November 2019

FRESNO STATE

California Water Institute

FUNDING A FUTURE FOR WATER IN THE SAN JOAQUIN VALLEY:

A Literature Review Of Public Funding For Water Infrastructure

Thomas Holyoke Ph.D.
Department of Political Science
California State University, Fresno

We would like to give special thanks to Fresno State students Jazmin Gallardo, Helio Ventura, and Harkiran Kaur for their excellent research assistance for this report.

Funding for this research provided by an anonymous donor.

For all of California's problems with surface and groundwater, the one not receiving the attention it arguably deserves is the problem of funding for new infrastructure, as well as the ongoing maintenance of existing infrastructure, much of which is now old and decaying. Nationwide, the American Water Works Association estimates that an investment of about $1 trillion in infrastructure is needed by 2035 to make sure that Americans have access to clean drinking water (Thompson 2015). Just achieving this in California alone would require spending approximately $30 to $160 million more a year on infrastructure, which, along with flood control and ecosystem preservation, are believed to be more poorly funded than water storage infrastructure (Hanak et al. 2014). Where will new money come from?

In California, most water infrastructure is funded by local government agencies, but restrictions placed in the state constitution by voters, most notably Propositions 13 and 218, place severe limits on their ability to fund the maintenance of existing structures, to say nothing of building anything new (Hanak et al. 2014). Yet if local water agencies are going to be able to cope with the future, which climate change makes even more unpredictable, some form of broad, equitable, and sustainable funding mechanism and governance structure needs to be developed. Indeed, California's Little Hoover Commission (2010) shows that without a fairly radical re-design at the local level, the state has no hope of solving its water problems. Here we review some of the options that have been tried and which may be tried in the hope of creating a foundation for innovative new approaches to funding water infrastructure.

The Historical View

As long as people have tried to live in California's arid regions, they have found moving and storing water to be essential for survival. Spanish missionaries and military colonizers built some of the first aqueducts in the state to capture and move water from fairly modest rivers, such as the Los Angeles River, to their missions to support their communities (Hundley 2001). After California became part of the United States, much of the land in the interior, such as the San Joaquin Valley, was initially used for ranching, but with the discovery of high quality soil, and a new railroad offering access to markets all over the nation, there occurred a shift to farming. While wealthy landowners like Henry Miller could survive and thrive in the semi-arid San Joaquin Valley without too much infrastructure by acquiring most of the land along its rivers and asserting riparian rights to that water (Igler 2001), most growers needed to build water storage and conveyance infrastructure to capture snowmelt coming out of the Sierra Nevada and bring it over dozens, even hundreds, of miles to their farms.

Private or cooperative canal companies were established in the late 19th and early 20th centuries to supply water to farmers on land distant from natural water sources, with the water distributed according to priorities established under the doctrine of appropriative rights (Ajami and Christian-Smith 2013). Yet the sheer cost of building and maintaining this infrastructure drove most of these companies into bankruptcy. They relied too heavily on bank loans for initial capitalization and ongoing operations, and with agricultural income being highly volatile, especially for small farmers, revenue streams were too small and variable to repay these loans or pay dividends to investors (Ajami and Christian-Smith 2015). The enactment of the Wright Act of 1887 by the California state legislature allowed growers and other citizens in defined geographic areas to vote to create public agencies, called irrigation districts, which, in turn, could issue general obligation bonds to build infrastructure and then assess water delivery and property tax fees to pay off the value and interest of those bonds. Because of such districts, smaller scale farming was able to survive the early 20th Century in the Central Valley.

