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Shopping for Water: How the Market Can Mitigate Water Shortages in the American West

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Shopping for Water: How the Market Can Mitigate Water Shortages in the American West

For the past fifteen years the American West has experienced a widespread and severe drought that has strained water-supply systems. This prolonged drought has exposed substantial deficiencies in our nation's approach to water management, leading to widespread shortfalls in water supply and increasingly unsustainable use of groundwater resources. The United States needs a fundamentally new approach to water management in order to address the long-term challenge of rising water demand in the face of an increasingly scarce and unpredictable water supply.

In the U.S. economy, well-functioning markets help to allocate many resources, with the quantity and price of traded goods determined by supply and demand. For a host of reasons—including physical and legal restrictions—opportunities to trade water are limited. Rather than using markets, the historical solution to water scarcity challenges in the United States has been to increase the supply of water—for example, by additional pumping of groundwater—and to reduce demand—for example, by strengthening conservation measures. These traditional approaches are inadequate in the face of increasingly unreliable water supplies in many parts of the West.

Absent new and innovative approaches to addressing the issue, the economic costs of an inadequate water-supply system will intensify. In 2014 alone, the drought is expected to cost California's agriculture sector \$2.2 billion and to result in the loss of more than 17,000 seasonal and part-time jobs. But the economic consequences of water scarcity extend far beyond California's farmers, potentially impacting a variety of industries ranging from commercial fishing to energy production to technology. In line with The Hamilton Project's vision that long-term prosperity is best achieved by promoting sustainable growth, there is an important national interest in identifying mechanisms to address the Western water crisis that will improve the efficiency of water use, safeguard the future of farming communities, and ensure a reliable supply of water for domestic companies.

In this brief, The Hamilton Project provides context to the Western water crisis, and details a proposal by Peter Culp of Squire Patton Boggs, Robert Glennon of the University of Arizona, and Gary Libecap of the University of California, Santa Barbara. In their discussion paper, the authors suggest using market mechanisms to increase flexibility and resilience in water management. To address the water crisis, the authors

call for five bold new proposals and guidelines, four of which state and local governments can readily implement. Their proposals would strengthen water markets across Western states by reforming legal barriers to transferring water rights; establishing water-trading institutions; and supporting mechanisms for mitigating risk related to water-supply disruptions. The authors also call for improved management of precious groundwater resources, together with a stronger role for the federal government, especially in encouraging better data on water use. Together, these five reforms will help promote markets for water trading and mitigate the water supply challenges that plague many areas of the West.

The Challenge

Prolonged drought has subjected water systems in the American West to increasing stress. The authors contend that even after the current drought ends, the water challenges facing the West will continue, exacerbated by population growth in Western states and the concurrent rise in water demand. These constraints, combined with the potential for climate change to markedly increase variation in precipitation, would dramatically exacerbate pressure on the West's water supply and infrastructure.

Water reserves in underground wells and aquifers have traditionally served as a buffer against shortfalls in water supply. Because many states do not adequately regulate groundwater, water users have little incentive to avoid exploiting this seemingly unlimited resource, and have drawn down the supply of underground water to unprecedented levels. Such a result is predicted by economic theory, which posits that a common resource, which is shared by many but owned by none, can become overexploited. Indeed, in the American West the absence of robust water markets—systems to buy and sell water-use rights—has intensified the economic costs of water scarcities and prevented the efficient use of water.

Barriers to effective water markets are diverse: for one, the physical difficulty and expense of moving large quantities of water pose significant challenges to getting water to where it is needed. In addition, a myriad of legal and regulatory restrictions—that limit the trade of water among its users—aggravate relative water scarcity and existing price disparities, and act as an equally important obstacle to the establishment of markets.

Open access to groundwater has also substantially impeded the development of water markets. In the absence of regulation, a prospective water user will choose to access free groundwater

instead of paying for access to a more sustainable, but comparatively expensive, supply of surface water. As a result, overexploitation of underground water sources has not only caused irreversible environmental damage, but also impeded the development of robust water markets.

The lack of effective markets for water has produced the perverse situation where water itself cannot be easily traded, but the commodities that are produced with water can be, and are, traded. For example, farmers in California used more than 100 billion gallons of water in 2013 to grow alfalfa that they shipped to China to support its rapidly growing dairy industry, even as the rest of the state struggled through the worst drought in recorded history. If those alfalfa farmers were given an opportunity to sell water to their water-starved neighbors in other parts of the state, that might have alleviated some of the economic damage to California's economy caused by the drought, while simultaneously generating higher economic returns for farmers.

