Environmental Updates

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Designed for use with the Global Development And Environment Institute's *Environmental and Natural Resource Economics* textbook

The Water Crisis in California

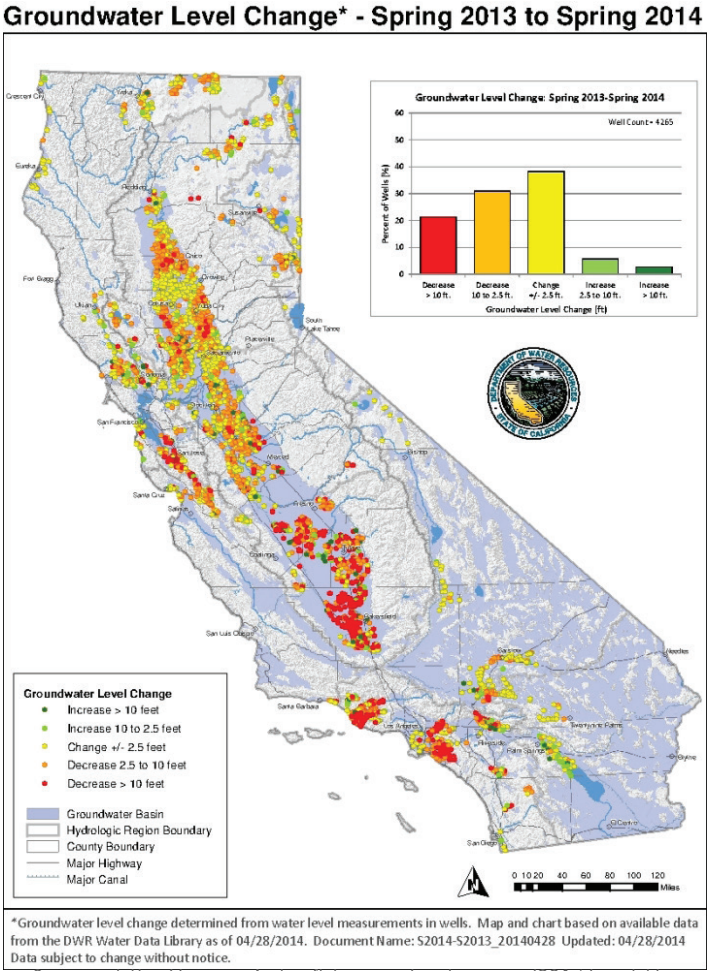
From 2011 to 2015, California has suffered severe drought conditions. On April 1st, 2015, California governor Jerry Brown issued an executive order – the first of its kind in the history of California – mandating that the State Water Resources Control Board implement measures in cities and towns to cut the state's overall water usage by 25 percent compared to 2013 levels. Standing in the Sierra Nevada, the source of most of California freshwater, the governor stated: "Today we are standing on dry grass where there should be five feet of snow. This historic drought demands unprecedented action."

The groundwater level changes during 2013-14 are displayed in Figure 1, which shows most aquifers in central California experiencing decreases of more than 2.5 feet in groundwater levels and in several cases more than 10 feet. According to the California Department of water, there are "many areas of the San Joaquin Valley where recent groundwater levels are more than 100 feet below previous historical lows."[1]

On the edges of the Central Valley, where aquifers are relatively shallow, municipal wells are running dry, forcing small towns to import water at very high prices. Chronic over-pumping has led to widespread land subsidence in the valley, with some places sinking more than 30 feet in recent decades.[2]

Following a lack of snowfall

Figure 1: Groundwater Level Change in California



Source: http://www.circleofblue.org/waternews/2014/world/groundwater-tables-california-time-lows-state-report-says/

This update speci ically relates to *Environmental and Natural Resource Economics: A Contemporary Approach* Chapter 20. For more information about the books, teaching materials, and research, see www.gdae.org

during the winter of 2014-15, NASA scientists estimate that California's reserve of water is barely enough for one year of consumption.[3] According to NASA, it would take about 11 trillion gallons of water (42 cubic kilometers) - around 1.5 times the maximum volume of the largest U.S. reservoir - to recover from California's continuing drought.[4]

In addition to California, eight other states are experiencing severe droughts: Arizona, Colorado, Kansas, Nevada, Oklahoma, Oregon, Texas, and Utah. Climate change models indicate that droughts are likely to reoccur in the coming decades. According to a study by NASA:

> Droughts in the U.S. Southwest and Central Plains during the last half of this century could be drier and longer than drought conditions seen in those regions in the last 1,000 years.[5]

Water scarcity is a looming national issue, as 40 of the 50 states are expected to face some kind of water shortage in the next ten years.[6]

Water pricing and water management

Several counties in California have adopted pricing structures that follow an increasing block rate pattern (see Chapter 15, pp.360-365) with lower prices for lower consumption and higher marginal prices for high consumption. But in California, water consumption by the wealthy turns out to be price-inelastic:

> The wealthy use more water, electricity and natural gas than anyone else. They have bigger properties. They are less price sensitive. So if you can afford it, you use it. Then it becomes a moral question.[7]

