



WATER EDUCATION  
FOUNDATION

# Recommendations for Leveraging Green Infrastructure to Manage California Water

A report by the 2023 California Water Leaders



Photo Credit: River Partners

## Disclaimer & Acknowledgements

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## Acronyms and Abbreviations

<b>AB</b>	Assembly Bill
<b>CDFW</b>	California Department of Fish and Wildlife
<b>CEQA</b>	California Environmental Quality Act
<b>CGT</b>	Cutting Green Tape
<b>CVP</b>	Central Valley Project
<b>DACs</b>	Disadvantaged Communities
<b>ENSO</b>	El Niño - Southern Oscillation
<b>EO</b>	Executive Order
<b>ESA</b>	Endangered Species Act
<b>NEPA</b>	National Environmental Policy Act
<b>O&amp;M</b>	Operations and Maintenance
<b>SB</b>	Senate Bill
<b>SCWP</b>	Safe Clean Water Program
<b>SWP</b>	State Water Project
<b>EPA</b>	United States Environmental Protection Agency
<b>Foundation</b>	Water Education Foundation
<b>WIFIA</b>	Water Infrastructure Finance and Innovation Act

# Executive Summary

Prior to European settlement of California, Native American tribes lived on and stewarded the lands. The Gold Rush of 1849 brought an influx of people and with that a growing demand for water. Over the next 100 years, California's landscape experienced one of the most monumental transformations found anywhere in the world. The ability to store and convey water from the Sierra Nevada mountains to the fertile Central Valley and the southern half of the state allowed California to grow from a population of a few hundred thousand to a state with more than 39 million people and the fourth-largest economy in the world. The state's water system is an engineering marvel, recognized worldwide for its massive reservoirs and conveyance systems spanning hundreds of miles and fueling one of the world's largest economies. However, this rapid development came at a cost to people and the environment.

California's water resources drive the state's \$3.5 trillion economy and meet a variety of critical needs including drinking water, food and fiber production and supporting the state's natural environment. Variable hydrology and large distances between population centers and available supplies have led California to develop one of the most engineered water supply systems in the world. While traditional gray infrastructure has proven efficient in the transport and storage of water, the roles played by wetlands, mountain meadows and floodplains in boosting water supply and quality have been reduced or even eliminated. As a result, there is growing recognition in California of the merits of turning to multi-benefit and nature-based solutions. However, green infrastructure, which includes *practices that use or replicate natural systems to achieve a desired outcome*, must be more extensively and effectively used to better manage California's water resources.<sup>1</sup>

Members of the 2023 Water Education Foundation's California Water Leaders cohort spoke with experts in the field, attended Foundation tours and considered multiple dimensions such as policy, regulations, funding, engagement and implementation to develop recommendations to address these needs. The 2023 cohort recommends that decision-makers enact the changes below regarding funding availability and sustainability, regulatory efficiency requirements and centralized data management to better leverage green infrastructure in the management of California's water resources.

**Funding:** Expand funding accessibility, flexibility and long-term sustainability to set up more green infrastructure solutions across California. This can be achieved by:

1. Increasing allocations from state grant and low-interest loan funding programs that are dedicated to multi-benefit green infrastructure projects.
2. Creating a State Green Infrastructure Endowment Fund to generate recurring investment income to offset project operations and maintenance costs in under-resourced regions.

**Regulatory Efficiencies:** Make it easier to launch green infrastructure projects on the regulatory front to help increase support and establish holistic, multi-beneficial green infrastructure initiatives. This can be achieved by:

1. Adapting or expanding existing laws, regulations and policies to further leverage regulatory efficiencies that promote green infrastructure projects and their broader deployment across sectors.

2. Encouraging early and equitable engagement to advise impactful initiatives and secure support from interested parties.
3. Increasing interagency collaboration across the state.

**Data and Information:** Enhance the availability and use of data to drive the successful integration of green infrastructure projects within California water resources management. This can be achieved by:

1. Establishing a Green Infrastructure Database Task Force responsible for development and implementation.
2. Implementing data-driven performance monitoring and reporting.
3. Incentivizing continued data reporting with performance-based incentives and streamlined data input.
4. Ensuring equitable access to the Green Infrastructure Database and promoting education and engagement.

As California continues to experience a whiplash climate that brings both dry periods and floods, prioritizing green infrastructure will restore natural processes that will boost water supply and quality while augmenting traditional infrastructure. Decision-makers should expand funding, streamline regulations and enhance data collection and its use to help move more green infrastructure projects forward.