By the 1920s, it was becoming clear that even with irrigation districts, region-wide agriculture was unsustainable. Irrigation districts had trouble selling bonds to raise capital, and too many growers still relied on underground aquifers with rapidly falling water tables (Leshy 1982; Hundley 2001). In response, the state designed a plan to construct

a large dam to capture much of the annual flow of the Sacramento River, build canals to ship the river's water out of the San Joaquin-Sacramento River Delta and send it to farmers throughout much of the Central Valley. Ultimately, it fell to the federal government's Bureau of Reclamation to build this system, now called the Central Valley Project (CVP), which expanded it to include another large dam on the San Joaquin River. Water captured behind Shasta and Friant dams was shipped to Valley growers through the Delta-Mendota, Friant-Kern, and Madera canals (Rowley 2006), making relatively sustainable agriculture possible. The state followed with its own massive infrastructure project centered around Oroville Dam on the Feather River and the California Aqueduct (Pitzer 2013). The CVP and State Water Project (SWP), and their joint expansion with the San Luis Unit in the 1960s, were funded to a large extent by general obligation bonds and congressional appropriations with requirements that beneficiaries gradually repay the costs. While the SWP is finally being fully paid off, a fair amount of the CVP has yet to be repaid by benefitting growers (Office of the Inspector General 2013). [1]

By the 1970s, state and federal funding for water infrastructure development began to dry up. Today, with the federal government backing-off of efforts to store more water by raising Shasta Dam on the Sacramento River, and the state's decision not to fund the building of a new dam for more storage on the San Joaquin River at Temperance Flat, coupled with a new emphasis on building and preserving groundwater supplies, the infrastructure focus has turned back to local water agencies and utilities. The recently enacted State Groundwater Management Act (SGMA) only accelerates this shift in priorities. Unfortunately, it is much harder for local agencies to coordinate the building of large infrastructure projects, nor do most have the financial resources to pay for them. In fact, the user fees that many local water agencies have tried to rely on for support are probably going to be inadequate to finance the maintenance and repair of the aging infrastructure they already have (Little Hoover Commission 2010).

Twentieth Century Funding Mechanisms

General obligation and revenue bonds

Funding for building and maintaining water infrastructure, big and small, will most likely have to be raised by public agencies now and into the future. Responsibility for designing and building what are sometimes called "design-bid-build" models of infrastructure tend to be contracted out to private sector companies, but, traditionally, the money to pay for it is raised from the public, usually by issuing bonds. Thus the private sector's only role in water funding is to purchase these "general obligation bonds" as investments and so provide public agencies with the capital they need to build dams and canals (Auton-Smith and Mehan 2019). For the most part, this has been a fairly easy system to implement. Government-backed bonds have always been popular with investors because the interest income is guaranteed and, very often, tax-exempt. This has benefitted the public sector as well, because bonds can be issued at lower interest rates, sometimes as low as 4%, and still attract investors (Dayton et al. 2016). Paying off the debt incurred by the bonds has generally sat well with government officials and (mostly) voters because of the "public good" nature of the water infrastructure built with bond revenue.

Unfortunately, general obligation bonds have proven so popular that they have arguably been over-used as a financing vehicle. Between 2000 and 2018, California voters approved eight general obligation bond issuances supporting water infrastructure, totaling about $24 billion

[1]While there has been some talk about allowing growers to quickly payoff the remaining debt as part of a larger package where control of CVP facilities may be transferred to growers, this would likely require an act of Congress.

(PPIC 2018). The rejection of a ninth bond, Proposition 3 in 2018, suggests that voters' comfort with growing state debt because of water may be waning. Organized environmental interests have also raised concerns that using bonds means the public is subsidizing wealthy farmers who can afford to pay more of their fair share. Moreover, the state has such a large debt obligation to pay now that other spending priorities and pension obligations cannot be easily met (Little Hoover Commission 2010).

Local water agencies have relied heavily on bond issues for infrastructure financing. However, since Proposition 13 severely limits local governments' ability to repay general obligation bonds with property tax revenue, many local agencies have tended to shy away from general obligation bonds in favor of "revenue bonds," which target the benefits of the spending towards particular groups of people. It is these beneficiaries who are required to repay the bonds, typically through the imposition of user fees on water customers. Overall, it is estimated that 85% of all revenue in California going towards water infrastructure comes from user fees to local agencies (PPIC 2018).