Some states and localities have adopted innovative market mechanisms—such as water banks and exchanges—to support markets for water trading. As a result, a variety of tools and institutions for facilitating the trading of water and for mitigating water-supply risks already exist. Yet these tools and institutions are underutilized, and have not allowed water markets to fully develop across the West. Furthermore, private market mechanisms for managing risk in other industries, such as option contracts, can serve as a model for innovative strategies to insure against costs associated with inevitable supply disruptions in the water sector.

In sum, water scarcity is an economic problem that demands an economic solution. A host of impediments to water markets, ranging from burdensome regulation to underutilization of proven risk mitigation strategies, have exacerbated the costs of water scarcity. Culp, Glennon, and Libecap suggest ways to overcome these physical, legal, and regulatory restrictions through an innovative and diverse set of solutions to promote effective water markets in Western states.

A New Approach

Growing uncertainty over water supplies means that Western states must adapt their water management frameworks and prepare for meeting the demand for water during periods of prolonged scarcity. The authors contend that the United States needs to restructure its approach to water management and create institutions that would make water allocation more flexible and resilient, so that users of water can thrive even in the face of substantial disruption of supplies. Water markets represent an important tool for achieving that flexibility and resilience.

Reform Legal Rules That Discourage Water Trading to Enable Short-Term Water Transfers

One important mechanism for achieving more-robust markets for water is to reform legal doctrines that obstruct the trading of water. Water markets fundamentally depend on a system of property rights; exchanges cannot realistically take place in the absence of recognized owners and legally enforced contracts. The authors propose reforming the legal and regulatory framework to create a more efficient system of property rights. These reforms would require three elements: a complete definition of property rights so buyers and sellers know what is being exchanged; exclusivity, meaning the right to exercise control over the asset; and transferability, or the ability to sell or bequeath ownership.

While acknowledging that a comprehensive legal overhaul would take decades, the authors propose a series of targeted reforms to legal doctrines to clarify property rights, and consequently facilitate trading of water rights in the short run. As an example, one of these legal doctrines, called the salvaged water doctrine, effectively encourages overuse of water because it does not allow farmers and other parties who reduce their water use to lease or sell conserved water. The authors advocate for reforms to this legal doctrine in order to allow existing water users to invest in conservation, and to allow those users to lease or sell the conserved water on a short-term basis to others who might value the water more. As another example, the authors also propose that states jettison a rule—known as the anti-speculation doctrine—that requires water users to document the new location, purpose, and use of the water before it can be transferred. Ultimately, the proposed legal reforms would lower barriers to the short-term trade of water by allowing buyers and sellers to feel more secure about property rights; this, in turn, would lead to more trade, which would benefit the involved parties and increase overall economic efficiency.

Create Basic Market Institutions to Facilitate Trading of Water

As a complement to their proposed reforms to clarify property rights, Culp, Glennon, and Libecap propose the establishment of institutions to facilitate and promote the trade of water. Well-functioning market exchanges involve more than just a bundle of legal right; they commonly also involve a set of supporting institutions. Depending on physical and geographic constraints, water infrastructure, and regulatory restrictions, water markets could potentially operate at a variety of scales—for example, within regions or within the boundaries of urban areas or agricultural districts. Establishing effective frameworks and trading platforms for markets to operate at these various scales is a key prerogative of state and local governments. Properly assembled, these frameworks can employ powerful market forces to achieve water management goals.

To that end, the authors propose that state legislatures authorize the development of local and/or regional water exchanges or banks to facilitate the transfer of interests in water. Water banks function similarly to regular banks, holding deposits of water rights until the depositor decides to use them or allowing depositors to lend, give, or sell these rights to someone else. Existing water banks in the West serve as brokers by helping sellers find buyers and vice versa, as clearinghouses by pooling supplies from willing sellers and making them available to buyers, and as facilitators by using storage entitlements to trade water rights. To facilitate the exchange of information among users, the authors also propose that states develop a central registry of water rights that would disclose information about market participants and exchanges, such as a list of rights holders and recent exchanges including amounts, duration, and prices paid. This registry would help all parties, particularly small users, locate one another and determine volumes to be exchanged and prices to be paid.

Use Risk Mitigation Strategies to Enhance System Reliability

In addition to legal reforms and establishment of trading institutions, the authors discuss the benefits of private risk management strategies to buffer farmers and other water-dependent businesses from the risk of water-supply disruptions. They argue that once basic mechanisms for the lease and transfer of water rights are in place, creative transactions to manage the risk of water fluctuations will likely evolve organically through private-market mechanisms. Borrowing from tools already in use in some jurisdictions, the authors argue that several types of option contracts could be used to create flexibility in water use.

