California’s water problem can be described simply. The state does not have enough water to meet human, agricultural, and environmental demands, and the water California does have is not located where the demand is. Much of the state enjoys a seasonal Mediterranean climate with warm, dry summers that provides ideal growing conditions for fruits, vegetables, and nuts and contributes to Californians’ high quality of life. However, careful management of water resources is needed to sustain large human populations in this environment. Cycles of flooding and drought are inherent to Mediterranean climates, but large cities, farms, and businesses cannot tolerate these cycles. Instead, such locales import water from other parts of the state in order to secure a more reliable supply.

In some regions, water is abundant: rainfall is plentiful in the northern part of the state, and snowpack in the Sierra Nevada serves as an excellent water storage system. But almost all human demands for water reside elsewhere—along the coast, in the southern desert, and in the fertile Central Valley—creating the need for an enormous infrastructure to transport water to where people live and crops are grown. The infrastructure that has developed over the last century is precarious, with aging pipes and treatment facilities that might not withstand damage from earthquakes or climate change. Moreover, the mass diversion of water away from its natural course has had significant environmental consequences that create an obstacle to further infrastructure expansion. Projected population increases in the coming decades will place even greater pressure on the state’s water resources.

The root cause of California’s water problem may be simple, but its manifestations are complex. Water scarcity forces choices about how to allocate water among competing demands, how best to protect water quality and natural ecosystems, and who should pay for securing a safe and reliable water supply. Battles over water underlie much of California’s most contentious politics. Water shapes the state’s history and explains many contemporary schisms and alliances. With insufficient water resources, different user groups must compete to acquire enough supply to meet their demands. The state’s agricultural industry has benefited over time from an ample allocation of water at extremely low prices. Agencies representing urban water users have long challenged these subsidies and fought to increase the amount of water dedicated to business and residential use in metropolitan areas. In recent decades, environmentalists have become important players in water politics by demanding that more water remain in streams and wetlands in order to protect water quality and wildlife habitat. These three groups operate in a complex legal and institutional environment, changing strategies and shifting coalitions across water policy issues and questions.

California’s water problem is a public policy problem; it cannot be resolved wholly in the marketplace. Water is an essential good, and governments have an interest and duty to ensure that all state residents have enough water to meet their basic needs. If water were managed like any other commodity, with price mechanisms alone determining allocation, some residents or communities might be excluded from the marketplace. The quality of water service also might suffer. Indeed, governments first stepped in to manage local water resources in California when customers became dissatisfied with the high rates and poor service provided by private water companies.

A marketplace also can fail to protect common assets. Too many users drilling wells into an underground aquifer or diverting water away from a running stream will collectively damage the environment. Ultimately, they may reduce the capacity of that source to store and transport future water supplies. The power and resources of the state may be necessary to coordinate the actions of private individuals and enforce limits on water use. The public sector can protect state assets in whose benefits all residents share, such as clean and scenic rivers and beaches, wetlands that provide...
habitat for migratory birds, a sound economy that provides jobs and security, and a diverse agricultural industry that allows state residents to enjoy fresh produce and local wine.

The government’s multiple interests in water management—the provision of safe drinking water, the control of negative externalities from private water use, and the protection of public assets—leads multiple levels of government to participate in water policy. Water policy in California is a case study in federalism. The involvement of many governmental bodies across jurisdictional levels has both advantages and disadvantages for resolving questions about water policy. In some cases the multiplicity of public actors makes it difficult and costly to arrive at a policy decision. Often, however, greater resources and expertise become available than if a policy question resided at just one level of government. Federalism provides a greater number of checks to make sure that no issue or interest is overlooked in reaching a policy solution. Finally, a federalist approach to water management can help to overcome stalemate when governments offer incentives and penalties that encourage other governments to act. The remainder of this chapter explores how federalism influences the development and resolution of water policy conflicts in California.

California’s Water Supply

California has a complex hydrological infrastructure of rivers, lakes, snowpack, and groundwater basins to store and transport its water supply, but, given the state’s climate, this natural system is not enough to support millions of residents and a booming economy. Most of the state’s precipitation falls in the winter months, primarily in the north and in the mountains. Drought cycles produce large annual fluctuations in rainfall, so even wet regions have an unpredictable water supply. The deficiency of precipitation at the time and place where users require water creates the need for a built system of reservoirs, dams, and aqueducts to supplement the state’s natural hydrology.

Natural groundwater basins are an important part of the state’s water conveyance and storage system. Almost half of the state’s precipitation and imported water contributes to the water supply by running off into rivers and streams or seeping through the ground to recharge a groundwater basin; the rest either evaporates or gets consumed by vegetation. The 431 groundwater basins throughout California help to distribute seasonal rainfall and store it for use throughout the year. Groundwater basins also can be artificially recharged to store additional water beyond what seeps in naturally. Pumping groundwater is a relatively low cost method for obtaining water, and approximately 30% of the state’s urban and agricultural water use in an average year comes from groundwater.