Customers are really paying for the cost of pumping and transporting water, and the administrative costs of water agencies, but not paying for water itself which is basically free. Currently the average residential water bill in Californian is $40 to $70 a month, which is less than monthly bills for cable or cellphones. But the era of cheap water is probably coming to an end in California, as major investments will be needed to build more water storage and better methods of recycling water.[8]

To manage freshwater sustainably, consistent institutional governance involving all levels of decision making from the county level to the State level is needed. But there are still many legal loopholes that can be manipulated in courts by users who are unwilling to follow new regulations. "California has allocated five times more surface water than the state actually has, making it hard for regulators to tell whose supplies should be cut during a drought" according to a study by University of California researchers.[9]

In California, agriculture accounts for 80% of water use. Since the founding of the state "water has been considered a property right; landowners have been able to pump as much water from the ground as they want."[10] California landowners can still drill water wells as often and as deeply as they can afford, without permission from anyone, whether government agencies or neighboring communities. With few exceptions, users are not required to report how much they pump. For California farmers, aquifers provide 30 to 40 percent of the state's water supply in normal years but close to 60 percent in drought years.

The only laws that exist now in California govern surface water (rivers and lakes) but not the underground aquifers, which are de facto open access. This lack of regulation is a leading cause in the over-pumping of groundwater in many parts of California. Water is being pumped at a much faster rate than it is being replenished.

"We've turned a renewable resource into a nonrenewable resource," says Peter Gleick, president of the Pacific Institute. "Whoever has the most money, the deepest wells, and the strongest pumps has been able to take this public good and turn it into a private commodity."[11] While other states have regulated the use of their aquifers, "California has lagged in this area because a strong political lobby of

groundwater users resisted state regulation" according to Brian Gray, a law professor at the University of California-Hastings.[12]

To address this challenge, Governor Jerry Brown signed a bill in September 2014 establishing a framework for statewide regulation of California's underground water sources, but with management at a local level. "Manage your groundwater basins, and the state will not have any reason to interfere with your right to have your own governance board and to set your own rules and regulations," as expressed by California Senator Fran Pavley.[13] However, these new regulations will take years to implement and may fail to adequately protect some of the State's rapidly depleting aquifers.

Water scarcity also reveals potential conflicts between different types of users competing for the same scarce resource. Municipalities are required to cut drastically on municipal uses, meanwhile farmers, who are the main consumers of water, still benefit from free water pumped from their wells, which might exacerbate tensions between farmers and municipalities for the use of water.

California State officials are engaging in negotiations with farmers to have them agree to a reduction of their consumption. On May 22, 2015, California state officials accepted an offer from farmers in the Sacramento-San Joaquin River Delta to

> give up a quarter of their water this season, either by leaving part of their land unplanted or finding other ways to reduce their water use. In return, the state has assured them that it will not seek further reductions for the growing season. The deal is an important concession from a relatively small number of growers that officials hope will prompt similar agreements.[14]

Other users seem to be unaffected by the new regulations. Multinational companies such as Nestlé have secured access rights to California aquifers thanks to their longstanding contract with the Morongo Band of Cahuila Mission Indians, who are based in a southern area of the state. Because of the previous lack of regulation of groundwater withdrawal, Nestlé has built a plant inside the Morongo Reservation which is pumping 200 million gallons a year, which are bottled up to be sold under the "Arrowhead" water brand. That Nestlé might be able to continue pumping unabated in the context of the current drought has created public outrage and the launching of several petitions in California.

If the drought worsens in California in 2015 and subsequent years, it is likely that more conflicts will erupt and that more drastic regulation measures will be needed to address this unprecedented situation.

Endnotes

1 California Department of Water Resources, April 30, 2014, p.2 http://www.water.ca.gov/waterconditions/docs/Drought_Response-Groundwater_Basins_April30_Final_BC.pdf
2 http://news.nationalgeographic.com/news/2014/09/140917-california-groundwater-law-drought-central-valley-environment-science/
3 http://www.theguardian.com/us-news/2015/mar/16/california-water-drought-nasa-warning
4 https://www.nasa.gov/press/2014/december/nasa-analysis-11-trillion-gallons-to-replenish-california-drought-losses
5 http://247wallst.com/special-report/2015/04/22/9-states-running-out-of-water/
6 GAO, FRESHWATER: Supply Concerns Continue, and Uncertainties Complicate Planning, GAO-14-430 (Washington, D.C.: May 20, 2014) Accessed from http://www.gao.gov/products/GAO-14-430
7 "Drought frame economic divide of Californians" New York Times, April 27, 2015
8 http://www.cnbc.com/id/102714268
9 http://news.ucdavis.edu/search/news_detail.lasso?id=10999
10 http://www.latimes.com/local/political/la-me-pc-groundwater-regulation-bills-20140916-story.html
11 http://news.nationalgeographic.com/news/2014/09/140917-california-groundwater-law-drought-central-valley-environment-science/
12 http://www.psmag.com/nature-and-technology/outlawing-water-conflict-california-legislators-confront-risky-groundwater-loophole-89714
13 ibid.
14 http://www.nytimes.com/2015/05/23/us/some-california-farmers-to-cut-water-use-to-ease-drought.html?emc=edit_na_20150522&nlid=48442206&_r=0
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