For example, dry-year options can encourage water sharing in the face of shortages. Water users with a low tolerance for loss of water supply—including municipal water users or citrus tree growers—can enter into a contract to pay seasonal agricultural users (or other users with more flexibility to accommodate changes in water supply) a certain amount of money each year. In dry conditions, the buyers of the option would have a right to use the seasonal agricultural user's water, while the interrupted seasonal user would use the money received to offset the costs or losses associated with the reduced water supply, such as through adjustments to the types of crops grown or the amount of land in production.

The authors also lay out a framework for mitigating individual and system-wide risk through alternative mechanisms. Two examples include the increased tradability of water stored in reservoirs, achieved by allowing reservoir water rights holders to either trade or carry over their water from season to season for later use instead of requiring them to use their entire water allocation each year; and water trusts, which are institutions that acquire water rights and dedicate these flows to limiting both environmental and systemic supply risks.

Roadmap

- States would reform legal rules that currently discourage water trading—such as the salvaged water and anti-speculation doctrines—in order to enable short-term water transfers. Given the substantial and diverse interests at stake, it will take many years to fully reform Western water law. However, Western states would remove or provide exceptions to a number of these doctrines in order to authorize simple, short-term water transfers, benefitting the involved parties and increasing economic efficiency.
- State and local governments would establish essential market institutions, such as water banks, to facilitate and promote longer-term water transactions and transfers. These institutions would allow markets to operate at a number of scales (e.g., within regions or within the boundaries of urban areas or agricultural districts) and would allow users at these various scales to achieve water management goals.
- Water managers—such as farmers and irrigation districts, nongovernmental organizations, or local and state governments—would support and encourage the use of market-driven risk management strategies to address growing variability and uncertainty in water supplies. These tools include the use of option contracts to provide for water sharing in the face of shortages, and water trusts to protect environmental values. Additionally, reservoir management strategies that allow for sophisticated, market-driven use of storage could build resilience into water distribution.
- States would better regulate the use of groundwater in order to preserve groundwater reserves, protect environmental values, and support the development of effective markets. States would monitor and limit groundwater use through a number of actions, such as requiring existing well owners to install meters and investing in better groundwater data collection and reporting. Protecting groundwater resources would also bring groundwater under the umbrella of water trading opportunities.
- Strong federal leadership, from Congress and from the Bureau of Reclamation, would promote interstate and interagency cooperation in water management, and coordinate essential state-level gathering of data on water supplies and water use. These efforts would help water markets work at scale. In particular, the Bureau of Reclamation would play a key role in water projects across the West, especially as Reclamation negotiates contracts, shapes policy, and updates infrastructure.

Learn More about This Proposal

This policy brief is based on The Hamilton Project discussion paper, “Shopping for Water: How the Market Can Mitigate Water Shortages in the American West,” which was authored by:

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Protect Groundwater Resources

A fourth set of reforms calls for improved groundwater protection. The authors describe how the failure of some states to regulate groundwater use has created an ongoing open-access resource problem that causes erosion of private property rights in both land and surface water. This, in turn, inhibits the development of water markets and distorts market prices. While the regulation of groundwater varies markedly across Western states, the authors propose a general series of recommendations for groundwater management. These recommendations include tradable credits for recharging groundwater, permits for drilling new wells, and demand-offset systems. Together, these innovations would protect surface and groundwater systems and provide incentives for groundwater recharge. In addition, the authors propose increasing budgets at federal and state agencies to promote research that increases understanding of groundwater systems.

The authors also note opportunities created by the recent California law that mandates the adoption of groundwater management plans and expands local authority over groundwater. These recent efforts will be accomplished under the auspices of groundwater sustainability agencies (GSAs), which can be specific local water agencies or cooperative efforts among agencies. With that in mind, Culp, Glennon, and Libecap propose a set of guidelines modeled after Arizona’s successful efforts at regulating groundwater that would guide California’s GSAs in managing groundwater resources.

Continue and Expand Federal Leadership

Finally, the authors propose that the federal government play a role in establishing better water markets in the West. For example, one way the federal government can improve water trading is through improved data collection and measurement of water supply and use. The authors propose that the Bureau of Reclamation in the Department of the Interior require, as a condition in new contracts or renewal of existing contracts, that contractors have meters or other effective measurement devices to measure the quantity of surface water diverted or groundwater pumped. The authors argue that the federal government should also play an important role in supporting and coordinating state and local efforts to generate accurate data.

More broadly, the authors propose various policy recommendations for Congress, and specifically for the Bureau of Reclamation. These proposals include revisiting some of the subsidy assumptions built into early contracts; promoting rules and regulations that require irrigation districts to allow individual farmers an opportunity to benefit from conserving water; undertaking pilot projects to test the viability of conservation approaches; and reexamining current federal agricultural policies. Overall, the authors argue that continued federal leadership is essential to encouraging more-flexible water management, reducing barriers to trade, and developing critical market institutions.