Snowpack is another natural contributor to the water storage system. Precipitation is heaviest throughout the state in winter; snowpack stores water in the mountains while rain is falling in the valleys and along the coast. The majority of winter snowfall in the Sierra Nevada does not run off until after March, with snowpack runoff peaking in May. This runoff contributes to the flow of rivers and streams long after the rainy season has ended throughout the state.

Groundwater and snowpack are critical elements in the state’s water supply system, but both resources may be in jeopardy. Groundwater basins are a common good shared by owners of land overlying the basin and consequently are

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1 For current detailed information about the state’s water supply and use, see the California Water Plan, updated every few years by the state Department of Water Resources.
subject to exploitation. Private actors have an incentive to maximize their individual water use, even though overuse produces a collective harm. Paving over open space and agricultural land affects groundwater supply by reducing the amount of water that flows into basins. As a result, Californians extract approximately 2 million acre-feet more groundwater every year than what naturally recharges. When users extract more water than seeps in over the long term, the basin may suffer saltwater intrusion or even land subsidence—the land literally sinks, diminishing the basin’s future storage capacity. Climate change poses a further threat by reducing snowpack and spring recharge of groundwater basins. Water storage in the Sierra Nevada’s early snowpack has declined by approximately 1.5 million acre-feet per year and is projected to fall another 3.8 to 6 million acre-feet by 2050 (California Department of Water Resources 2009).

Since groundwater is not plentiful enough to meet California’s water demand, and precipitation does not fall where and when the state needs it most, a developed infrastructure of reservoirs, dams, canals, and aqueducts stores surface water from rivers and streams across seasons and transports it throughout the state. The largest single project is the Central Valley Project (CVP), a set of dams and canals operated by the federal Bureau of Reclamation. California took the lead in planning the CVP, but the Great Depression interfered with construction. A project that would provide water to farmers and develop public power while creating jobs fit nicely into President Roosevelt’s New Deal program, and the president authorized an emergency allocation to begin construction in 1935 (Hundley 2001). The CVP taps northern California rivers to supply an average of seven million acre-feet of water annually, primarily to agricultural users. The state of California runs another large water project, the State Water Project (SWP), built by the Department of Water Resources after voters approved its construction in a 1960 statewide vote. The state project is less than half the size of the CVP, with original long-term contracts to deliver 4.2 million acre-feet a year to urban and agricultural users. The project has never been completed as planned, however, and existing facilities allow delivery of approximately three million acre-feet in a normal year.

Many local water agencies operate their own surface water projects, which together provide more than a quarter of the total state water supply dedicated to urban and agricultural uses. The largest of these local projects is the Los Angeles Aqueduct, which delivers water to the city of Los Angeles from Owens Valley and Mono Basin. Los Angeles first began importing water from Owens Valley in 1913 and extended its aqueduct to the Mono Basin in 1940. The aqueduct has an annual delivery capacity of 550,000 acre-feet, but Los Angeles has had to reduce its draw in response to judicial and regulatory decisions that call for environmental restoration in the two source regions. San Francisco’s Hetch Hetchy system delivers water from the Tuolomne River in Yosemite National Park to San Francisco and surrounding cities. Congress authorized flooding the Hetch Hetchy Valley in 1913, 23 years after the park’s establishment, over the bitter opposition of John Muir and other preservationists. Other large local projects include the East Bay Municipal Utility District’s Pardee Dam and Mokelumne Aqueduct.

The final major water source for California is the Colorado River, whose north and south basins provide 15

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2 An acre-foot of water covers the area of an acre to a depth of one foot and supplies enough water for one to two households per year.

3 For more on the colorful and sometimes tragic history of Los Angeles’ quest for water, see Kahr (1982), Reisner (1986), and Hundley (2001).
million acre-feet annually to the seven states along its course. A 1922 agreement among these states, later codified in federal law, gives California a legal right to 4.4 million acre-feet of Colorado River in an average year. A subsequent treaty with Mexico committed the United States to assuring that 1.5 million acre-feet would flow to its southern neighbor each year. For years, California routinely overdrew from the Colorado, however, tapping into Arizona’s and Nevada’s unused allocations to divert as much as 5.2 million acre-feet annually. The state has reduced its usage, but scientists project that climate change may reduce the Colorado’s average stream flow by 10%, potentially depleting storage on the river’s largest reservoirs.

Table 1 shows the sources and applications of the total amount of water dedicated to specific uses each year, averaged over the period 1998-2005. California’s average total annual water demand was 83.3 million acre-feet, about half of which was used for environmental purposes and the rest for urban and agricultural consumption. Together, the facilities described above currently have supplied enough water to meet statewide demand in a typical year. The diversion of so much water has inflicted enormous environmental damage, however, destroying ecosystems and fundamentally altering hydrologic flows. Moreover, the state lacks sufficient supply to carry it through dry years, and projected population growth will put enormous pressure on the state’s water systems. California’s Department of Finance estimates that the state is expected to grow by over one-third between 2010 and 2050, gaining almost 14 million new residents. This population increase will create greater demand for water in urban areas and will add to the challenge of maintaining adequate water quality and groundwater recharge. With little change in current population and water usage trends, water demand is expected to rise by 2 million acre-feet per year by 2050, ignoring any additional effects from climate change, which may add to water demand (California Department of Water Resources 2009). Because climate change also is projected to reduce water supply, the state faces real challenges in meeting the water needs of future Californians while protecting natural resources and wildlife.

