

New Water

Sustainable



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Thank you for supporting agriculture by coming to learn of a pair of newly available tools for you to meet the challenge of finding sustainable water supplies.

Advances in water-efficient farming continue to increase food supplies. Today, we are challenged as never before to employ our knowledge of the physical sciences to steward our natural resources while continuing our quality of life. Your collaborative participation today is another step to meeting this challenge.

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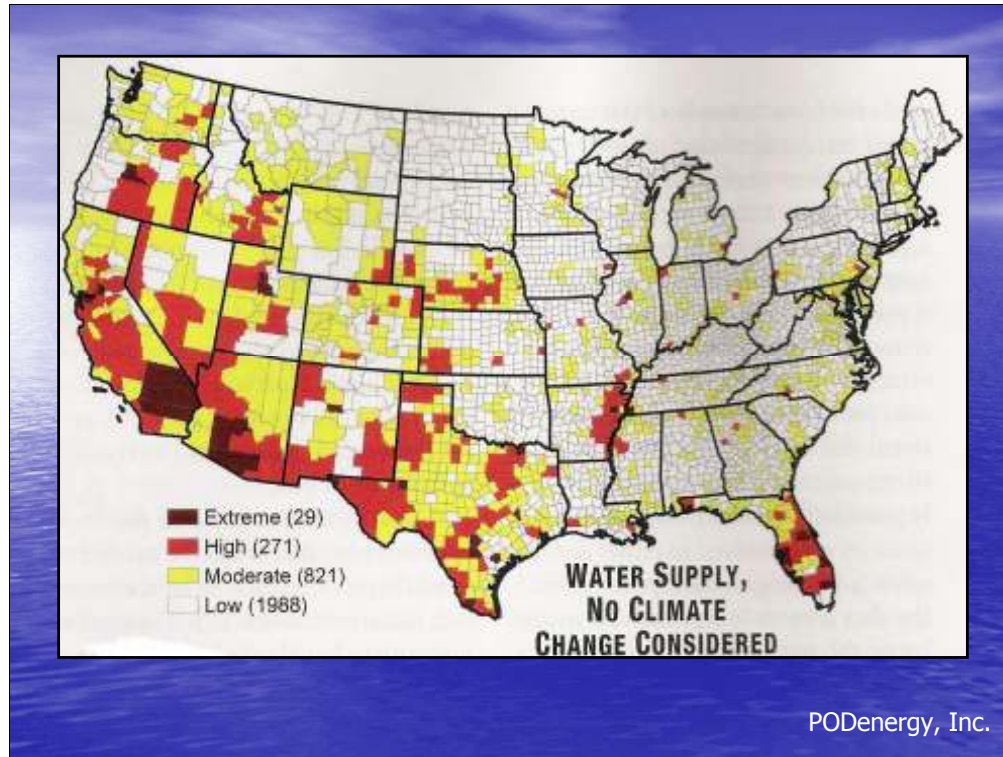
We will cover three concepts and two actions - Our future climate, the two new tools: long-range weather prediction paired with temporary reservoirs, and the grant funding available for feasibility studies.

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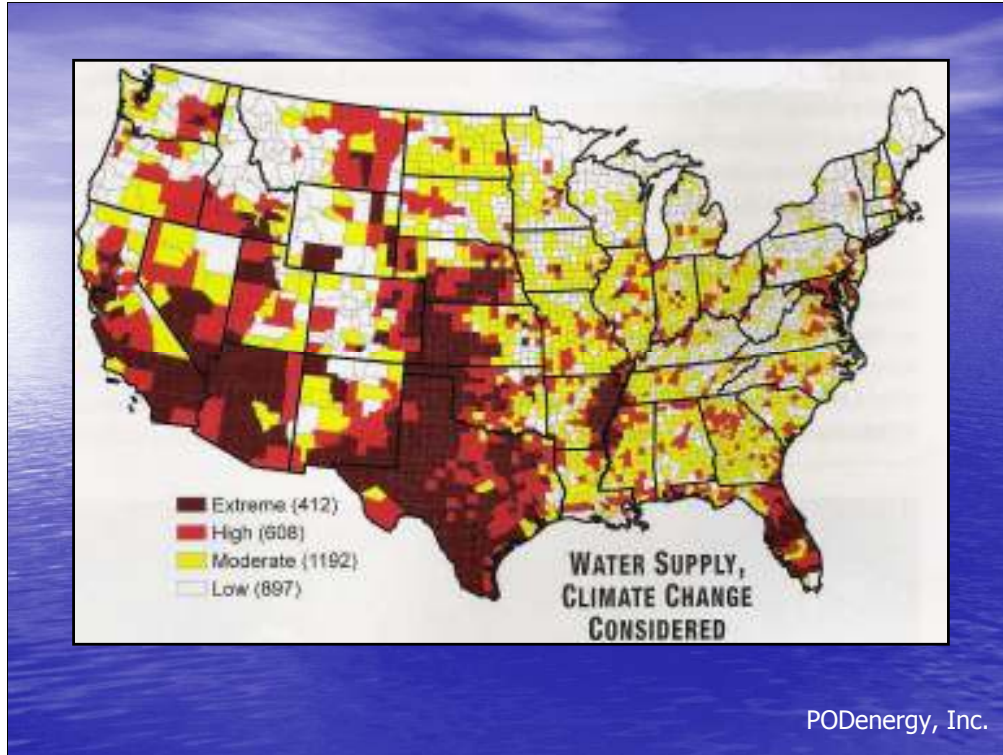
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The first concept addresses our future water resources.