Conclusion

Western states continue to struggle with water scarcity in the face of rising demand. Traditional solutions to water-supply challenges are proving increasingly unworkable, with underground reserves dwindling to unprecedented levels in some areas. Instead, Culp, Glennon, and Libecap argue that a series of reforms to promote more-robust water markets in the West will lead to a healthier water sector and improved outcomes for water-dependent industries. They contend that, by tapping into the power of markets, policymakers and stakeholders can design better tools to halt the excessive pumping of groundwater, avoid the construction of environmentally destructive infrastructure, improve the efficiency of our water use, safeguard the future of our farming communities, and ensure a supply of water for our nation’s productive use.

Questions and Concerns

1. Won't water marketing hurt American farmers and rural communities?

Farmers have considerable experience in making adjustments, as weather and market conditions for inputs and crops shift every year and over time. The authors argue that water markets offer farmers increased flexibility to look after their own economic interests.

It is true that many water transfers will involve moving water from agriculture to other uses. These transfers need not reduce the value of farm output, or come at the expense of rural communities, particularly if it is accomplished by modernizing agricultural infrastructure. For example, almost half of the 60 million irrigated acres in the United States are watered by flood irrigation, despite its relative inefficiency. By contrast, the most efficient method of irrigation—micro-irrigation, which emits a precise quantity of water to each plant—is used on only 6 percent of the West's irrigated fields, even though evidence shows that such irrigation systems can result in both higher yields and lower water use.

The authors note that the farming areas that have achieved the greatest efficiency gains with less water use typically grow the highest-value crops (such as the lettuce fields of Yuma or the citrus and nuts of Central California), or have been subject to regulatory requirements that have mandated specific levels of agricultural water-use efficiency (such as in Central Arizona). The authors contend that if states were to make short-term leasing options readily available, there would be opportunities for municipal, industrial, and high-end agricultural users to help fund irrigation modernization in exchange for use of the water conserved—allowing farming communities to remain vibrant as they grow the same (or greater) amounts of product with less water.

2. Does water marketing transform water—a resource essential to life—into just another commodity?

Some critics of water marketing believe that such an approach would treat water as just another marketable commodity, no different from oil and lumber. But in the United States water is already treated as an economic good, though in an incomplete and disjointed manner. Since the 1850s, Western states have recognized property rights to the use of water. Furthermore, most U.S. households and firms directly pay for the water they consume.

Rather than decrying a system already in place, the authors contend that the United States should employ it to help us solve the water crisis. Treating water as a property right but failing to clearly define it, they argue, got us into the crisis in the first place by encouraging overuse of a critical public resource. It is a classic example of the tragedy of the commons: because no one had exclusive rights to the resource, everyone had an incentive to exploit it. If states and localities strengthen the water-use rights that farmers, industry, and others already have in water by permitting them to sell or lease their rights, they can create incentives for all users to utilize the resource more productively.

Highlights

Peter Culp of Squire Patton Boggs, Robert Glennon of the University of Arizona, and Gary Libecap of the University of California, Santa Barbara, propose the establishment and use of market mechanisms to encourage reallocation and trading of water resources and to provide new tools for risk management. Together, the reforms would build resilience into our country's water management systems and mitigate the water-supply challenges that plague many areas of the West.

The Proposal

Reform legal rules that discourage water trading to enable short-term water transfers. Western states would remove or provide exceptions to a number of legal doctrines in order to authorize simple, short-term water transfers between parties.

Create basic market institutions to facilitate trading of water. Trading platforms, such as water banks, would promote longer-term water transactions and transfers and allow markets to operate at a number of scales, such as within regions or within the boundaries of urban areas or agricultural districts.

Use risk mitigation strategies to enhance system reliability. The use of market-driven risk management strategies would address growing variability and uncertainty in water supplies. These tools include the use of dry-year option contracts to provide for water sharing in the face of shortages, and water trusts to protect the environment and limit supply risks. New reservoir management strategies that allow for market-driven use of storage would build additional resilience into water management systems.

Protect groundwater resources. States would better regulate the use of groundwater, including monitoring and limiting use to ensure sustainability, in order to preserve essential groundwater reserves, protect against environmental damages, and support the development of effective markets.

Continue and expand federal leadership. Strong federal leadership, from both Congress and the Bureau of Reclamation, would help markets work at scale and promote cooperation between states and agencies in water management.

Benefits

The deployment of market tools in the water sector could help mitigate the Western water crisis by facilitating the reallocation of water to meet the demands of changing economies and growing populations. Market mechanisms can also play an important role in encouraging conservation and stewardship of water supplies in a way that can address economic and ecological priorities. Overall, market tools would help overcome the increasing fragility and vulnerability of the water management institutions and infrastructure in the West.



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