Options for increasing water supply are limited. Many groundwater basins already have suffered damage from overuse. New surface storage proposals consistently face overwhelming political opposition, primarily from environmentalists. In one of the biggest water battles in California history, voters in 1982 repealed the legislature’s authorization of the Peripheral Canal, a proposed facility intended to help restore the Delta and increase water supply to the CVP and the SWP. Other options for expanding water supply include recycling and desalination. These currently account for 1% of the state’s supply, and both face important hurdles to widespread use. Approximately 200 water reclamation facilities currently recycle water, but public concern about the safety of recycled water restricts its application to nonpotable uses. Even for applications such as landscape irrigation, recycled water faces some opposition based on fears that it will contaminate groundwater. Desalination is very expensive and energy-intensive, the latter an especially important obstacle considering the state’s limited electricity supply.

Without substantial increases in system capacity, major conservation initiatives will be needed to reduce demand for water. The state has made considerable strides with respect to reducing demand. Water use in agriculture, which accounts for approximately 80% of water consumption not dedicated to environmental restoration, has declined since the early 1980s as a result of irrigation improvements and the retirement of farmland. Opportunities exist for reducing agricultural use through conservation, because heavy subsidies through the CVP and SWP have
led to substantial waste and inefficiency in irrigation practices. Even while reducing water use, the economic value of the state’s agricultural output has risen (California Department of Water Resources 2009). The remaining 20% of human consumption goes to urban uses, primarily residential applications but also commercial, industrial, and public sector water use. Per capita urban water usage has changed little in recent decades except for a temporary dip in consumption during a prolonged statewide drought in the late 1980s (Christian-Smith et al. 2012). This overall stability masks considerable variation across regions, however—after significant investment in water conservation, urban water usage in Los Angeles is now the lowest in the state. Urban water conservation has the potential to offer considerable payoff in reducing strain on the state’s water system (Gleick et al. 2003; Hanak et al. 2011).

In some ways, conservation is a more difficult political challenge than expanding supply. Technological improvements can achieve some amount of conservation; these require funding but generate little political opposition. Substantial progress in reducing demand requires changes in how we use water, however, and few politicians are willing to mandate those changes. Water might not be a high-profile issue in most elections, but it becomes salient when constituents learn that they cannot wash their cars on certain days or that they will pay higher rates to water a large lawn, or when farmers are told that they must allow land to lie fallow. With fragmented control of the state’s water system, politicians often avoid making those hard decisions by passing responsibility to another level of government.

[Table 1 about here]

Water Federalism

Discussions of federalism often concern how multiple levels of government should divide responsibility for some function. One might ask whether states should exert influence over local land-use decisions, for example, or if welfare programs are better administered by state or federal government. This type of discussion suggests that governments make clear choices about how to allocate responsibility for programs and services. In fact, a government’s authority in a given policy area may emerge from historical legacy or political convenience rather than careful consideration of appropriateness, and frequently the boundaries of authority for any individual government are less than clear. In a complex issue area such as water planning, policy questions often have too many natural, social, cultural, and economic dimensions to be resolved by any single jurisdiction. When we consider how federalism affects water governance, therefore, it is useful to think about how different levels of government cooperate to produce policy outcomes rather than focus on how they divide responsibility.

Current institutional arrangements for water governance are in part a function of existing commitments and investments. As long as a government has a role in operating one of the state’s water projects, it has an interest in a wide

4 In 1990, farmers paid between $2.50 and $19.31 per acre-foot for untreated water from the CVP and $62 per acre-foot for untreated SWP water. The Metropolitan Water District of Southern California paid $123 per acre-foot to the SWP in addition to transportation costs (Hundley 2001, 465). These price differences have grown smaller in recent decades as the CVP’s 40-year water delivery contracts have come up for renewal.
range of water policy decisions throughout the state. But justification for the involvement of multiple levels of government in California’s water planning reaches beyond their ownership of water projects. Even if all projects were managed by the state, local and federal agencies still would have important influence over water policy. The complexity of water issues draws in a wide array of public actors. Federal and state agencies charged with protecting the environment and local governments responsible for land-use decisions all must play a part in water planning, since the activities they regulate have important effects on water quality and supply. State and local governments have an interest in promoting economic development and maintaining a water infrastructure adequate to serve all residents. The value of California’s agricultural industry as a national resource contributes to federal involvement. Moreover, California’s choices about water policy have effects that extend beyond the state’s borders. Rivers and groundwater basins do not respect political boundaries, so it is impossible to address California’s water policy questions in isolation from surrounding states and Mexico.