This is a map with a prediction of water supplies relative to demand in **2050**. That is 40 years from now. The **darkest red** is the most water challenged. The map was prepared by Tetra Tech as part of a report funded by the Natural Resources Defense Council.

This map is prior to considering predicted effects from Climate Change. Climatologists have gathered **tree ring data over 1,200 years** for the American Southwest, both Colorado River and the Sierra watersheds. Those studies indicate the Dust Bowl years of the mid 1930s had the average rainfall for the past 1,200 years.



This is the same map including changes in precipitation based on climate models. Ventura County's situation remains "**High**" however we should expect little to no imported water by 2050 because both Northern California and the Colorado River watersheds will be dryer.

Also, water resources managers and climate models have noted and are predicting increased **intensity** of rain, when it does rain. That is, we can expect more droughts separated by floods.



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The climate studies and the tree ring studies indicate all Californians can expect less water and less water stored as snow. Unless Engineers act, this picture of a dry lake bed will be the future of farming in Santa Barbara, Ventura, and Los Angeles Counties.

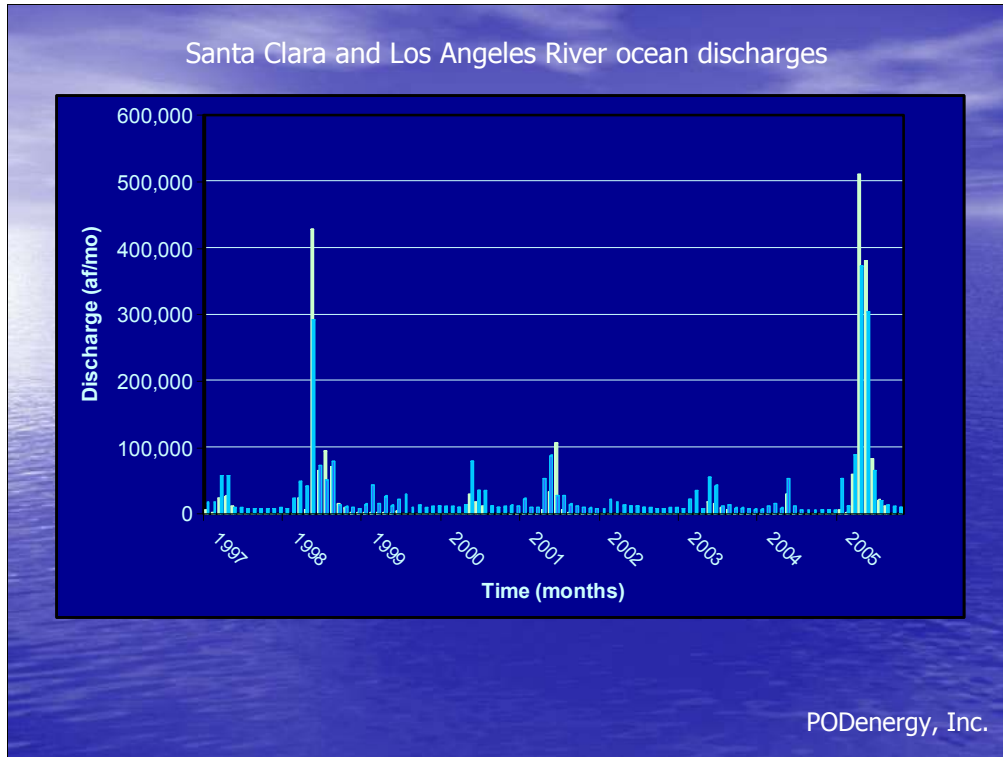
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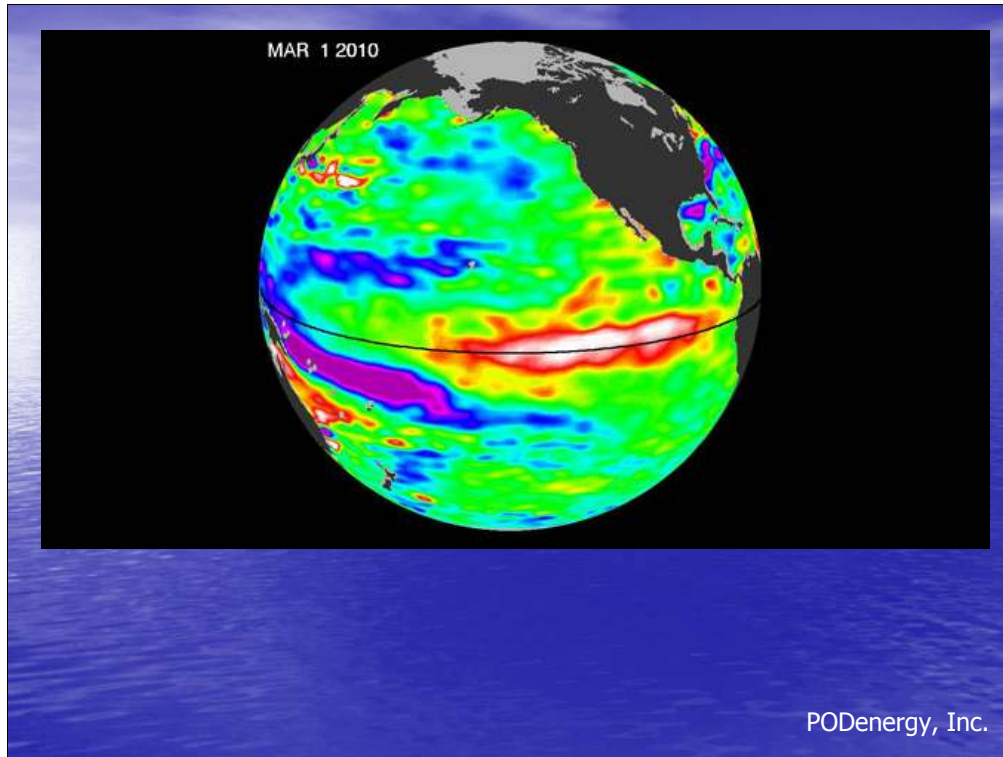
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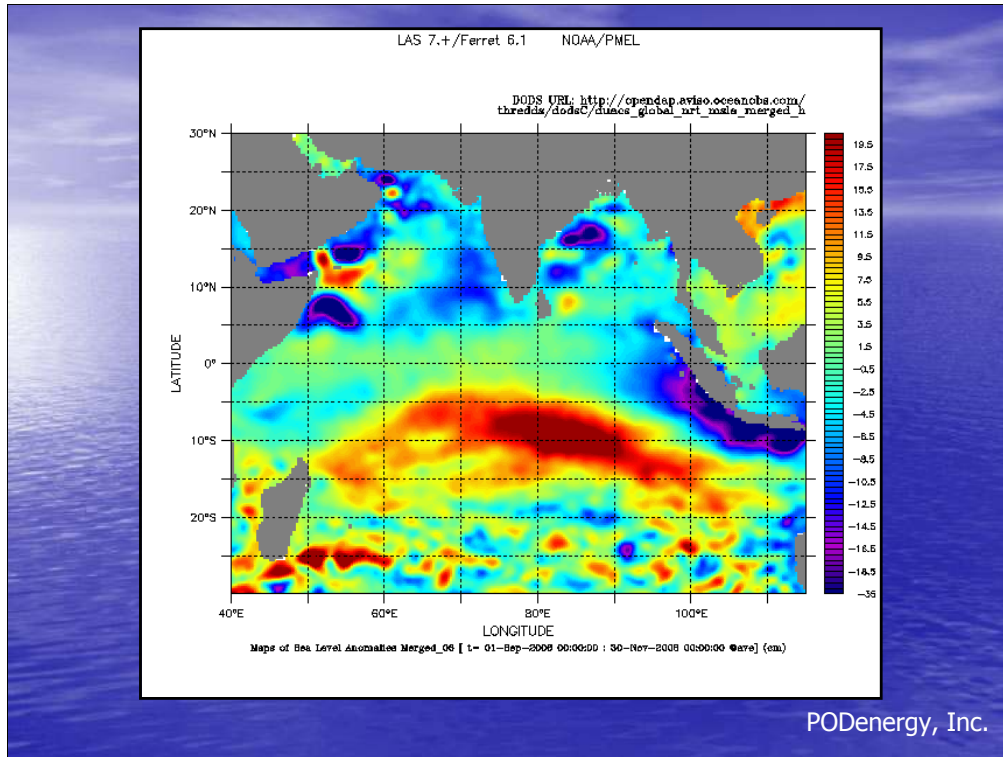
Our first new tool is the recognition that wet years are predicable about a year in advance.



