly would want to do that first before you go on and desal water.

A lot of recycling opportunities. We're recycling about 10 percent of the wastewater in California. The 90% is going into the ocean. So we've got a huge opportunity to recycle water. And that's cheaper using a lot of the same technology but it's a lot cheaper and easier to do that than ocean desal. So I think there's a place for it. I think we'll see it but you sure would want to do it after you've exhausted other more cost effective alternatives.

Greg Dalton: Heather Cooley.

Heather Cooley: Yes. If I can jump in on that. Just to kind of take a statewide perspective, there are 16 proposed seawater desalination plants in California and two in Mexico that would actually potentially provide water for California. So there are a number of proposals, most of those are in Southern California although there are some in sort of the central coast Monterey area because of the challenges that they're having. I agree, we will probably see seawater desalination in California at some time but as Bob mention, there is a real risk to doing it too soon.

And I think we've seen that in Santa Barbara. They built a plant in early 1990s. And as soon as they opened the plant, the draught ended, and that plant never ran.

Greg Dalton: How do you run that for two weeks?

Heather Cooley: Yes. Tampa Bay is similar issue. They built a large plant and found that there were cheaper options available so they essentially cut it to about a quarter or half depending on kind of water resource conditions.

Greg Dalton: So what happen is ratepayers — citizens get stuck with a big bill for a white elephant.

Heather Cooley: Absolutely. So in Santa Barbara, yes, water rates are very high partially because of the desal but there are a lot of other reasons. So certainly you wouldn't want to build — it's a very expensive insurance policy. You really wouldn't want to build one and then shut it down but that is in fact what we're seeing. So there's a risk to building too large or before we need them. And so it's important, as Bob mentioned, to do some of the other cheaper things first but in the long term with climate change and population growth and continued economic growth, at some point it's likely that we will see more in California.

Greg Dalton: Heather Cooley is the water program co-director at the Pacific Institute. Our other guests today at Climate One are Brandon Goshi, Manager with the Metropolitan Water District of Southern California, Bob Wilkinson, Adjunct Associate Professor at the University of California in Santa Barbara, and Lester Snow, former Secretary of Resources for California. I'm Greg Dalton. We're going to invite your participation and put audience microphone over here. We welcome you to

come up and join us with a one part brief comment or question. I'm here to help you with that. And the line starts with our producer, Jane Ann Chien right there. And then we will invite you, if you're on this side of the room, to please go through and not cross these cameras. And let's include our audience questions. Welcome to Climate One.

Male Participant 1: Thank you. Nobody mentioned the Kern Water Bank which has been one of the success stories in the last 20 years although it's controversial as to sort of who gets the benefits down there.

But Kern Water Bank and other water banks in Kern County store water for most of urban Southern California, much of the Bay Area and much of agriculture but other parts of Central Valley aren't doing so well. Is that a geological reason or a political reason? And if it's political, what can we do about it?

Greg Dalton: Lester Snow.

Lester Snow: Sure. I'll start on that. Thanks for the easy question, Sprek [laughter]. I think there is a little bit of geology information and location but I think a lot of it is simply the politics. In much of California where you don't have a court adjudication of determining who gets to pump water, it's considered a private property right. And so that means I own property and I can put a well on and pump as much as I want. It's what you could call the classic tragedy of the commons. It's not anybody's responsibility to take care of it.

So you have areas in California where if you were to do a bank, your neighbors can pump the water out of your banks. So it's like everybody having a checking account to write checks on your investments. And I think before we see the expansion of the Kern type of water bank which is very successful, we need to see some form of groundwater regulation in the state to provide better control and the ability for people who store water and create a bank to protect what they've invested.

Greg Dalton: What's stopping more regulation on groundwater in California?

Lester Snow: Well, probably a couple of reasons. I think the biggest is that anytime this gets queued up, and it probably has been queued up 40 times over the last 50 years, the main issue that comes to bearers of private property or as the state is trying to take away my property right to pump water from underneath my land. What we're seeing now though all across California and great press stories coming out of San Luis Obispo County where bigger vineyards have gone in, huge irrigation wells have gone in, and people's domestic wells are drying up, and we're seeing more and more of that.

And so I think there's a ground swallow of people wanting to see some reasonable ability to manage groundwater. They don't necessarily want the state to come in and do it but perhaps easier mechanisms for local districts to better manage their ground water.