In addition to these functional grounds for water federalism, there are political reasons for multilevel governance in water issues. Elected politicians have an incentive to distribute benefits to their constituents in order to claim credit and win reelection; for the same reasons, they often seek to shift burdens to other levels of government. Federal officials view major investment in a large water project as attractive if it benefits residents in several states, as in the Colorado River projects, or if there is a national interest at stake such as protecting California’s valuable crops. State officials can receive credit for winning federal approval for these projects and passing the cost burden up to the national level. On intrastate water disputes that position one group of stakeholders against another, the federal government has every reason to stay neutral. The state will only get involved if its participation is unavoidable, or if state officials think they can receive credit for resolving the dispute. Otherwise, they may pass responsibility on to local governments and the private actors involved in the issue. Local officials have a similar incentive to shirk on their policy responsibilities where little political payoff exists for taking action.

Thus for historical, functional, and political reasons, water governance in California is divided among multiple jurisdictions and many agencies at each jurisdictional level. Table 1 shows the federal and state agencies involved in water management. Of the federal agencies, those with the biggest roles include the Bureau of Reclamation, which operates the CVP; the Environmental Protection Agency, which regulates water quality; and the Fish and Wildlife Service, which is charged with protecting wildlife and habitat. In addition to managing water projects and enforcing regulations that restrict water usage, the federal government is responsible for interstate and international agreements that affect California’s allocation from the Colorado River.

[Table 2 about here]

At the state level, 28 different government agencies have a role in water planning and management. The primary state actors are the Department of Water Resources (DWR), which oversees the SWP and is responsible for overall water planning, and the State Water Resources Control Board, which regulates water rights and water quality. The nine regional Water Quality Control Boards enforce water quality standards. The state has its own set of environmental laws—the California Endangered Species Act, the California Environmental Quality Act, the California Wild and Scenic Rivers Act, as well as others—that in many cases are stronger than their federal counterparts, so state environmental regulation is an important constraint on water policy choices. The state also has a regulatory duty to control prices charged by private water companies. Finally, the state coordinates thousands of local agencies that take part in water delivery.

Local governments involved in water policy include cities and counties as well as independent special districts that provide water as part of a limited package of services. Native American tribes have water rights and play a role in some
water disputes. Local governments manage delivery of both drinking water and irrigation water, and they are responsible for most of the water treatment and wastewater management in the state. In addition, local land-use and development decisions have important consequences for overall water management. As water has become more scarce, water availability in many cases has become an obstacle to growth. Recent debate at the state level over the linkage between water and land use has drawn attention to the complex negotiations that occur in local communities over how to distribute water and who should bear the costs of system expansion.

In this complex institutional environment, lines of authority frequently are uncertain and decision-making processes rely on negotiation and collaboration. As in many other policy areas, federalism means more than the division of responsibility among multiple nested governments; it is a mode of political decision making that involves extended relationships among political actors (Elazar 1966). Governments themselves become stakeholders in debates over policy questions, and agency officials may join in coalition with advocacy groups to contend with other governmental actors (Sabatier and Jenkins-Smith 1999). The fragmentation of responsibility for water policy creates a variety of different decision-making venues at all jurisdictional levels. Interests and groups often enjoy an advantage in certain venues—urban water users exert substantial influence in the state legislature, for example, while environmentalists often have greater success pursuing their agenda in the courts—so the venue in which a policy question is considered may influence its outcome (Baumgartner and Jones 1993).

Water federalism can create coordination problems that increase the time and cost required for reaching decisions, but it also can help to overcome stalemate and stimulate action. Political obstruction that occurs in one venue can be overridden by action elsewhere. The possibility of preemption by other jurisdictions may prompt governments to act. Rules and incentives exist that encourage governments to cooperate rather than obstruct one another. State and local governments may be required to operate within the constraints of federal law, or they may comply in order to benefit from federal programs. On some particularly complicated water issues, multiple agencies and stakeholders across jurisdictional levels have come together to collaborate on a solution, bringing more resources and expertise to the issue than would otherwise have been the case.

These features of water governance help to overcome the constraints on policy making that arise from historical behavior and long-established patterns of water use. The state’s legal system of water rights locks in levels of consumption by providing an incentive for holders of a water right to use the maximum amount of water allowed. Holders of appropriative rights have to “use it or lose it”; if they do not put their water to beneficial use for five consecutive years, the amount of water they have a right to receive in future years may shrink. Appropriative rights give greatest priority to the earliest users of a water source, locking in water usage for subsequent generations. Land-use decisions at the local level also lock in patterns of water use: building houses with large lots creates demand for outdoor irrigation that will last for the life of the house. Decisions by farmers to specialize in a crop similarly comprise a commitment to a certain level of water consumption—high consumption if the crop is cotton or alfalfa, lower for fruits and vegetables.

California’s system of water rights recognizes both appropriative rights, which are based on actual use of water, and riparian rights, which grant a right to use water based on ownership of property that abuts a natural watercourse. As a general rule, riparian rights are not lost through nonuse.
Once patterns of usage have been established, constituencies arise to defend those uses and it is difficult to construct political agreements that shift water from one use to another.