Unfortunately for local water agencies, growing voter resistance to public debt and user fees means the 2/3rds voter requirement to approve revenue bonds is becoming a significant barrier to raising money for water infrastructure (Hanak et al. 2014). Furthermore, Proposition 218 has made it increasingly difficult for local agencies to impose or increase user fees, which is pushing public officials into more unchartered territory of using parcel taxes (different from property taxes, see below), water surcharges, and even local sales tax increases to pay for infrastructure (PPIC 2018).

Revolving Funds

At times government agencies at all levels have tried to rely on what are called "revolving funds" to raise and support water programs. Such funds are initially capitalized by the government, usually through legislative appropriations or general obligation bonds, and then doled out as low-interest loans to support a few promising infrastructure programs. Beneficiaries of these funds use a portion of the revenue generated from the sale of services, products, or commodities produced with the new infrastructure to repay the revolving fund over a set period of time, with payments on the interest of the loan (when this was allowed) used to increase revenue in the fund. More money is then available to finance additional projects, which in turn will repay, and so on. Revolving funds have a long, but bleak history in regards to water infrastructure. The original federal reclamation program was supposed to be funded by a revolving fund, but this was quickly discarded in favor of congressional appropriations when it turned out to be impossible for most farmers to repay the Reclamation Service within the allotted time of ten years (Rowley 2006). Moreover, with farmers exempted from repaying interest on Reclamation loans, the revolving fund never had an opportunity to significantly increase in value.

Revolving funds also became a fairly popular way to try to fund water projects in the later part of the 20th Century, but have not led to any clear achievements (Hanak et al. 2014). In many cases, they have been poorly managed, with loans given out more for political considerations than practical ability to repay (Ajami and Christian-Smith 2013). The most recent example of a revolving fund failing to establish its purpose is the one created in 2014 to provide financing to renovate water treatment plants and water service hook-ups for small, poor communities in the San Joaquin Valley where shallow local wells had gone dry or yielded water too contaminated for human consumption. The state's revolving fund received so little initial capital that advocates for solutions to groundwater quality problems quickly started looking around for other solutions.

Infrastructure and Financing Ideas for the 21st Century

As Hanak et al. (2014, p. 15) make clear, without bonds or support from the state or federal governments, there are really only four practical sources of revenue for local agencies to use for water infrastructure: fees, taxes, fines, and local bonds (and bonds are really just loans that need to be paid back with interest). Bonds have already been discussed, and fines are a politically unpalatable and unstable source of revenue, so the focus here is on taxes and fees, as well as ways of involving the private sector in financing. Given that water fees are often some of the lowest utility bills that consumers pay in the United States, there is a strong argument to be made that water pricing can be used more aggressively to rebuild infrastructure and reduce the demand for water (PPIC 2018c). Proposition 218 limits may exist on the degree to which such user fees can be imposed, but there may also be enough flexibility in those restrictions to make it work.

General Considerations

First, though, it is important to realize that, given the challenges to funding and maintaining water infrastructure, whatever funding strategy is developed, managing and reducing demand for water must be part of that strategy, for that will make it possible for smaller infrastructure projects to succeed (Little Hoover Commission 2010). This includes embracing new technologies to recycle and purify existing water resources, stretch water use over greater areas (especially in agricultural irrigation), finding new water resources (such as desalination), but also includes finding ways to use pricing and policy to reduce consumer demand for water such as imposing higher user fees (sometimes referred to as "demand management") (PPIC 2018a, p. 3).

In addition to demand management, another principle ought to be embraced. The prices set for buying and selling water should at least reflect the true cost of its extraction, storage, and movement (Shanske 2009). In other words, the cost of building a water treatment plant should be passed on to water consumers, not to all residents in a geographic area who do not necessarily consume the water. It has been suggested that fees be placed on fertilizers and other farm chemicals to help pay for the cost of building treatments plants that can remove these same chemicals from groundwater (Arax 2019, p. 510). These are all equitable approaches, for those who use more (or make it harder for others to use water) should pay more, which is different from paying for water with general tax dollars where those who do not benefit from the infrastructure must still pay for it. Unfortunately, much of California's water infrastructure funding does not reflect this basic principle (Ajami and Christian-Smith 2013).