Greg Dalton: There's a new fracking law in California that will have some ground water management that some people think will get at this — was intended for fracking but it may have some more data information on ground water. Let's have our next question at Climate One. Welcome.

Male Participant 2: I haven't heard any mention of the F word this evening so far. Maybe I missed it. But what is your opinion about fracking on groundwater? And should we be moving more slowly

in that direction? What do you see is the potential impact on California's water?

Greg Dalton: Heather Cooley.

Heather Cooley: Hydraulic fracturing is being done in California although, as you just mentioned, there was a bill passed, SB-4, which is trying to provide better information about where it's occurring, looking at regulations around fracturing. So there's no doubt that it will be happening and will likely be expanding. It certainly requires large amounts of water relative to conventional oil and gas development. There are issues associated with potential contamination of groundwater and of surface water. So I think it's an area that hasn't yet been well studied although there are studies going on in SB-4, one of the outcomes of that will be studied to better understand what the impacts are.

Greg Dalton: Lester Snow, is fracking a threat to California's water supply?

Lester Snow: I guess I'd start by saying I don't know. When this issue first came up and I talked with groundwater managers and groundwater experts that were familiar with it, they really felt it wasn't a big contamination issue just because of the difference in depth. I think that one of the biggest concerns that's out there that, in my opinion, the oil industry has done a terrible job with is they want to keep their chemicals proprietary. And anytime somebody wants to inject something underneath your property and they don't want to tell you what it is, what do you assume about it? It's pretty nasty stuff. And so I think there's a whole issue of trust going on here that's completely distinct from hydrologic connection between the groundwater supply and fracking. And I think until that issue is addressed as to what's happening, how is it being studied and monitored, there needs to be greater regulation of it.

Greg Dalton: Well, this law, authored by Senator Fran Pavley, has disclosure of fracking chemicals, though not quantities in the law. So that is coming according to the law that Governor Brown signed. There's also supply competition, Bob Wilkinson. There's concern not only about contamination, but that's just there'll be more demands on it on what is already a fragile water supply in California.

Bob Wilkinson: I completely agree with Lester on this. I just came from a meeting in Sacramento talking with oil industry folks and the state regulators. There are arguments that it won't — the techniques that are proposed for California won't use a whole lot of water. I don't know if that's accurate or not but it's part of what I'm hearing, assertions that it's safe and don't be concern. But I think Lester is exactly right. If there is too much uncertainty and unknown in the process, it's very difficult to develop the trust. And as you talk to regulators, they're saying the same thing; "We're really not sure because we don't have the information we need to be able to determine."

So I do think we've got a way to go. I think what Fran did is very helpful, actually. I know it was a very controversial bill but once again — of course, she's the same person who wrote a book for California on some of climate laws.

Greg Dalton: Senator Fran Pavley. She got a lot of environmentalist mad at her.

Bob Wilkinson: She did but I think she's done a lot of good work on this and it was a very tough sled but I think we're moving, at least, in the right direction of disclosure and then determine whether or not this can be done safely. I would it can, and that it could be a contribution.

Greg Dalton: We're talking about California's fresh water at Climate One. Let's have our next question. Welcome.

Male Participant 3: Thank you. This question is for Brandon. From its inception until now, the metropolitan has met its capital and operating expenses by primarily selling imported water. With the long term trend of imported water going down, the only option for maintaining a level of expenses that's commensurate with what you've spent in the past is either to raise the price or really change the business model. So my question is do you think that there's the political will within the current leadership to be transparent about that need for change?

Bob Wilkinson: You mean the current leadership in metropolitan?

Male Participant 3: Correct.

Bob Wilkinson: I think we're very transparent. We have a public board that the combination of investments and water resources, what the impacts are going to be on our sales and revenue basis, the sources of revenues and our rate making process is a public one. And so the key, I think, to addressing the question that you have is can we continue to make and are customers willing to pay for levels of reliability that metropolitan is seeking to provide for them. And that's just an ongoing balance of what are the cost of those resources and what are the revenues that you have to be able to recover paying for those.

And we're going to continue to look at those the same way we have and try to balance those things so that you have affordable, cost effective water supply and a level of reliability that the customers desire.

