Comments by Jonathan Parfrey of Climate Resolve to the National Research Council Committee on Urban Sustainability: Pathways and Opportunities

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Let me begin my testimony with a story – a recent incident that may illuminate the importance of conveying accurate scientific information in setting public policy.

Last Friday, I was part of a briefing session with seven California legislators,and a few environmental leaders. When it became my turn to speak, I broached the subject of the drought, and the frankly frightening news that the California Department of Water Resources was erecting an emergency barrier to hold back saline water from San Francisco Bay from entering the intake of the California Aqueduct. Although there had not been a single news story on this subject, I thought the emergency measure was big news as saltwater entering the aquifer seriously threatens the water supply for 25 million Californians who rely on the aqueduct.

Curiously, none of the legislators had heard about the barrier or the emergency measure.

In my briefing, I proceeded to place this saltwater incursion problem in a climate context. I said, although anthropogenic climate change could not be blamed for the lack of precipitation over the past few years, warmer temperatures have exacerbated the drought by diminishing the snowpack. Therefore we could expect this same drought-like dynamic in the future. When storms arrive in the Sierra Nevadas, warmer temperatures will result in precipitation increasingly falling as rain and not snow, and we can anticipate, even in rainy years, an early pulse of runoff followed by lower flows in summer months. Emergency barriers might need to become permanent barriers – or the state may need to move the intake further upriver. I concluded this was an urgent area of study.

The environmentalists in the room didn't focus on the important revelation that the California Aqueduct might fail, but instead focused on my statement that anthropogenic climate change wasn't the chief cause of California's drought. A recent study by Stanford professor Noah Diffenbaugh had garnered a lot of attention. Diffenbaugh suggests that the resilient ridge blocking arctic storms from entering California was made ridiculously more resilient (their words) due to climate change. The San Francisco Chronicle featured Diffenbaugh and his theories on the front page. Previously, the President of the United States has associated California's drought with climate change, as had the Secretary of the California Natural Resources Agency, as had the Mayor of Los Angeles.

We now had a situation where an outlier theory has become fact -- despite the vast body of literature that suggests otherwise. Dozens of other studies affirm that California had experienced drought in the past and will continue to have years of drought as well as wet years in the future. It's important to note that resilient ridges have appeared in wet years as well. A recent study by the UCLA Department of Atmospheric and Oceanic Sciences, which downscaled thirty global climate models, suggests that the tug-of-war between northern wetter winters and southern dryer winters will continue into the next century.

Is this an important question? -- whether climate change is responsible for the lack of precipitation in California's drought -- or has warming, due to climate change, simply exacerbated a natural situation? Clearly, whatever is true, California's water supply will be stressed by climate change. Is answering this question important to public policy? Is this a distinction without a difference?

No, I believe this is an important question. Billions of dollars and environmental impacts depend on the answer. If low-precipitation is California's new normal, then California's coastal cities will likely turn to desalination to augment supplies – as capturing local rainfall and recycling sewage water only make sense if you have supply in the first place.

Desalination is costly. The Carlsbad and Santa Barbara desal facilities, once online, will cost water agencies over $2,000 per acre foot, where Metropolitan Water District costs are traditionally about $700 per acre foot. That's a big price difference that will be borne by ratepayers. Of course, if there's no water coming from Metropolitan, then $2,000 looks like a bargain.

Desalination is also a highly energy intensive process. Today, witness Governor Brown's aggressive greenhouse gas reduction goals, California is working hard to reduce its energy load, not increase it. Moreover, desalination is destructive of plankton and other sea life. And the leftover brine presents a major disposal problem.

As a matter of policy, desalination must remain a choice -- but given the extreme cost, its energy and environmental problems, desalination should be the last choice. Yet, by hyping an association between climate and drought, environmentalists, trying to make political points on climate change, and politicians, trying to score political points with environmentalists, these groups are *de facto* making an argument for desalination. Again, the interpretation of scientific information could play a major role in California's climate response.

Here's another example of how science can play a role in climate policy – and a better one in my view.

To predict future temperature in mid-century and end-of-century, Dr. Alex Hall's team at UCLA did dynamical downscaling on five GCMs and statistical

downscaling on 25 GCMs based on the relationship established by the dynamical downscales. They produced both low-carbon and business-as-usual scenarios. The ensemble mean for mid-century showed, regardless of high or low emission scenarios, a 3.5 degree increase in areas near the ocean, and a 4 to 5 degree increase in areas further inland. The low emission, end of century scenario shows a slight decrease in temperature; where business-as-usual end-of-century scenario predicts much higher temperatures.

