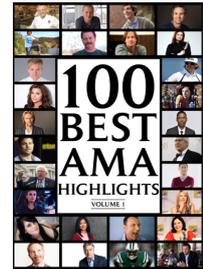


Dr. David Zetland

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[100 Best AMA](#)

[Highlights](#)



I'm a water economist. AMA on water shortages in California or water-related problems anywhere in the world!

Hi Reddit!

I did AMAs in **November** and **July** last year, but water crises are back in the news. That's because "Nature makes a drought, but man makes

a shortage.”

I’m here to answer **any and all questions related to the political economy of water**, i.e., who gets water and how do we put it to “highest and best use.”

Here’s **my proof** with a few important points, i.e., urban vs agricultural use, good management helps the poor, etc.

NB: I’ve traveled in 90+ countries and follow water issues everywhere, so AMA related to your local situation, and I’ll try to give a useful response.

I’m a **professor of economics at Leiden University College** in Den Haag (Netherlands).

I did my PhD at UC Davis.

Links of interest:

- **My blog**, aguanomics.com
- **My book**, *Living with Water Scarcity* <=== free to download
- **My PhD dissertation** “Conflict and Cooperation within an Organization: A Case Study of the Metropolitan Water District of Southern California”
- **“The end of abundance: How water bureaucrats created and destroyed the southern California oasis”**
- **All-in-auctions for water** <=== how farmers can reallocate water
- **People use less water when it’s expensive**
- **Pricing urban water for conservation, fairness and fiscal stability**
- **Water “consumption” is not the same as “use”**
- **Farmers only use 9 percent of water?**
- **São California** <=== radical ideas for California
- **Nestle is not the problem** <=== the problem is **governments that sell water too cheap**.
- **Desalination is usually not the solution** but it is **politically useful**
- The **free 2015 WaterSmarts Calendar** will help you learn about water around you

Political Economy 101: Corruption only works when politicians take bribes b/c THEY have the monopoly power. An honest politician or bureaucrat can hold off an army of corrupt businessmen (but not their

boss!)

Abbreviations

- af (acre-foot). 325,800 gallons of water = 1,234 m³
- Ag(riculture)
- g/w: groundwater
- LADWP = Los Angeles Dept of Water and Power

Does the CA water board recognize you/your work? After watching the CA Boards meeting yesterday, live, I saw a few presentations that showed frustration at the boards lack of progress. Is the politics and the bureaucracy the real culprit on progress?

Yes. They may say their hands are tied by procedure, etc. (see [this](#)), but there's also a constituency for business as usual.

It's time to bang heads, like they did in the 80-90s in [Australia](#)

I heard animal husbandry is the top user of water in the California and Texas. Fact or fiction? If fiction were in the hierarchy does it fall?

True, given alfalfa.

It's really burgers and ice cream...

I heard some houses don't even have meters in California. I think Sacramento area? Is that true?

True. Water was "too cheap to meter" in the past.

Meters are, AFAIK, only 70-80 years old. In the past (and now in places), water was a "civic service" paid by property taxes, rather than a utility service with user fees. Different philosophy.

Out of curiosity, which ideology do you favour?

Service as right in POOR countries. Pay for use (with income subsidies to poor) in richer countries.

Why doesn't California start charging farmers market rates for their water. Is it just because of political power or is there another reason?

It's not the State's place. Markets would "charge market rates" by revealing the value of water used to farmers...

If you were emperor of California and you could implement any three projects related to water, what would they be and which would be given priority? Why?

- (1) Intertie distribution systems and allow water markets to allocate bulk water, BUT
- (2) Cut off long-distance water transfers. It's time to live within your means and restore ecosystems that provide HUGE benefits.
- (3) Bring urban systems into full performance such that treated wastewater (and stormwater) could be recycled into human use. **How to pay?**

Um... ok... can I get an ELI5 on this anyone?

- (1) Allow people to share water (or sell it)
- (2) Use your water, not your neighbors
- (3) Don't break your toys; if you do, fix them so you can use them.

What does CA currently do with their wastewater?

into the ocean usually

What do you think is the likelihood of a war between nations over water resources and if like, how far away from it are we?