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

Female Participant 1: With the exception of rain barrels, most of the discussion has been around centralized solutions, and certainly the debates in delta plan thinking about how much billions of dollars we're talking about there. I'm just wondering what you think about other technological decentralized solutions. For example, I recently learned about the engineer, Dean Kamen, the size of this chair, this water purification system that he's working with Coca-Cola to distribute in the developing world. Is that possible in California on the block or apartment kind of level?

Greg Dalton: Technological innovation. Bob Wilkinson.

Bob Wilkinson: Yes. I think it's a good question. And I think you're seeing a trend in both the energy world, especially electricity or decentralized generation for many sources, especially renewable sources. We've got solar and so forth. I think you're seeing the same thing on water. The studies that I've done indicate very significant amounts of water that's available for capture in San Francisco urban area, broadly defined, and urban Southern California.

Hundreds of thousands of acre feet, even with very conservative assumptions, and that goes to a whole range of technologies for how to capture and put that water into groundwater basins safely or capturing directly. And then you go to the treatment question. And of course, the amount of treatment depends on the use. So there's a term fit for purpose. So if it's for water in the landscape or flushing toilets, you have a different quality requirement than for drinking. And we don't drink that much of the overall water supply or using a lot for a lot of different purposes. So yes, there are technologies now, including reverse osmosis which is very scalable and go from little systems under your sink all the way to major facilities but it's the same basic technology using membranes to filter the water.

So I think that's an interesting line to be looking at. There are cities now that are tapping sewer lines, they call it sewer mining, and treating that water and using it for things like flushing toilets in big buildings and cities like San Francisco, and capturing rainwater in big buildings in major cities in Tokyo and using that right there in the building. And they'll often treat it for safe levels for a lot of the purposes like cooling towers and toilet flushing. So I think it's very intriguing. I think we're going to see a lot of the technical innovation on that.

Greg Dalton: Sewer mining, that was not a term thought of by the marketing to people, was it? No.

[Laughter]

Bob Wilkinson: There are some other terms for it but I want you to just… [Laughter]

Greg Dalton: Same people who brought us toilet to tap. Okay. Let's have our next question, please.

Male Participant 4: Yes. The Colorado River has always been an important water supply in the American west. And it sounds like Lake Powell behind Glen Canyon Dam is very low as well as Lake Mead behind Hoover Dam. And I think there was just an article on the New York Times that the inlet turbines for one or both of those lakes is at risk of actually going above the water level of the reservoir. So what does that mean for California or Southern California, sort of the health for the Colorado River?

Greg Dalton: Brandon Goshi.

Brandon Goshi: Thanks. A very good question. There are a lot of parties involved with the Colorado River. It's a seven-state project with — the state is being divide into upper and lower basin. There's been a great deal of work and study on how shortages on that system would be shared, what types of actions could be taken to address those shortages, how the water rise and the allocations between the states and the basins are set.

And so this is not a problem that I think is not being addressed. The Bureau of Reclamation, the United States Bureau of Reclamation just went through an extensive study on the impacts, potential impacts of climate change on that system. And a lot of the actions with the different tools that can be used to try and address some of the shortages that could occur. So is it important? Yes. Is there a system in place now with regards to water rights and allocations on the system? Yes. But is there work to see if there's a better way to address those problems? The answer is yes as well.

Greg Dalton: Thank you for that question. Before we wrap up here in our remaining time together, I want to ask each of you briefly to address two questions. How do you manage your personal water footprint at home and what can average person do to reduce theirs? Bob Wilkinson, do you mind your sewer? No.

Bob Wilkinson: No [laughter]. I'm sure that I could be doing better. I did install a cistern, 1,200-gallon tank. They're not terribly expensive and fairly easy to put in. I'll suggest to kind of test and learn how much rainwater, and it's wonderful for gardens so I'm enjoying using that. We put in — I just put in a new — I have low-flow toilets. I have a new one that's 0.8 gallons per flush, half the US code, which is 1.6. And I thought, "I'll this out." It works better than the old one. It works very well. And so there are very efficient plumbing fixtures that work really well. When you start multiplying that out times millions of toilets in California and suddenly what seems small adds up to really big numbers. So you try to do that sort of thing but it's inside, it's outside; it's irrigation of landscape. I don't have lawn but I do have fruit trees and they take some waters.

Greg Dalton: Heather Cooley.