Also, another point should be kept in mind. When most people think of water infrastructure, they think of storage facilities, especially dams and reservoirs. Conveyance, when thought of at all, is considered simply as a means of getting water from reservoirs to consumers. Increasingly, though, conveyance systems such as canals are serving another purpose. Water transfers and markets are being used more frequently as individuals and businesses in need of water purchase it from those who have it and are willing to sell. Actually moving the water from one owner to another, however, requires using public conveyance systems, so this to should be considered when government officials and the public consider the importance of new infrastructure, as well as the idea that those who buy and sell water should also pay a surcharge towards maintaining this public infrastructure. (PPIC 2018b). Indeed, as water transfers become more prominent as the market value of

water increases, sellers may also be more willing to pay for storage as well, for selling water may first require finding a place to store lots of water (Dayton et al., 2015, p. 25).

Public-Private Partnerships Serving the Public Interest

Many consider public-private partnerships to be the most promising solution to many problems of financing water infrastructure in the American west, so much so that even the California Department of Water Resources advocated such approaches in its 2013 Water Plan Update (see Dayton et al. 2016, p. 16). While such projects, which involve some degree of private sector business participation in a water project, only account for roughly 15% of all public sector infrastructure projects, they are widely used in other developed nations such as Canada, Australia, Spain, Italy, and the United Kingdom (Little Hoover Commission 2010). Originating with toll-roads in the United States, several state and local governments have started experimenting with such partnerships for a variety of public services. Thirty-five states (including California) have laws authorizing such projects, and over twenty states currently have some kind of public-private partnership underway (PWC 2016). In California, though, very few water infrastructure projects can be truly labeled as public-private partnerships, though one interesting case is the desalination plant being built in Carlsbad (Douglass and Sykes 2013).

There are many models of how public-private partnerships, often just called "P3s", might work; too many to explore here. Having said that, one of the most important decisions public sector managers considering a P3 can make is the length and depth of the partnership. Is the private sector involvement merely in raising capital by working with private equity and venture capital firms? Or are partner corporations actually going to design, build, and maintain the infrastructure? Or both? Furthermore, is the partnership to last just the duration of the construction phase of the project, or over the entire lifetime of the infrastructure, or some other set number of years? In the end, who takes final control of the infrastructure, the public agency or the private investor? These are crucial questions to answer before embarking on P3 projects (Conneran 2009).

The general principles underlying effective P3s are cost, efficiency, and risk. "Cost" in that, under the right structure, infrastructure projects can be designed to cost less over the life of the project. While many P3s involve the private sector as funders, say through venture capital funds, it may be more useful to involve larger design and construction companies. There are simply some aspects of a project that the private sector may be able to do more cost-effectively than the public sector, though this is not universally true. As Conneran (2009) points out, if one company can handle multiple aspects of the project such as design, construction, and even maintenance, then its greater responsibility for the long-term health of the project may push it to more efficiently complete earlier tasks in order to reduce later, especially if the company is responsible for long-term maintenance. Cost savings may also be realized by having the same company design and build the infrastructure. While lower cost should never be the overriding concern for public agency leaders, the more long-term responsibility that is shifted to the private sector, the lower the upfront costs may be (Conneran 2009; Auton-Smith and Mehan 2019).[2]

[2]Relatively speaking. Hughes and Rosenfeld (2016) note that it took the cities of Woodland and Davis three years to get their P3s up and going for surface water treatment plants.

"Efficiency" can be understood on a number of dimensions. It can refer to technological innovation, with private sector companies seeing the partnership as an opportunity to try out new means of construction and processing. Efficiency may also occur simply because private and public sector knowledge and experience is being pooled together. It can refer to the quality of construction, as a company that is going to also be responsible for operations and maintenance of the project is motivated to build it as well as possible in the first place to prevent higher maintenance costs later in time. Finally, efficiency can also refer to the speed of project construction. Typically public agencies have to issue separate RFPs, and receive separate bids, for the design of a project and then for the actual construction of the project. In most P3 arrangements these can be combined, which may shave years off of the project (Lawrence 2018; Auton-Smith and Mehan 2019).