Urban water conservation offers one example of the political constraints on policy change. For years, many Central Valley cities refused to require water meters and charge residential customers based on water usage. Valley residents were among the most profligate consumers of water, in many cases subsidized by favorable contracts with the CVP. Without meters, households had no incentive to conserve. The public strongly opposed any effort by local officials to introduce metering. In Fresno, a group of taxpayers convinced city officials to include a metering ban in the city charter and remove meters that had been installed voluntarily. In the face of this set of local conditions, in 2003 the state legislature passed a law mandating residential metering. Fresno city officials supported the state action because they could not convince voters to overturn the charter provision, even as the federal government threatened to cancel the city’s water contract. Since then, the state has enacted several other bills to promote conservation, most recently a 2009 law requiring urban water agencies to reduce per capita usage 20% by 2020.

The challenges for policy makers grappling with conflicts over water are substantial, and the stakes are high. California’s economy and the quality of life of its residents rely on a vast infrastructure to store and transport water so that a safe, clean supply is available where and when humans demand it. This infrastructure has reached its capacity, but the state’s population continues to grow. Californians must learn to control their consumption through conservation or find a way to expand the developed water supply. Substantial hurdles stand in the way of either solution. Political rivalries, long established behaviors, locked-in institutions, and the environmental damage that has resulted from previous decisions all constrain the options available to policy makers. On top of all this, the cost of any solution is high and there is no consensus on who should pay to secure future water supply. Is it the obligation of the heaviest users or future residents to pay for the conservation and system expansion that is necessary to meet their water demands? Or should all Californians share these costs, since existing residents benefit from an earlier generation’s willingness to subsidize water use? These questions arise in almost every water conflict, and local issues frequently reflect larger statewide battles.

The divided, federalist system of water governance complicates decision making in water policy, but it also can provide opportunities and incentives that make it easier to find solutions. The following section describes two complex contemporary water policy challenges and shows how the interplay among governments at different jurisdictional levels creates multiple opportunities for the resolution of conflicts among interested stakeholders.

**Water Transfers**

As demands for water begin to put pressure on the state’s developed water supply, many policy makers are looking to water markets as a tool for reallocating existing supplies to the places with the greatest need. Water markets supplement California’s rights-based system for water allocation with one that relies on price, giving farmers with historical water rights the opportunity to profit from them by selling water to urban and other users who are willing to pay higher prices.
Water trading first captured the attention of state policy makers during a drought in the mid-1970s, but it did not become an important element in water management until another multiyear drought prompted the state to establish an emergency water bank in 1991. In that time of extreme water scarcity, DWR served as a clearinghouse for water trades. State and federal legislation helped stimulate the market in various ways, including by clarifying that transferred water is a beneficial use and thus does not jeopardize the seller’s water right and by requiring owners of conveyance facilities to lease available space to move transferred water.

California’s water market expanded through the 1990s, but the volume of water transferred has leveled off since 2003. The current water market is less centralized than in its early years but still favors transactions in which the state or federal government plays an important role. Transfers among contractors within the same water project made up more than 60% of all water traded in the state between 1995 and 2011. Direct state and federal government purchases of water made up another 18% of the total volume traded. This water primarily goes to environmental uses and, in dry years, to offset lower deliveries from government projects. Only 16% of water transfers occurred between private and local government users not associated with the same project. Water trades currently account for approximately 5% of water use in the state.

Agricultural users are the leading source of supply in the water market, because they hold most of the water rights and entitlements in the state and obtain their water at a very low price. Urban users are the main recipients of traded water, accounting for 37% of the flows during the period 2002-09 (Hanak et al. 2011). The share going to environmental purposes has increased over time, now accounting for 25% of the volume traded. Another important end user group is farmers in the San Joaquin Valley, who have lost deliveries from the water projects due to drought and the dedication of water for instream use and wildlife refuges.

As the water market has matured, the nature of transactions has shifted from short-term trades to mostly long-term or permanent transfers. Urban agencies attempting to secure water supply for growing populations cannot rely on temporary contracts, but long-term commitments can be very difficult to negotiate. They involve many parties, including buyers, sellers, conveyers, and agencies that regulate water along the path of the transfer. They also raise concerns on the part of the seller about how the transfer will affect viability of the water source; whether the seller will have some unforeseen need for the water in the future, perhaps for environmental mitigation; and what negative “third-party” effects the transfer might have on economic health in the source region if farmers allow land to lie fallow. All of these issues can create obstacles for large-scale, long-term water transfers.

Events surrounding a 2003 agreement for a water transfer from the Imperial Irrigation District (IID) in the southern California desert to San Diego highlight the complexity of a major agricultural-urban water transaction. Initially negotiated between IID and the San Diego County Water Authority in 1998, the proposed transfer soon captured federal and state attention as an important element in California’s plan to reduce its Colorado River consumption to the 4.4 million acre-feet per year the state is allowed under federal law. Imperial Valley farmers’ Colorado water rights date back to the 1880s. IID holds rights in trust for individual farmers, so an elected board rather than individual farmers makes decisions about using those rights. One of four agencies that hold all the state’s rights to the Colorado, IID alone has

6 The following description of the current water market relies primarily on Hanak and Stryjewski (2012).
rights to 65% of the state’s allocation. Consequently, Imperial involvement would be critical if California was going to achieve a reduction in its use of Colorado River water.