It's possible (see Chp 9 in my book), but even more dumb than wars over land.

But don't underestimate political stupidity.

In 1991 the Governor of Alaska proposed to build a water pipeline from Alaska all the way to Southern California but nothing ever came out of it. Would that actually work out or is it just too crazy of an idea?

Too expensive. It's MUCH cheaper to desalinate the Pacific and THAT'S crazy expensive.

I heard an NPR report that they're building (or maybe opening) a big desalination plant in San Diego that's supposed to produce 4% of the water they use yearly. That's pretty cool, but it's also the biggest desalination plant in America, so that is not as cool.

I saw 6%.

Not a solution.

Why does everybody in CA politics go on about people having to preserve water personally when only about 6% of the water in California is used for personal

consumption? Most of it seems to be used for growing fringe non-essential agricultural products like alfalfa and almonds.

“It’s something you can do while we get more campaign donations from farmers”

Isn't rice literally grown in fields of water?

Rice is not actually a problem when it's grown off of flood flows...

What are the biggest lifestyle changes individuals can make to help combat shortages of fresh water?

No watering outdoors

What, in your opinion (unless there are facts to back it up with), is the biggest culprit/beneficiary of the outdoors watering?

Developers, real estate agents and gardeners

What about eating less beef and dairy? I'd argue, as a whole, driving down demand for domestic beef and dairy and shrinking herds would have a greater impact than watering my lawn once a week.

I'd prefer that you eat beef and get water managers to change policies...

I'm visiting California and the topic of water naturally came up at breakfast. I told my friend I'd read municipal golf

courses can use as much water as small cities. My friend said that isn't true because golf courses recycle 99% of their water. Uh, evaporation....He waved it off and repeated his idea. Are golf courses automatically given special privileges?

They *use* recycled water, which evaporates. They *do* get a lot of slack, due to \$ raised. [Golf vs farmers](#)

What is the state of current research surrounding desalination? You mentioned in this thread already that it's crazy expensive, but is anyone working to make it more economically viable?

Yes. It's cost competitive on small islands (vs shipping water) and good for national security (Israel and Singapore).

Read the desal links above.

In Australia we've had major water problems since about 2004. Now that the drought has eased it seems like water security isn't being discussed anymore. What can we do while things are good to save for the future (is long-term water storage even viable?). Also, there was a lot of talk about desalination, is that an environmentally sound long-term solution?

You guys are already installed for desal.

Restore your environment and aquifers; flush salts from land. Drought will return and it's better to be "in shape"

How would that work, like just produce

desalinated water and then pump it into aquifers? It sounds like a great solution, but then who's going to pay for that desalinated water if essentially no one is using it immediately?

You're paying now but I meant storing rainwater.

If California were a blank slate in terms of water law, what legal framework would you suggest to allow for the most economically efficient use/distribution of finite water resources?

I'd follow the [Aussie example](#) with LIMITED licenses for surface and groundwater, so that demand was "capped" and trade could occur (not strictly necessary for, e.g, local g/w). Cali has a mix of prior appropriation, riparian and g/w rights that conflict.

So I'm a California resident. This sounds like a good idea, and we have this mostly stupid system of ballot propositions. Could the voters fix this damn thing in 2016? Who would be against it, besides farmers with senior rights?

Void all rights, reform rights for issue. Auction them. Pay off prior owners of rights. [My idea](#)

Super excited to see this thread, as I'm working on a Masters thesis on water issues (from more of a sociological perspective). I'm trying to research socioeconomic disparities and having access to water/high water quality (through municipalities/water treatment facilities) in the midwest. My project

focuses on a specific geological area, mostly considering surface water as it goes through the water treatment cycle (I've read EPA reports, etc.). Even though my summary (above) was kind of general, do you have any suggestions (methodological or otherwise) on how to proceed in examining how water is distributed to areas of socioeconomic hardship and/or how it's different from more affluent areas?

Great topic.

Look at breaks/leaks in different neighborhoods.

Water quality reports at the TAP

Blood contamination tests

Email me progress!