Stream gage data is graphed to show the monthly discharge of Ventura County's Santa Clara River in light blue-green bars and the Los Angeles River, the blue bars. Notice there is no "average" year! The "normal" year has less than 100,000 acre-feet of ocean discharge. But during wet years, the ocean discharge is over 10x the "normal" year. Our challenge is to capture a few hundred thousand acre-feet during the wet years to tide us over the during the dry years.



This picture of Pacific Ocean surface temperatures shows the higher than average temperatures represented by the yellow, red, and white. The average temperatures in green and the cooler temperatures in blue and violet. This picture shows the persistence of El Nino, which is this patch of warm water in the Pacific Ocean. The El Nino causes storms to pass over Southern California. Using Pacific Ocean surface temperatures, climate and weather scientists can predict the wet years over half a year in advance.



Here is a picture of Indian Ocean surface temperatures with a similar color-temperature scale. This is India, horn of Africa, Madagascar, and Indonesia. Japanese and French geophysicists have recently announced that the Indian Ocean Dipole predicts El Nino or La Nina conditions in the Pacific Ocean as much as 14 months prior to the El Nino formation.

The net result is that engineers can employ good, and increasingly better, predictions of “wet” or “dry” years nearly a year in advance of the rain.

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Your first tool is predictability.

Your second tool is large water-filled tubes.



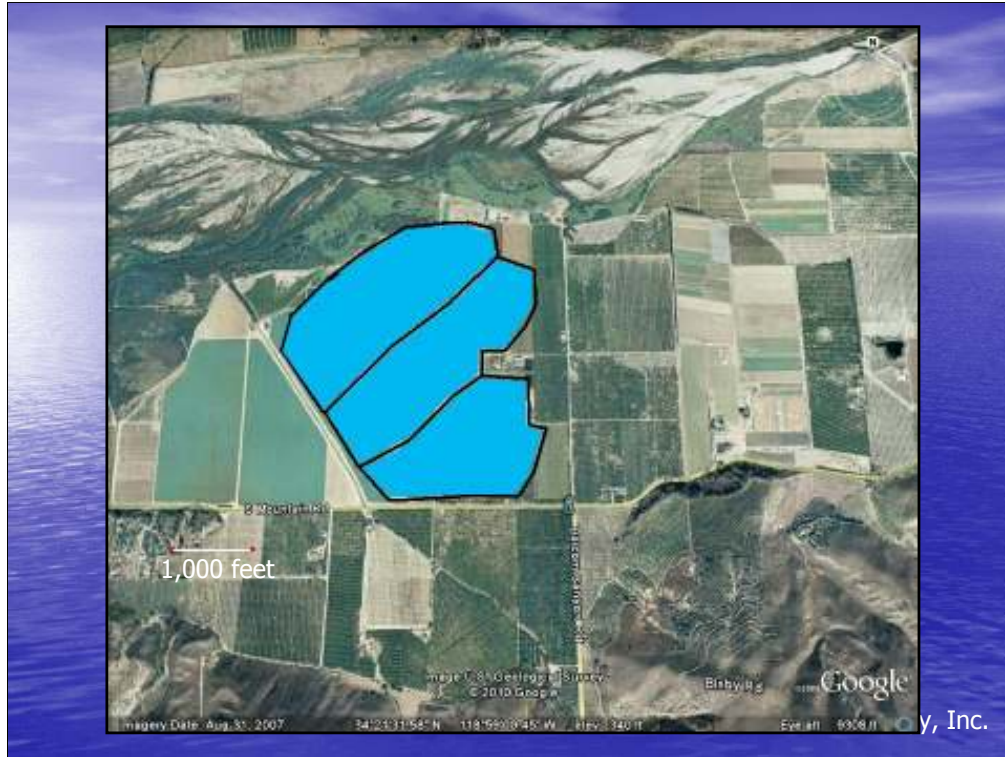
Here is a picture of a large water-filled tube acting as a construction cofferdam. The river is on the left and bottom of the picture. The water-filled tube is about 6 feet high.