"Risk" also has multiple interpretations. Certainly the more a company invests its own resources in a project, the more likely it is to construct and maintain it well, for it raises their costs and lowers their profits to do the work poorly over the long run. Public agency officials, though, must remember that the private sector never provides financing and labor for free; some profit is expected. A big part of the reason that governments are responsible for infrastructure problems in the first place is that the private sector rarely sees any profit or other benefit for doing it itself, though it may make money from using the infrastructure (what economists call a "complimentarity") (Weimer and Vining 2017). Financial risks for the private sector are likely to be lower in larger, more urban-oriented projects where the scale of the project can lead to greater revenue, but this also means that it would be harder to use P3s for smaller, rural projects (Lawrence 2018).[3] Finally, there is risk in terms of control, both near term and long term. Many P3s permit the private sector partner to operate the facility for a set length of time and realize, during that period, most or all of the revenue. How long does this last, or does the corporation receive control of the entire project in the end?[4] Do state and federal laws even allow for certain kinds of P3 relationships? Are public officials even experienced enough to understand complex financing arrangements that private sector venture fund partners might propose? These are also questions the public sector official must answer (Ajami and Christian-Smith 2013; Conaboy et al. 2018).[5]

Legal Environment for Local Funding

One of the biggest challenges that local public officials face is finding a way to raise revenue to support water infrastructure that does not run afoul of several state constitution prohibitions, which became state law as ballot propositions. Municipalities and counties, for instance, are limited in their ability to raise property taxes at any given point in time by Proposition 13. Consequently, they tend to rely heavily on utility fees for water (and other utility) infrastructure development and maintenance and cities may also opt to raise revenue through the sales tax (Coleman 2016a, p. 4). Unfortunately, public officials in

[3] Other solutions may also exist beyond those explored here. For instance, Quesnel, Ajami, and Wyss (2016) explore ideas such as creating public-private investment funds to support infrastructure and environmental restoration projects (so-called "green banks"). Such funds may receive periodic injections of public money, which is then invested in the stock market, low-risk ventures, and even the purchase of other public bonds, much as public retirement systems such as CALPERS do.

[4] As Algarni, Arditi, and Polat (2007) point out, these types of relationships, where the private sector partner has long term control of the infrastructure, are most likely to abuse the public trust considerations where the ability of the infrastructure project to operate in the public trust loses out to the need of the private sector to make a profit. Perhaps for that reason, these "build-operate-transfer" models are relatively rare.

[5] Other P3 concerns can be found in Hall (2015).

other kinds of jurisdictions may not have quite as large of a toolbox of taxes and fees on which to draw, and therefore must carefully choose which funding approach to rely on.

Generally, local taxes in California are of two types, general and special, and this affects how they are imposed and what they can be used for. A general tax can be imposed on people within a geographic area, provided that a majority of them have voted for it, and the revenue raised can be used for most any purpose, including infrastructure. The down-side for public officials hoping to use this revenue for infrastructure is that its unrestricted nature may tempt politicians with appropriations powers to spend it on other priorities. Alternatively, special taxes may be raised and used for specific projects, such as financing water infrastructure, but the voter threshold for such targeted taxes is two-thirds, and are therefore very difficult to adopt (Coleman 2016a).

Perhaps for these reasons, public agency officials often turn to fees as a source of revenue, including utility fees and surcharges. They have a lot more freedom to impose fees, though fees connected to the value of property may be limited by laws such as Propositions 13 and 218. For instance, "developmental impact fees" imposed on new real estate construction can be used to pay for constructing and maintaining the extension of services such as water and sewer, though the fees may not be used for actual operating expenses, nor can they be greater than the cost of providing the service (Coleman 2016b). In other words, as a general matter, public agencies cannot impose these types of fees in order to raise money to repay the cost of new infrastructure. Also, if the fee is not very clearly linked to the need to provide service to the new development, it may be challenged in court as an illegal tax (Brown and Lyons 2003).