In late 1996, the federal government began to put pressure on California to comply with legal limits on its use of Colorado water. The following year, the state released the California 4.4 Plan, which relied on agricultural-urban transfers among Colorado River users as a key strategy for reducing river usage. The U.S. Secretary of the Interior determined that if parties could come to an agreement on a major water transfer by the end of 2002, the state would get another 15 years to lower its Colorado consumption to the legal level. Without a deal, the federal government would immediately limit California to the 4.4 million acre-feet the state was allowed.

In the initial transfer proposal, San Diego would pay for conservation projects in the Imperial Valley in exchange for 300,000 acre-feet of water. Environmental review of the plan revealed that increasing conservation would damage the Salton Sea, a lake created in 1905 when a levee broke and Colorado River water rushed in to the desert basin. Now the lake is almost entirely fed by agricultural runoff, and with the loss of wetlands in California the lake has become critical habitat for wildlife and an important sanctuary for migratory waterfowl. The Salton Sea is growing increasingly polluted and saline, and its survival depends on the flow of runoff. Ironically, increasing conservation in the Imperial Valley would harm the environment by increasing the lake’s salinity and exposing more of the lakebed, potentially triggering dust storms.

Recognition of these environmental costs complicated negotiations, and the parties failed to reach agreement by the December 2002 deadline. In response, the federal government unilaterally cut the state’s allocation of Colorado River water by nearly 15%, enough water for 1.2 million households, and state officials proposed legislation to further reduce IID’s water supply. Talks continued into 2003, involving the Coachella Valley Water District and the Metropolitan Water District in addition to IID and San Diego. At the same time, IID went to court to challenge the federal government’s authority to cut the district’s water allocation. In August, federal officials stepped in again, this time with a promise to restore some of the water the federal government had taken away and extend California’s deadline for reducing Colorado withdrawals if the parties could reach agreement on a transfer. The parties finally signed a long-term transfer deal in September 2003.

The Quantification Settlement Agreement provides for the largest transfer of water from farmers to cities in U.S. history. It recommits over 600,000 acre-feet of water annually for up to 75 years, mostly to urban users, and provides for two major canal lining projects to reduce seepage losses. Some of the agreement’s transfers help to offset reduction in irrigation to the Salton Sea from conservation and land fallowing, and the agreement established state responsibility for permanent restoration of the Salton Sea. Federal officials applauded the agreement and restored California’s access to surplus Colorado River allocations while the state transitions to consuming within its legal limit.

Water markets offer much promise for promoting more efficient water use and better matching supply with demand. The ideal of a water market involves exchange between willing buyers and willing sellers with prices set by the marketplace. In fact, any water transfer is likely to be much more complicated and far-reaching than this ideal. The initial exchange between IID and San Diego offered benefits to both parties: urban residents would receive a secure water supply, and conservation investments in the Imperial Valley would boost the local economy and stimulate job growth. The potential for environmental damage extended the impact of this transfer beyond the two parties, however, introducing a state and federal interest in the trade and increasing the potential cost to IID. In this way, expanding the scope of the transfer beyond the immediate buyer and seller created an obstacle to its completion. But state and federal interest in reducing California’s Colorado River consumption helped to secure a deal when negotiations otherwise
would have fallen apart. Using its control over the source of Imperial water supply as leverage, the federal government pushed local actors towards a policy solution.

Despite the historic agreement, conflict continues. Imperial County authorities brought litigation soon after the agreement was executed, and as of 2013 many legal questions remain unsettled. Because the state has failed to approve a comprehensive Salton Sea restoration plan, environmental conditions could deteriorate after commitments in the agreement end in 2018. Although leadership from the state played a key role in allowing parties to reach agreement, the state must meet its own responsibilities in order for the agreement’s full benefits to be realized.

**Delta Restoration**

In the case described above, periodic threats and incentives from higher levels of government prompted local actors to reach an agreement. In the case of restoration of the Sacramento-San Joaquin River Delta, ongoing involvement by state and federal agencies has not been enough to reach a solution to a complex water policy problem.

Located where the Sacramento and San Joaquin rivers meet before flowing into San Francisco Bay, the Delta receives roughly half of the state’s total streamflow and supplies approximately 15% of the total water consumed by farms and cities. Historically a wetland before settlers diked it off and converted it to farms, today the Delta covers 700 square miles with interconnecting marshes, islands, and channels. It provides critical habitat for fish and wildlife and serves as a migration corridor for two-thirds of the state’s salmon. The Delta is the center of the state’s developed water supply. Huge pumping stations near Tracy capture water from the Delta and send it through the pipes and aqueducts of the CVP and SWP to farms and communities throughout the state. The Delta provides drinking water for 25 million Californians.

Over time, the Delta’s central role in quenching the state’s thirst has severely damaged the health of its ecosystem. Oxidation of the Delta’s organic-rich soils has caused land subsidence; many Delta islands currently sit 10-15 feet below sea level, and some have been immersed. Drought and excessive diversion of the Delta’s freshwater has caused saltwater intrusion and deterioration in water quality. Subsidence and rising sea levels caused by climate change worsen the inland migration of salinity, damaging habitat for wildlife and jeopardizing water supplies for drinking and agricultural use. Fish populations have declined due to poor water quality and growth in the populations of introduced species. Pumping from the southern end of the Delta disrupts natural salinity and flow patterns, reversing the direction of water flow in some Delta channels. On top of all this gradual change, the levees providing flood protection for the Delta’s homes and farms have deteriorated and become vulnerable. Scientists estimate there is a two-in-three chance that major flooding or an earthquake will cause widespread levee collapse and major flooding by 2050 (Mount and Twiss 2005).