Here is an aerial photo of farm land along the Santa Clara River near Santa Paula showing the potential flood storage area as of early December. Can any of you pick out the flood storage facilities?

PAUSE

Correct! You don't see the flood storage facilities in early December. Farms can keep farming food crops up to the last minute.



You didn't see the flood storage facilities in early December, because there were no flood storage facilities in early December. The black lines represent water-filled tubes deployed in late December **only when a wet year is predicted**. The solid blue represents an open reservoir covering about 200 acres and storing about 1,000 acre-feet in February. Based on very preliminary estimates, the stored water can cost less than \$500 per acre-foot.



Here is the same location in June. Can anyone see the flood storage facilities? The captured flood has been percolated into the groundwater in April. The farmer is back to food crops in June.

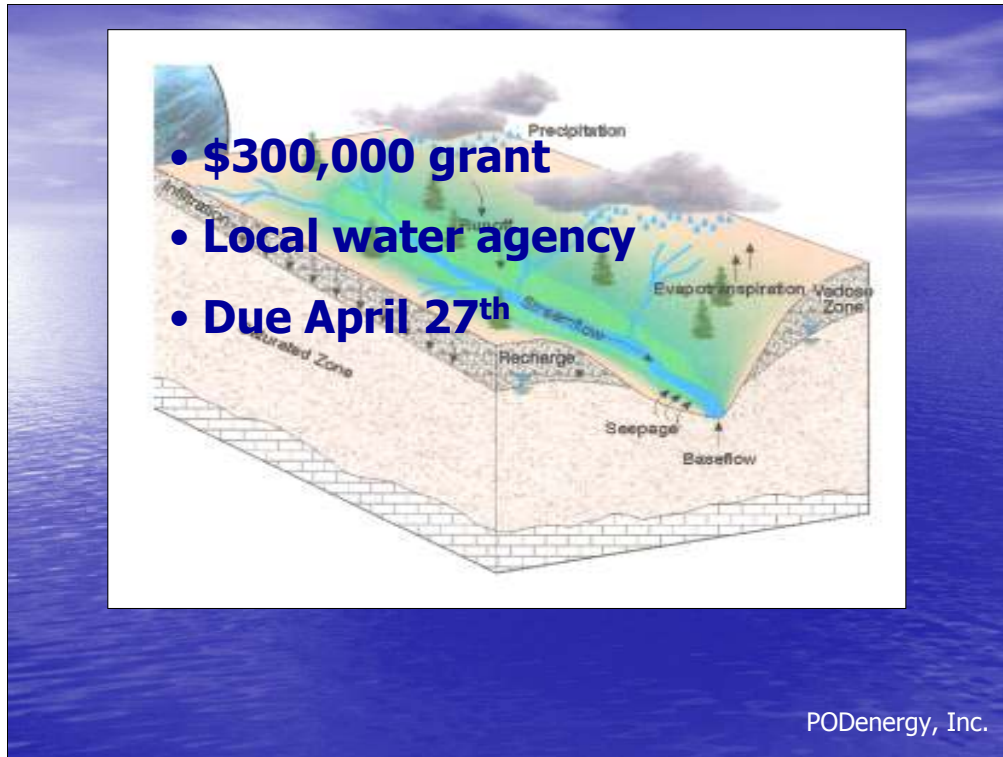
Mohammed has next.

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- **Two grant opportunities**

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How can you participate in a grant funded feasibility study?



On March 9th, the **Bureau of Reclamation** announced grants up to \$300,000 for **watershed optimization studies**. Any western U.S. water, irrigation, or power agency can apply. The applications are due in less than **six weeks**.

You can quickly lobby our local water agencies to apply for this watershed optimization grant.

- Fox Canyon GMA
- Local demonstration
- 1 to 5 acres



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You might want to partner for a local demonstration with a grant from the Fox Canyon Groundwater Management Agency. The demonstration of “**water as a crop**” project would involve a small instant reservoir installed on your property for a few months.

PAUSE



Any questions?



The cost will vary depending on location, location, location.

Seriously, size and shape of the flat area, percolation rates, use, type of diversion, and numerous other variables. Very preliminary estimates suggest some locations will capture floods for less than \$500 per acre-foot.



In spite of California's budget crisis, public awareness of our water crisis suggests grant funds will be available for the first few innovative flood capture projects.

Federal funding may also be available, because the basic concepts can be applied nationally or to the Clean Water Act.

We haven't discussed applying these concepts to stormwater, which opens more grant opportunities.



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