Parcel taxes

California is unique in that it has an alternative real property-based form of tax that local agencies can levy - the parcel tax. While Proposition 13 limits the assessment of taxes on the value of property, the parcel tax is a flat-tax merely assessed on the ownership of property. In other words, all property is assessed at the same rate (usually per square foot) regardless of how much property is owned or what (if anything) is done with the property to increase its value. Larger landowners would pay more only because they own more land. In this sense a parcel tax does not "punish" anyone for using their land (as a property tax would) or for earning money (income tax) or spending their money (sales tax). Public officials should keep this in mind when considering a parcel tax. The median tax per parcel assessed by those cities which use it is $60, and is $68 by special districts (other than school districts), and $96 by school districts. Many unincorporated rural communities have successfully used parcel taxes to fund school construction, maintain fire and police services, and even use the revenue for parks and libraries (Sonstelie 2015).

What might make parcel taxes intimidating is that they require the approval of two-thirds of all voters in the jurisdiction to be assessed, which can be a high bar. Nonetheless, between 2002 and 2012, about 700 parcel tax measures went on to local ballots and over half were passed (Sonstelie 2015). Anti-tax interest groups may still challenge the constitutionality of any parcel tax, claiming it is a back-door around Proposition 13, but at this point they are considered a legal way to generate revenue for local governments.

[6]Tiered-rates where higher-income beneficiaries pay more are likely not possible as the California courts have struck down many such attempts as illegal (Hanak et al. 2014, p. 29).

Enhanced Infrastructure Financing Districts

Arguably, the most promising approach for raising money for new water infrastructure is a variation on the approach that local public officials have been using for decades, the creation of special districts that can levy user fees and charges on utility bills (Coleman 2016a).[6] Enhanced Infrastructure Financing Districts (EIFD), at least in their current form, were created in 2014 by the legislature as replacement vehicles for redevelopment agencies, which had been phased out by Governor Brown (Day 2016). Essentially, these are "umbrella" entities in the sense that they are designed to encompass other local agencies and thus use of the revenue powers of those agencies rather than be granted significant new powers of their own. Perhaps that is why they are easier to create than most other kinds of special districts; voter approval is not required. A city or a county that will be part of the EIFD must initiate the process, but after that almost any other kind of local agency, including irrigation and water districts, can be added in. Only school and community college districts are forbidden to participate. Once all of the local entities have been assembled, they must all vote to create the EIFD, and the Public Finance Authority that will be the organization actually running it (Praw 2015). Because of this, EIFDs can be quite large, covering significant geographic territory (i.e. multiple counties) and encompassing both urban and rural areas, along with their water agencies, as long as it is supporting an infrastructure goal needed by everyone involved.

Again, infrastructure development financing districts do not have many revenue-generating powers themselves. One significant power they do have, though, is the issuing of revenue bonds, which they can do with only 55% of voter approval rather than the normal two-thirds (Praw 2015). Furthermore, they can use tax-increment financing to raise revenue for repaying these bonds, which means capturing incrementally increasing tax revenues from member agencies, which are derived from the development itself, for bond servicing. In other words, if the infrastructure development funded is economically successful, increases in sales and income tax, or even property tax, can be passed on to the EIFD so it can repay the value and interest of the bonds issued to build that infrastructure. Furthermore, the EIFD can issue revenue bonds with a forty-five year term, which means it, and the agencies and customers on which it relies for revenue, are less likely to be crushed under debt repayment obligations.

EIFDs may also benefit from other financing methods contributed by other member public agencies, such as sales and income tax revenue, and even developer fees (Day 2016). Whatever method it uses, the Public Financing Authority running the district must lay it all out as part of a formally approved financing plan at the time the district is created; all revenues taken in must be shown to contribute to the building and repayment of the infrastructure project (Praw 2015). The great advantage of EIFDs, though, is that multiple financing methods can be used, a whole portfolio approach, to reach a specified goal. Sacramento is using an EIFD to fund a bridge over the Sacramento River, and the Bay Area

may create one to fund extensions of BART (Day 2016).