Heather Cooley: So I've done, I think, a lot of them. In my home I have high efficiency toilets with use 1.3 gallons per flush, high efficiency showerheads, important way to save both water and energy, front-loading clothes washer, and I have rain barrels as well, I have slow-water use plants. I'm in about 20 gallons per person per day in my house so pretty low. I'm very proud of that.

Greg Dalton: How do you get the water out of the barrels? Is it just gravity? It just flows into the garden?

Heather Cooley: So I just have a water can and then I water everything by hand. So it works well for me. I imagine that the average person, probably, is not going to get down that low. But we've seen numbers in Australia. People are using 35-40 gallons per person per day. So there's a lot of opportunity for efficiency.

Greg Dalton: And the average in California is more, what, 100 gallons?

Heather Cooley: Much over 100. In some parts of California, over 300 gallons per person per day, and much of that is outdoor water use. So a lot of potential to improve our landscapes on providing not only a water supply but a water quality issue as well, habitat for native birds, native plants. So I think there's a lot of opportunity going forward.

Greg Dalton: Lester Snow.

Lester Snow: I think you should have had Heather go last [laughter]. The only way I could get my per capita down is add more capitas to my house, I think. A couple of thoughts. One thing that — we did finally have no lawn anywhere. Everything is draught tolerant and on drip system to make that change. I think in terms of what people can do, there are a lot of simple things. And fortunately, there's an ongoing review of appliance standard. So the next time you replace your appliance, whether it's a toiler or your dishwasher, constantly moving the energy efficiency and water efficiency up. And it's important to pay attention to that.

One thing I would add: A test done here in the Bay Area by East Bay Municipal Utility District that serves Berkeley-Oakland area, they put out a different billing system so that you get, as a customer, details about your water use and compare it to your neighborhood. So no other changes in that. But by people having that information, it looks like they reduced their water use by 5 percent just by knowing how they compared to typical water use. So that's probably the best thing anybody can do is understand their water use and what uses water in your home and then constantly pushing the standards to conserve energy and water.

Greg Dalton: Here in San Francisco, people of the Department of Environment say that that's one of the big drivers for the composting program, which took off very quickly in San Francisco, was that social norm. People are saying, “Oh, my neighbor is doing this and you compost.” So you get into that socialization. That really drives behavior in a sticky way that it doesn’t just happen and then go back to the norm before.

Lester Snow: Well, then people should invite Heather over, I think, would be another good thing.

[Laughter]

Greg Dalton: Yes. The hand watering, I have a vision of Heather — yes, water in can. Brandon Goshi.

Brandon Goshi: Well, I think the less we hit it on the head, it's understanding where your water use is and separating that indoors and outdoors and understanding where the most savings can take place. So on the indoors, Southern California — and so my house is kind of a manifestation of Southern California. The devices that we use inside the house are efficiency devices. That's mostly what's available. It's been pushed and incentivize by Southern California agencies and builders, et cetera. So on the indoor side, it's having those efficient water use devices. And we do have those low-flow toilets, low-flow showerheads, efficiency washers.

On the outdoors, it's paying attention how your outdoor is landscaped. So it's one thing to have a number of square feet of irrigable landscape but it's another thing to manage how you landscape that so that the water requirement is less. And so you have a mix of hard escape or water efficient plants or draught tolerant plants. And really try to make the trade up. I don't have the fruit trees and the other kinds of things that other people might make choices on like that. And so that just comes from the awareness of where the water is used and maybe there's a better way or an alternative to be able to use that water. And that's part of the focus that I think you'll see metropolitan with water use efficiency is a shift to the — is more focused on the outside because I think in the last 20 years the inside has been taking care of the outside. It needs to be taken care of on the same way.

Greg Dalton: Just to not let myself off the hook here, we recently installed a recirc pump on our hot water so that during certain time — four hours a day, it's on a timer. So when the family is taking showers it's recirculation hot water so we don't let good water go down the drain just to wait for that hot water go down. I think around 50 gallons a person. Heather, I don't know if we can get down to where you are but at least we're well under the average.

We have to end it there. Our thanks to Heather Cooley, water program Co-Director at the Pacific Institute, Brandon Goshi, Manager with the Southern California Water District, and Bob Wilkinson from the University of California at Santa Barbara, and Lester Snow, Executive Director of the California Water Foundation. I'm Greg Dalton. Thanks for coming to Climate One today.

[Applause]

[END]