There have been a zillion articles and tweets lately claiming that farmers "need to pay the true cost of water." Exempting the federal subsidies for Reclamation projects, which are substantial, I don't see how they aren't. If I dug a ditch in 1867 for \$10,000, and it fills up in the spring, haven't I paid the marginal cost of acquiring X volume of water? How can I be expected to pay more for it, and who would I pay it to?

Good question. (1) There *are* subsidies on many projects in many countries. Read Cadillac Desert for the US. (2) There are "opportunity cost" subsidies in terms of water that they get but others would pay more for OR water we'd like to have in the future. (1) is easy to measure, (2) much harder without markets.

When it rains in SoCal, I see all the dry river beds, Santa Ana River etc. flowing and think we should be pumping that into holding areas etc. Is there any chance of that happening instead of letting it flow out to sea?

Yes! There's a **BIG project in LA** to remove concrete and allow water to infiltrate.

What can we do here in Utah? We have are the second driest state in the nation and our water usage here is absurd. From what I understand or aquifers are being drained to supply Nevada and southern California.

That may be true. The first step is to limit use/exports to "return flows" so aquifers stabilize. "Abundance" is gone, so management needs to change. (see my book)

What does it cost to move water in a pipeline – like the keystone xl deal? vs the cost of desalinating water? Or what other wacky options are out there?

Desalinated water costs about \$1,000/acre foot (US measure; roughly \$1/m³) which means a barrel (42 gal) costs about \$0.13. Oil is worth about \$40/bbl, so it's WORTH shipping by pipeline.

I heard a proposal once for transcontinental waterways linking major rivers. It would allow flooded rivers a way to divert extra water, and for drought stricken areas to siphon water when needed. I imagine there's great ecological challenges but that usually doesn't stop mankind.

India is debating a version of this; China's building the S-N water system. Both are (1) enviro disasters and (2) no cure for poor management.

On a scale from 1 to 10, 1 being not a serious problem, 10 being the next dust bowl and you should consider moving now, how bad is the situation in CA?

CA is a 6 on water, 3 on other things (to me)

What other things?

<http://www.aguanomics.com/2013/12/amsterdam-versus-vancouver.html>

How come all we hear about is how the people must make consumption sacrifices but businesses like Nestle are allowed to continue with their extraction and bottling operations? Is there anything being done to make those operations more transparent and manageable? Also does CA have a natural gas fracking industry that also consumes an unknown quantity of water?

Both businesses *should* be monitored for use. Nestle (see link @ top) is probably charged for water. Many utilities use business revenues to subsidize houses, so they don't like their use (\$) to fall. Also remember that bottled water is <0.5%

Fracking is far more worrying, due to g/w depletion and possible contamination.

From what I understand, Nestle is using expired permits and their consumption is not tracked by the government (as

requests for this information have gone unanswered). Is there anything we can do as citizens to fix this? Who should we write to?

well that's a much worse problem.

Go get the gov to do its bloody job.

Over the next 30-50 years do you think California will remain the agricultural producing region that it is today? In general, do you think policy makers will be able to incorporate a longer-term perspective when addressing the current acute water shortage (especially given shortages anticipated by many of the downscaled climate scenarios for the Colorado River Basin)?

I'd prefer the gradual evolution that markets would drive, since pols are not great at planning economies

Singapore uses reverse osmosis to recycle our waste water into drinkable water. In other words, we drink and shower from our poop and urine water. When will other countries start doing the same and being self sufficient?

When they get serious. I admire Singapore's system, but it is (1) a city state and (2) humid enough.

The problems are biggest where governance is complex and "old" systems were based on abundant water. Watch Saudi Arabia for the trainwreck/change of direction.

I'm working on studying the Saudi Water-Energy nexus and can only imagine what

horrors the future might bring. How would you recommend the Saudi government change its policies to avoid disaster?

Change “internal prices” to “world prices” for energy. Bam! Efficiency

How likely are we going to see water rights reforms, especially for agribusiness?

It's rising in probability. The key is to retire “paper” licenses so “wet” ones are worth something.

Aussie farmers made \$billions trading theirs. US farmers should too.

What happens when we drink the aquifers dry? Aren't we currently pulling out way more than can be replenished?

They can collapse (useless for storage in future).

No water next year.

Yes.