## Introduction

In 2023, the Water Education Foundation (Foundation) selected 22 up-and-coming leaders from diverse backgrounds to be part of the *William R. Gianelli Water Leaders Class*. This program is designed to deepen the class members' water knowledge, enhance leadership skills, and provide experience in developing collaborative approaches to decision-making on water resources issues in California. This year's cohort developed policy recommendations and strategies on the topic of "*Leveraging Green Infrastructure to Manage California Water.*"

Over the course of the year, members of the cohort attended the Foundation's Water 101 educational workshop and gathered for workgroup meetings designed to build relationships between participants and a foundational understanding of green infrastructure. Water leaders were paired with mentors who are recognized leaders in government, agriculture, environment, private business, urban utilities and more. Class members interviewed their mentors about green infrastructure and spent a "shadow day" observing what their mentor does day-to-day. All class members attended at least two Foundation-led water tours across California guided by expert resource speakers, with the Bay-Delta Tour being mandatory. These tours provided an on-the-ground opportunity for class members to observe key water infrastructure, meet water managers and better understand the nuances of water resources management in California. At workgroup meetings throughout the year, class members built relationships through discussion and analysis of newfound water knowledge and the development of these policy recommendations.



## Background and Need for Green Infrastructure

Prior to European settlement of California, Native Americans lived on and stewarded the lands since time immemorial. These original stewards of California were dislocated from their lands through colonization, relocation and termination policies. European settlement ushered in an era of control over natural processes. These efforts escalated during the Gold Rush of 1849, which brought 300,000 people to California in just a few years, along with a nearly insatiable need for water. While mining was the major driver for early water development projects, towns, cities and farms soon began to flourish and needed both a reliable water supply and protection from devastating floods. Over the next 100 years, California's landscape experienced one of the most monumental transformations in the world.

California's water system is an engineering marvel, recognized worldwide for its massive reservoirs, conveyance systems spanning hundreds of miles and the highest single hydraulic lift in the world over the Tehachapi Mountains. The ability to store and convey water from the northern Sierra to the fertile Central Valley and the southern half of the state has allowed California to grow from a population of a few hundred thousand to more than 39 million people and the fourth-largest economy in the world. This highly engineered system, however, has come at a cost.

Channelizing and damming rivers, cutting off floodplains, suppressing natural burns and reclaiming wetlands has led to the extinction and endangerment of native species, and left California still vulnerable to catastrophic fires and high flood risk. Further exacerbating these issues is climate change, with warmer temperatures and more extreme hydrology. While California's climate has historically been characterized by extreme variability in temperature and precipitation – climate change is amplifying that pattern, leading to greater unpredictability and variability uncertainty in annual conditions. It has become clear that California must increase water supply security in the face of these challenges and that there are many benefits to working with, not against, nature, especially under a changing climate.

### Water Year 2023 Highlighted the Need of Green Infrastructure

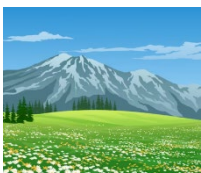
Beginning on December 25, 2022 and continuing for 25 days, California received roughly half of its annual precipitation<sup>2</sup> through a parade of nine atmospheric rivers.<sup>3</sup> Flooding resulted in 22 deaths and an estimated \$4.6 billion in losses across the state between December 2022 and March 2023.<sup>4</sup> Several vulnerable communities, including Pajaro<sup>5</sup> north of Monterey and the Tule River Indian Reservation northeast of Bakersfield, experienced severe flooding that disrupted lives for weeks. The onslaught of storms and cooler-than-average temperatures resulted in a Sierra Nevada-Southern Cascades snowpack that was 237 percent of average on April 1 – one of the largest on record. All of this came after the state's three driest years on record (2020-2022).<sup>6</sup> If California had leveraged green infrastructure more widely as it developed its water systems, the loss life and property could have been mitigated and possibly avoided. Climatic models indicate are projecting these extreme events will only intensify, emphasizing the need for green infrastructure to safeguard people, environment and economy.

Green infrastructure can be defined in many ways. Some liken it to terms such as “*nature-based solutions*” and “*natural infrastructure*,” or concepts such as “*engineering with nature*.” Others find it helpful to contrast green infrastructure with “*gray infrastructure*,” which include dams, canals, levees, seawalls and pipes that do not exist in the natural world. While green infrastructure has no exact definition, it achieves multi-benefits that, in some instances, eliminate the need for gray infrastructure. For this paper, the 2023 California Water Leaders cohort used the United Nations definition of nature-based development, as it was the most comprehensive and inclusive version.