Another virtue of the downscales, they went from the 100-200 kilometer cells of the GCMs down to 2 kilometers, and thereby demonstrated how temperatures varied from neighborhood to neighborhood. Unlike other parts of the nation, Southern California has many micro-climates -- born of our hills and mountains and exposure to the ocean – so the 2 kilometer downscale proved very helpful for planners. They could use data of this scale.

Using the temperature study organization worked in conjunction with the Mayor's office, and the LARC collaborative, to determine how to best protect the people of Los Angeles from higher temperatures. First, we determined cost benefits of curbing urban heat island. The Mayor announced these favorable findings at a public conference our group organized at City Hall. Second, we worked with the Los Angeles Department of Water and Power, to expand the incentive for cool roofs. Next, at the Mayor's directive, we worked with the Department of Building and Safety to expand the city building code to mandate the use of cool roofs in single-family homes. (The state's energy code already mandates the use of high albedo roofing materials on most multi-family and commercial buildings.)

The new law on cool roofs and other heat-island measures was unanimously adopted by city council in December 2013, and signed by Mayor Garcetti in January 2014.

Mayor Garcetti's recently announced his sustainability plan where he expanded on this good work by setting the following goals on heat island:

- By 2017, install 10,000 cool roofs in the city
- By 2025, reduce the city's temperature by 1.7 degrees
- By 2035, reduce the city's temperature by 3 degrees.

Our organization is also developing a cool streets pilot with the LA Department of Street Services, Lawrence Berkeley Labs and Western Emulsions. The Department of Water and Power is about to coat a service yard in the San Fernando Valley with high albedo slurry.

We believe the best climate solutions are the ones that also improve the quality of life and save money.

There are also numerous indirect effects from extreme heat. These include:

- public health
    - important to note: Los Angeles County Dept of Public Health is developing an urban heat island guidance
- air quality
- food supply
- energy demand and supply too
- vegetation and habitat
- evaporation and water supply
- wildfires
- public transportation infrastructure
- property values

Gong back for a second, and let me be clear, Dr. Hall's downscaling study was an essential precursor to the cool roofs and heat island legislation and projects. The 2 kilometer downscales helped both the public and policymakers alike to understand the effects. Climate change was no longer a vague generalized idea, but specific, and it meant Angelenos would be effected.

The downscale studies on future precipitation and snowfall were also helpful on the policy front as they implicitly argue for enhanced local water supply. As noted earlier, Dr, Hall's study, aligning with a great many other studies, predicts precip patterns to remain the same. Therefore, to be resilient in the face of climate change, the city needs to do a better job of conserving water, such as promoting the adoption of drought tolerant plants outdoors, capturing more stormwater and recycling sewage water. Predictions of future precipitation gives confidence that these local measures are effective investments.

Other climate effects facing Southern California include a shift in wildfire season and sea level rise. Climate Resolve will be releasing a wildfire study in the coming months. USC Sea Grant, using USGS data, has performed an admirable investigation into sea level rise affecting LA ocean-facing neighborhoods. They will soon release a study for other parts of the county.

All of these studies can be found on the C-CHANGE.LA website where they are compelling presented. Our organization operates the C-CHANGE website and will soon relocate it to the popular news website run by the PBS station KCET.

Other efforts related to climate adaptation in Los Angeles include:

- Cal Adapt, a project of the California Energy Commission and UC Berkeley. Planners and others could use their mapping tool to downscale climate impacts to their cities or regions
- Climate social vulnerability studies have been conducted by Pacific Institute and climate specialist, Susie Moser

- Also based on UCLA's downscales, Trust for Public Land is starting an initiative on creating cool alleys and other heat island related projects
- The Los Angeles Regional Collaborative on Climate Action and Sustainability, housed at UCLA, is an innovative center that coordinates municipal efforts among the region's many cities and agencies
- The statewide group, Alliance of Regional Collaboratives for Climate Adaptation, also known as ARCCA, was formed by me, Bay Area's Bruce Riordan and Michael McCormick in the Governor's office. This effort combines five regional collaborative statewide.

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