Recommendations

1. Before planning new infrastructure, local water agencies need to set policies in place to reduce demand (by improving water use efficiency) as much as possible, both through more efficient delivery and use systems, as well as pricing mechanisms.

2. While a portfolio approach to water storage is

[7]PPIC estimates that the per-acre foot cost of new groundwater storage only ranges from $10 to $600, while surface storage ranges from $340 to $1,070 per-acre foot (Hanak et al. 2009).

sensible, underground storage is more cost-effective, easier to develop, and the California Department of Water Resources claims the state has ten times more underground capacity than above ground (Dayton et al. 2016, pp.20-21; PPIC 2018d).[7]

3. Consider establishing multi-county special districts, especially along the lines of enhanced infrastructure districts or enhanced finance authorities (per SB 628) over multiple existing political jurisdictions and geographic spaces that have common needs for more water, and which may allow P3s (Praw 2015).

    a. Identify geographic regions of the state with common water needs that can be met by a single, or tightly integrated, infrastructure system.

    b. Convene a group of elected official representing that geographic region to review, evaluate, and discuss alternative infrastructure financing options.

    c. Evaluate alternative governance structure models for a water infrastructure financing authority.

    d. Consider debt financing instruments that allow for a longer repayment term (45 years or more)

4. Use a portfolio approach in terms of fees and taxes to generate revenue, including parcel taxes, sales taxes, special taxes and even fees on groundwater extraction (not prohibited by Proposition 218 according to the California Court of Appeals, see Hanak et al. 2014, p. 32).

    a. The objective will be to develop a portfolio approach to water infrastructure financing that provides affordable water to all stakeholders, both individual household consumers and growers, by relying on a combination of local, state, federal, and private capital to fund critical water resilience projects.

    b. Develop a funding model that spreads the burden for the infrastructure in the most equitable manner in terms of need (by some measure such as annual income) and ability to use the infrastructure to increase productivity that contributed to repayment.

    c. Not only will revenue be used for constructing new conveyance, but to repair existing canals, build new treatment plants (and upgrade existing ones), locate and create new water banks, purchase private water rights if necessary for storage facilities, and even support environmental restoration;

    d. At this time, California law exempts agricultural products being subject to sales tax, and that may be an area to consider for further discussion. The SJ Valley generated $35.9 billion in farm receipts in 2017-2018, and a special sales tax applied to these products could generate revenue for water infrastructure.

This page intentionally left blank

References

Ajami, Newsha, and Juliet Christian-Smith. 2013. *Beyond Water Pricing: An Overview of Water Financing Options in California.* Pacific Institute.

Algarni, Ayed Muhammad, David Arditi, and Gul Polat. 2007. "Build-Operate-Transfer in Infrastructure Projects in the United States." *Journal of Construction Engineering and Management* 133(10): 728 – 735.

Arax, Mark. 2019. *The Dreamt Land: Chasing Water and Dust Across California.* New York: Knopf.

Auton-Smith, Stephen, and Tracy Mehan. 2019. *To P3 or Not to P3: A Water Industry View of the Relevance of Public-Private Partnership Delivery Models.* American Water Works Association and Ernst & Young.

Brown, Peter N., and Graham Lyons. 2003. *A Short Overview of Development Impact Fees.* League of California Cities.

Coleman, Michael. 2016a. *"A Primer on California City Revenues, Part One: Revenue Basics."* Western City, November 1.

Coleman, Michael. 2016b. *Understanding the Basics of Municipal Revenues in California: Cities, Counties, and Special Districts.* Institute for Local Government.

Conaboy, Jr., William P., Matthew T. Fine, Andrew J. Giorgione, Kenneth R. Luttinger, Thomas J. Madigan, and Jason P. Wrona. 2018. *3 Ways State & Local Governments Can Fund Infrastructure Projects.* Buchanan, Ingersoll & Rooney.