Is the First in Time, First in right system fundamentally flawed? Does it lead to suboptimal allocation of water and therefore poor conservation/efficiency? As you used to live in BC, what would be an ideal allocation system for the province?

yes, it's flawed if it's not used as a cap and trade system, i.e., people taking too much

The province should sell water based on local, “pooled” auctions, and **use the money for citizens**

I keep hearing this “one year of water left”

claim. As a homeowner in California, what does that really mean to me? Does that mean that in ~ a year, my tap won't work anymore? That we just pay more for water? How worried does the regular, head in the sand, Californian need to be?

Farmers will lose water before you do.

Lots of potential stupid before that tho.

How would something like the Great Lakes Compact for western state's water supplies help prevent abuse of those supplies? And how successful has it been for the Great Lakes states and provinces? Has it helped keep water levels at a safe level, no pun intended?

The *lakes* are easier to monitor and connected, so wouldn't work in West

Are there lessons to be learned from the Dutch policies on water management? Can such comparisons actually be made?

Yes:

- (1) Get serious on time and money.
- (2) Everyone needs to do their share.
- (3) Failure has political costs.

That said, the NL still has issues with water quality (ag pollution).

How much of the problem do you think is due to the vanity of having a green lawn?

Not as much of a problem as **\$1.15 for 1,000 gallons in Las Vegas!**

I am from Turkey and I was wondering about the true impact of multinational companies such as Nestle etc, owning wells and springs and other water resources. I read that it is a big deal in America. What about the rest of the world, especially Turkey?

It *can* be a big deal. I know of a local water bottler in Lebanon that's using the town's water.

Bottled water is ok, as long as use is limited to yield.

Just last night my friend was convinced that it is too late and that there is "absolutely nothing" we can do to help stop or ease the drought. I understand that we can't make rain, but what can we do as individuals and communities that isn't already being done? Is cutting down the time we take in the shower, or zeroscaping as futile as my friend thinks?

Call you representative and tell them to get serious about conserving supplies rather than letting farmers irrigate.

Would implementation of grey-water solutions on a broad spectrum or in high traffic areas (i.e airport terminals, stadiums, etc.) help the shortage in any significant way?

Yes, if that water was going to be treated and dumped (e.g, SD), but not if the water was going to be recycled (OC or Singapore). I prefer landscaping that can "survive on its own"

But could a system using, say, waste water from sinks to flush toilets make

any tangible difference? Toilets use a surprising amount of GpF

NOT if the water's recycled (uncommon in Cal)

I read recently that from beginning to end, it takes over 1,700 litres of water to make one 100g bar of chocolate. My question to you is, what is the biggest waste of water in manufacturing that you know of, or the largest use of it to output the smallest product?

It depends where the product is produced.

Rainfed chocolate is sustainable in that dimension.

Irrigated corn is less sustainable, esp if the water is "mined" from underground.

Proper water pricing would mean that foods would have the "right" price and you wouldn't need to ask this Q.

What progress is being made to bring more desalination plants to the California coasts? My limited understanding is that building these plants would qualify to get government subsidies or grants from the Energy Department? But if these plants could get a subsidy or grant to be built, why isn't there a major public push to do so? It seems that no matter what the cost (which you identified below to be very cheap) this should be a huge priority to address the problem long-term.

There's one under construction near San Diego. \$1 billion and 15 years due to lawsuits.

They are no panacea and thus subsidies may force greater stupid than you'd want.

Check the desal links above.

Do you have any advice on specializing my econ degree to freshwater science?

Get internships in industry AND govt

There are various water bills that are popping up in various major cities to increase the price of water. What is your stance on bills such as this?

I agree. Excess \$ can help the poor. [Read this](#)

Do you know about the water crisis in some parts of India? How serious are the other water economists all over the world about the water crisis in many parts of the world?

Not serious unless they can publish.

Most focus on local issues.

Can Arizona send CA some water?

I'd prefer they sell it.

I have family in Montecito who tell me that their wealthy neighbors use lots of water to keep their numerous plants alive because it would be too expensive to let them die and buy new ones. What's a reasonable solution to this problem?

Raise the price higher 😊

How much collaboration do you have in your field with landscape architects?

None. They don't like economics, usually.