United Nations definition of green infrastructure: “... *actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services and resilience and biodiversity benefits.*”

This report focuses on examples of green infrastructure throughout California and the outcomes green infrastructure seeks to achieve. In the context of urban stormwater management, green infrastructure can include rain gardens, green roofs, permeable pavement, bioswales, natural areas and urban forests. Green infrastructure can also include mountain meadows, floodplains and wetlands that allow water to spread out and percolate into aquifers. These lists are not exhaustive. Most agree that regardless of the form it takes, green infrastructure provides multiple benefits to people and the environment, such as increased resilience to drought, flood and sea level rise, as well as improved air and water quality, nutrient cycling, biodiversity protection, and carbon sequestration and storage.

## Key Benefits of Green Infrastructure Projects



Mountain meadows – and beaver dams – store rain and melted snow by slowing runoff, replenishing deep groundwater aquifers and releasing cool flows into the late summer. With reduced snowpack due to climate change, this natural storage is especially important for the state’s water supply.



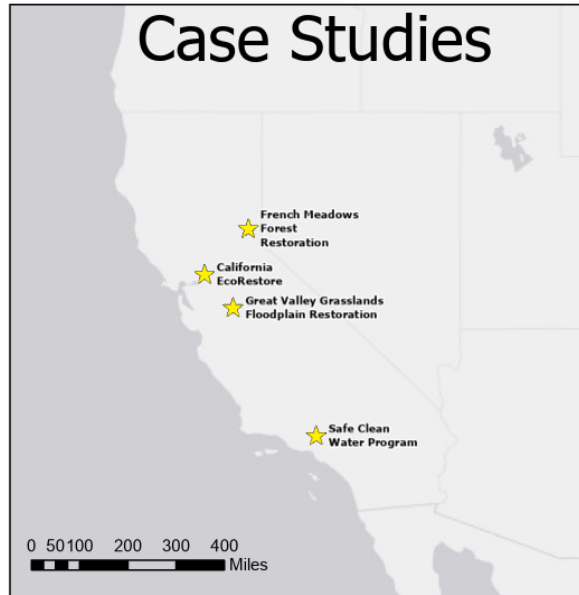
In addition to mitigating the risk of catastrophic wildfires, forest restoration can enhance water supply. Forest thinning makes more water available for the remaining trees, for in-stream flows, and for downstream water supply.



Floodplains are beneficial for wildlife by creating a variety of food-rich habitats for fish to become “floodplain fatties.” They slow and disperse high flows, which reduces flood severity, enhances water quality, and are key to recharging over-drafted groundwater basins.

## Case Studies

Throughout this report, several case studies are included to illustrate the diversity of green infrastructure approaches, as well as the 2023 California Water Leaders policy recommendations in action. The case studies represent different geographical locations across California, various landscape types and elements of a watershed, and span the gradient from urban to rural areas.



## Recommendation 1: Funding

*Improve the accessibility, flexibility and long-term sustainability of funding allocated to green infrastructure water projects.*

Funding is fundamental to the success of any project and can be a major obstacle to implementing green infrastructure solutions. Historically, public funding sources for water infrastructure projects have been compartmentalized (e.g., flood control, water supply, water quality) and geared towards gray infrastructure.<sup>7</sup> State and federal funding tends to focus on project planning and construction, leaving the cost of long-term operations and maintenance (O&M) and monitoring to local communities. At the local level, Proposition 218 limits agencies' abilities to assess beneficiaries to fund multipurpose projects. In addition, application requirements and cost-share provisions associated with conventional public funding programs can be a barrier to smaller local agencies and those serving predominantly disadvantaged communities (DACs) and native American communities.

The following policy recommendations are intended to meaningfully expand funding accessibility, flexibility and long-term sustainability for green infrastructure solutions across California:

1. Increase allocations from state-issued grant and low-interest loan funding programs that are dedicated to multi-benefit green infrastructure projects.