Beginning in the 1980s, environmental groups turned to federal statutes to win protection for the Delta. They sued the U.S. Environmental Protection Agency for failing to enforce Clean Water Act standards, and they petitioned the U.S. Fish and Wildlife Service to protect declining fish populations. When federal officials moved to establish federal water quality standards for the Delta and list the delta smelt as endangered, shutdowns of the state’s massive water projects became a real possibility to restore Delta flows. Agricultural and urban users that relied on water supply from the CVP and SWP recognized they needed to help find an alternative solution.

Facing a court-ordered deadline for resolution of the water quality lawsuit, in December 1994 all the major stakeholders in Delta restoration—including federal and state agencies as well as urban, agricultural, and environmental
interests—announced agreement on the Bay-Delta Accord, a statement of principles for Delta management that included a commitment to a long-term planning process. The CALFED Bay-Delta program was established the following year as a cooperative effort among 23 state and federal agencies and dozens of local and non-governmental stakeholders to improve the environmental health of the Delta while ensuring the reliability of water supplies. In bringing together rival interest groups to work on Delta issues, CALFED was a landmark achievement. The planning process was complex and contentious, however, and the enthusiasm of many participating groups waned over time (Wright 2001). In 2000, CALFED produced a framework for a 30-year plan for Delta management. Reflecting the consensus-based approach that generated it, the framework did not embrace any single plan for addressing water supply but rather endorsed a range of strategies including conservation, trading, and groundwater and surface storage expansions.

Although the CALFED plan included several successful policy innovations, including an Environmental Water Account that acquired water from willing sellers for use in fish protection, the collaborative process began to collapse in the years following plan adoption (Hanak et al. 2011; Hanemann and Dyckman 2009; Little Hoover Commission 2005). The process had no mechanism for reaching decisions in the face of fundamental disagreements among participating stakeholders. The federal government failed to follow through with promised funding, so further conflicts arose among stakeholders over who should pay for CALFED projects once state bond funds dwindled. In the meantime, water exports from the Delta were rising and fish species experienced sharp declines. Stakeholders eventually returned to the courts to battle over habitat protection and the operation of CVP and SWP pumps.

In its early years, CALFED was viewed as a national model for policy collaboration across jurisdictional boundaries. The CALFED process assembled expertise and resources from dozens of agencies, and it facilitated conversation and cooperation among historically contentious private actors. As a consequence, issues surrounding environmental restoration of the Bay-Delta received more sustained and thorough attention than would have been the case under normal politics. It is important to note, however, that CALFED never would have existed without the threats and deadlines produced by interest groups pursuing their goals through normal politics. Ultimately, a system of voluntary cooperation was inadequate to reconcile these groups’ conflicting goals, and conditions in the Delta continued to deteriorate.

Frustrated by the failure of the CALFED process, state officials are now attempting to exercise stronger leadership on Delta restoration. In response to recommendations from a task force convened by Governor Arnold Schwarzenegger, in 2009 the legislature passed a broad package of water reforms and an $11.1 billion bond measure to fund new water projects. It created a new state agency, the Delta Stewardship Council, with the twin goals of providing more reliable water supply and protecting, restoring, and enhancing the Delta ecosystem. The state also launched another collaborative process, this time with the specific goal of creating a plan to achieve compliance with the Endangered Species Act. This planning process has produced a preferred alternative of building a new conveyance infrastructure to channel water under the Delta, allowing better management of flows within the Delta for the protection of native species. The proposal involves constructing two 35-mile tunnels that carry water—60% less than what was proposed under the Peripheral Canal—from the Sacramento River south to the pumps that fill the CVP and SWP aqueducts.

Debate over the Delta tunnel proposal appears to represent a return to political contestation among the various stakeholders in California’s water future. As of early 2013, the plan is undergoing environmental review, but Governor Jerry Brown has made clear his intention to push ahead on the project over the opposition of Delta communities, who worry about loss of irrigation water, and environmentalists, whose multiple concerns include inadequate protection of migrating salmon and other species as well as a possible increase in overall water exports. The same groups have opposed the water bond negotiated in the 2009 legislature; the legislature has twice delayed a vote on the bond in re-
sponse to the state’s economic downturn, and opponents are attempting to rewrite the bond before it finally goes in front of voters in 2014. Ultimately, any action to repair the fragile Delta reflects some value decision over the allocation of California’s most valuable resource, and thus far, neither collaboration nor contestation has produced a solution.

Conclusion

Water management in California is by necessity an intergovernmental endeavor. It is part historical legacy and part inherent to the resource itself that federal, state, and local governments all should have an interest in water policy decisions. Water flows across political borders, and its use in any one location has effects that spill over to neighboring communities. The complexity of water issues and scarcity of the resource give rise to conflict that may play out in a variety of political venues.