How is Canada for water management? I hope it's not as bad as I think it is.

It's bad in a Canadian Way 😊

Would building a water desalination plants be a realistic option for the state? With rising sea levels and global water shortages this seems like it might be a good way to try to solve both problems.

No. \$ and time.

You're not going to drain the sea w desal 😊

I heard that most of our water problems would be solved if we all stopped watering our lawns, and planted succulents in our front yard instead. Is this true? If yes, how do we initiate a culture change?

True UNTIL more people move in.

Some people will "change culture" but most look at prices. Expensive water means fewer lawns (and people).

With the water quantity crisis making headlines, are there water *quality* issues that southern CA can expect to face in light of factors such as record low snowpack?

Yes. LADWP is working hard to "recover" g/w that's been

contaminated by defense industries. The less surface water, the more they will try to get that g/w. They may have a hard time removing all the crap. Then there are the MANY people who depend on well water (S Central Valley esp) who suffer from ag runoff contamination.

It's basically a problem of sucking off the bottom of the barrel.

I've heard it suggested that improving California's water storage infrastructure could have helped prevent the emergency state we are entering into. Is there any merit to this and if so, what sort of improvements do you think would be most beneficial?

Not really. There's just no water to go in reservoirs and bigger ones would run out too.

Jay Lund @ UC Davis says it's about interconnected systems, not storage.

The best spots are taken (so new reservoirs are a bad idea). It's better to manage aquifers since they store more with lower losses (and you can let rivers run).

What is your favorite human right and how do you celebrate it?

Free speech

How do we begin to regulate certain crops, e.g Almonds? Would reducing the crops truly make a difference? In Texas, we are seeing a continuation of crops like rice that are not native and are perpetuating the current drought. Similar situations elsewhere?

Regulation wouldn't work well.

Better to limit ag use and allow them to buy/sell water.

What is your opinion on companies like Coca-Cola that increase the depth of water tables in places like India? Also, is desalination plants something that may be needed to provide an increase in usable water?

CC is not the only baddie but international. Local water managers need to do their jobs.

ctrl+f for desal

What can we expect if the reservoirs dry up?

Reliance on groundwater and dead rivers.

I'm interested in owning clean water the way one might own oil, investing in it in other words, directly. Or the most direct way possible. How do you invest in water? It's the true oil.

Buy land over YOUR OWN AQUIFER.

Then hope that a city locates nearby.

I live in HB southern CA. Could you tell us some ways in which we can help this drought in our own homes? Or maybe other ways to save water we may not have considered?

Get your city council to ban lawns.

Find out HB's water source and stop others from depleting it.

We rarely talk about water as one of the reasons of the middle eastern crisis. Is it because the situation isn't that bad or it's just a case of shortsighted vision?

It's a problem caused by the same underlying issue: political failures.

What are your feelings on getting an economics PhD? Was it "worth" it to you (in the soft sense). (Hand wavey) What would be the equivalent cost for the burden of Brown's new cutbacks to fall on farmers alone?

Yes, since I liked being in grad school and survived the math crazy. I *love* teaching and this kinda outreach, so I'm happy.

25 percent on farmers 80%? Pretty easy with markets. Tougher without. Cities have an easier time, given outdoor watering isn't their income source.

Is hard water worse to drink than soft water? What kind of water is "best"?

Depends on your body chemistry, but I'm an economist 😊

What's the status on desalination worldwide? Any new developments? Big plants coming on line? Are they ever going to be viable?

Rising, for good and bad reasons

See links @ top

What's your take on the water situation in Las Vegas in general? If nothing changes, what is your take on the future? What's

the most reasonable solution that you think might actually be adopted?

Terrible management, wasting \$

Best solution, [raise the price](#)

also push for markets on the Colorado.

Will this water crisis have any negative effects for the wine production/quality in Napa Valley, Sonoma etc.?

Eventually. Profits will rise, regardless.

I was out at the Dead Sea yesterday and found out it's drying up. Why? What level of human related activities is related to this (e.g. agriculture use, climate change)?

Mostly agriculture with Israel taking more than Jordan.

They are talking of spending \$billions on Red-Dead desal, but it's cheaper to shut down farmers. Hard politically.

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