Conneran, Michael N. 2009. *The ABCs of PPPs: The Basics Regarding Public-Private Partnerships.* League of California Cities.

Day, Linda. 2016. "A New Financing Tool for California: Enhanced Infrastructure Finance Districts." *Planetizen* August 31. www.planetizen.com/node/88347/new-financing-tool-california-enhanced-infrastructurefinance-districts.

Dayton, Kevin, Jill Eicher, Marc Joffe, and Ed Ring. 2016. *Rebuilding California's Infrastructure for the 21st Century.* California Policy Center.

Douglass, Scott B., and Jeffrey A. Sykes. 2013. "Public-Private Partnerships in California." *California Public Law Journal* 36(3): 1 – 7.

Hanak, Ellen, et al. 2009. *California Water Myths.* Public Policy Institute of California.

Hanak, Ellen, et al. 2014. *Paying for Water in California.* Public Policy Institute of California.

Hall, David. 2015. *Why Public-Private Partnerships Don't Work: The Many Advantages of the Public Alternative.* Public Services International Research Unit, University of Greenwich.

Hughes, Jeff, and Carol Rosenfeld. 2016. *Davis Woodland Water Supply Design Build and Operate (DBO) Project.* Environmental Finance Center at the University of North Carolina.

Hundley, Norris, Jr. 2001. *The Great Thirst: Californians and Water, A History.* Revised Edition. Berkeley: University of California Press.

Igler, David. 2001. *Industrial Cowboys: Miller & Lux and the Transformation of the Far West, 1850 – 1920.* Berkeley: University of California Press.

Lawrence, Martin L. 2018. *Public-Private Partnerships (P3s): What Local Government Managers Need to Know.* International City / County Management Association.

Leshy, John D. 1982. "Special Project: Irrigation Districts." *Arizona State Law Journal* 14: 345-376.

Little Hoover Commission. 2010. *Building California: Infrastructure Choices and Strategy.* State of California.

Office of the Inspector General. 2013. *Central Valley Project, California: Repayment Status and Payoff.* Washington, DC: U.S. Department of the Interior, Report WR-EV-BOR-0003-2012.

Pitzer, Gary. 2013. *Layperson's Guide to the State Water Project.* Sacramento: Water Education Foundation.

PPIC 2018a. *Pricing for Water.* Water Policy Center, Public Policy Institute of California.

PPIC 2018b. *Water for Farms.* Water Policy Center, Public Policy Institute of California.

PPIC 2018c. *Water for Cities.* Water Policy Center, Public Policy Institute of California.

PPIC 2018d. *Storing Water.* Water Policy Center, Public Policy Institute of California.

PWC. 2016. *Public-Private Partnerships in the US: The State of the Market and the Road Ahead.* PwC Network.

Praw, Douglas. 2015. *Enhanced Infrastructure Financing Districts: A New Power Tool for Growth in California.* Holland & Knight.

Quesnel, Kim, Newsha K. Ajami, and Noemi C. Wyss. 2016. *Tapping into Alternative Ways to Fund Innovative and Multi-Purpose Water Projects: A Financing Framework from the Electricity Sector.* Water in the West.

Rowley, William D. 2006. *The Bureau of Reclamation: Origins and Growth to 1945.* Washington, DC: US Government Printing Office.

Shanske, Darien. 2009. "Clearing Away Roadblocks to Funding California's Infrastructure." *State Tax Notes* November 23, pp. 567 – 578.

Sonstelie, Jon. 2015. *Parcel Taxes as a Local Revenue Source in California.* Public Policy Institute of California.

Thompson, Barton. 2015. "Increasing Water Resiliency by Leveraging Public and Private Investment, Expertise, and Innovation." White House / NDRP Drought Symposium.

Weimer, David, and Aidan Vining. 2017. *Policy Analysis: Concepts and Practices.* London: Routledge.

FRESNO STATE

California Water Institute

2703 E Barstow Ave, MS JC133 • Fresno, Ca 93740
559.278.7001 • www.californiawater.org