Participation by multiple governments can have a positive effect on the design and implementation of California water policy. Water federalism ensures consideration of both local and global interests; local governments can respond to their constituents’ demands while higher levels of government coordinate fragmented local decisions and protect the state’s collective assets. On individual water issues, a combination of cooperation and competition among governments can produce an effective policy solution. The federal government’s obligation to fulfill commitments to Mexico and other western states prompted it to issue threats and incentives that led to a deal on the Imperial-San Diego water transfer. The threat of legal action against federal and state agencies brought about the CALFED negotiations among various stakeholders. And with the help of state mandates, local water agencies are providing incentives for water conservation.

The question remains whether the current system of water federalism is adequate to address California’s future water challenges. Public officials must find a way to meet the water demands of a rapidly growing population while coping with continued deterioration in the existing water infrastructure and potential reductions in water supply due to the effects of climate change. Unfortunately, while the problem of water in California grows more difficult, the pool of possible solutions shrinks. In the short term, it is possible to make substantial gains in water conservation by adopting cost-effective technologies. Piecemeal decisions by individual governments can help postpone the need for new supply. As water-saving technologies become more widespread, however, reducing per-capita water use requires behavioral changes that affect Californians’ quality of life. Similarly, the first major long-term water transfers are likely to be the easiest, because they target the greatest discrepancies between supply and demand. Negotiating trades from regions that have no excess supply, or where conveyance facilities are not readily available, is much more challenging.

California’s water problem is, in part, an institutional problem. A more coherent process for water policy making is necessary if the state is to secure a reliable water supply for coming generations. The process requires mechanisms for reaching decision when participants disagree, because building consensus is an unrealistic goal when people’s values and livelihoods are at stake. In reality, the tangle of federal, state, and local authority allows elected officials to ignore water problems until some external threat or incentive forces them to act. Given this pattern, the solution to California’s
water problem may lie in making those threats and incentives more available. It may be that contention, rather than cooperation, is what forces governments and other stakeholders to find a way to manage California’s water resources.
References


Table 1. Sources and Uses of California’s Water Supply, 1998-2005

<table>
<thead>
<tr>
<th>Sources</th>
<th>Applied Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface water:</td>
<td></td>
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<tr>
<td>Local deliveries</td>
<td>44%</td>
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<tr>
<td>Local imported deliveries</td>
<td>1%</td>
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<tr>
<td>Colorado River deliveries</td>
<td>6%</td>
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<tr>
<td>Central Valley Project</td>
<td>9%</td>
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<tr>
<td>Other federal deliveries</td>
<td>1%</td>
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<tr>
<td>State Water Project</td>
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<tr>
<td>Groundwater withdrawal</td>
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<tr>
<td>Groundwater recharge</td>
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<tr>
<td>Reused surface water</td>
<td>17%</td>
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<tr>
<td>Recycled water</td>
<td>&lt;1%</td>
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<tr>
<td>Desalination</td>
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**Environmental** 50%  
**Agricultural** 40%  
**Urban** 11%

Average Annual Total = 83.3 million acre-feet

Source: California Department of Water Resources (2009). Totals do not sum to 100% because of rounding.
Table 2. Government Agencies Involved in Water Management

<table>
<thead>
<tr>
<th>Federal Agencies</th>
<th>State Agencies</th>
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<tbody>
<tr>
<td>Bureau of Reclamation</td>
<td>State Water Resources Control Board</td>
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<td>U.S. Environmental Protection Agency</td>
<td>Regional Water Quality Control Boards</td>
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<td>Fish and Wildlife Service</td>
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<td>U.S. Geological Survey</td>
<td>Department of Public Health</td>
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<tr>
<td>National Oceanic and Atmospheric Administration</td>
<td>Department of Fish and Wildlife</td>
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<tr>
<td>Bureau of Land Management</td>
<td>Department of Food and Agriculture</td>
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<tr>
<td>National Park Service</td>
<td>Environmental Protection Agency</td>
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<td>Department of Agriculture</td>
<td>Delta Protection Commission</td>
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<tr>
<td>U.S. Army Corps of Engineers</td>
<td>Delta Stewardship Council</td>
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<tr>
<td>Western Area Power Administration</td>
<td>Central Valley Flood Protection Board</td>
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<td>Federal Energy Regulatory Commission</td>
<td>Colorado River Board</td>
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<tr>
<td>U.S. Department of Agriculture</td>
<td>Department of Pesticide Regulation</td>
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<td>Department of Toxic Substances Control</td>
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<td>Integrated Waste Management Board</td>
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<td>Air Resources Board</td>
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<td>Business Transportation and Housing Agency</td>
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<td>Coastal Commission</td>
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<td>Department of Conservation</td>
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<td>Department of Boating and Waterways</td>
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<td>Department of Parks and Recreation</td>
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<td>Native American Heritage Commission</td>
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<td></td>
<td>Sierra Nevada Conservancy</td>
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<td>State Lands Commission</td>
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Source: California Department of Water Resources (2009)