Accessibility  
Flexibility

State funding program eligibility criteria and application scoring metrics should be restructured to incentivize green infrastructure project applications. Funding programs are less likely to encourage green infrastructure projects if such projects and related elements are not required or otherwise preferred under the application requirements. Establishing new funding programs and altering the

requirements of existing programs would increase funding amounts allocated to green infrastructure and enable these projects to effectively compete for funding alongside traditional gray infrastructure solutions. For example, allowing cost-benefit analyses to account for the value of natural systems could boost the competitiveness of green infrastructure projects seeking state funding. Doing so would also align with proposed changes to federal funding guidelines.<sup>8</sup>

Legislative actions could also assist state agencies in refining eligibility criteria in favor of green infrastructure. For example, SB 122 (2023, Committee on Budget and Fiscal Review) added aquifers to the definition of “natural infrastructure” in a section of the State Public Resources Code related to climate change planning and investments.<sup>9</sup> Importantly, funding programs should include start-up grants and technical assistance to support applicants with limited organizational capacity or limited history of collaboration. Where possible, funding programs should include advance payments to eligible recipients. The state should also parallel or exceed the goals established under the Justice40 Initiative, which established a goal to direct 40 percent of the overall benefits of certain federal investments in areas such as climate change and clean water to DACs.<sup>10</sup> In addition, California Native American tribes should be included as eligible applicants in public funding programs.

## Case Study #1: Measure W Safe Clean Water Program, Los Angeles County (Developed Landscapes)

The Safe Clean Water Program (SCWP) is an example of a program that prioritizes green infrastructure to holistically improve local and regional water management.<sup>11</sup> The SCWP was created in 2018, when voters within Los Angeles County Flood Control District’s boundaries passed Measure W, authorizing a special parcel tax of 2.5 cents per square foot of impermeable area. The SCWP invests approximately \$280 million annually into projects and programs designed to clean and conserve stormwater in a way that prioritizes green infrastructure and promotes investment in DACs. Robust tax relief options were also built into the SCWP for qualifying parcel owners, including low-income seniors. A credit program is also available for property owners who can demonstrate stormwater improvements that result in water quality benefits, water supply benefits and community investment benefits. Fifty percent of revenues are allocated to projects at the watershed level and the remainder goes to municipalities. In its 2023-2024 budget, the district allocated funding to support 25 new projects, six scientific studies, five feasibility studies and 12 renewal contracts for watershed coordinators.<sup>12</sup>



**SAFE CLEAN WATER L.A.**

2. Develop a new State Green Infrastructure Endowment Fund to generate recurring investment income to offset green infrastructure project O&M costs in under-resourced regions.

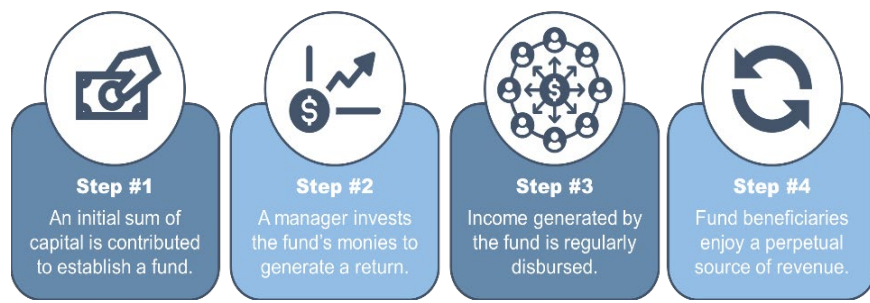
Endowments are a financial tool commonly used to generate a perpetual source of income. This income is distributed to beneficiaries to be prudently spent for specified purposes. The principal fund amount is typically invested into lower risk assets (e.g., bonds, treasuries) that generate conservative yet predictable returns (e.g., 2% to 4.5% per year) – a structure that keeps the principal amount intact while producing a reliable income stream (see **Figure 1**). Endowments are commonly associated with higher education but are also regularly used by habitat conservation and mitigation banks.<sup>13</sup> A new State Green Infrastructure Endowment Fund would emulate these precedents to provide long-term financial assistance to local agencies that might otherwise be unduly burdened by green infrastructure projects’ O&M costs.

Endowment funding awards should prioritize projects that benefit DACs and generate public environmental benefits that do not accrue to specific user groups. If seeded with an initial state contribution of \$500 million, a fund could feasibly generate between \$10 million and \$22.5 million annually for distribution to selected applications. Private parties and philanthropic organizations should be allowed to make tax-deductible donations toward the endowment pool to increase total available funding and facilitate participation by the private sector.

Accessibility  
Flexibility  
Sustainability

**Figure 1.**

**How Endowments Work**



## Recommendation 2: Regulatory Efficiencies

*Improving the regulatory environment for green infrastructure projects will help increase support and establish holistic, multi-beneficial green infrastructure initiatives.*

In the context of water management in California, improving efficiencies in permitting is indispensable for optimal implementation of green infrastructure projects. While California’s laws, regulations and policies play a vital role in protecting its air, water, land and wildlife, it is also evident that the associated environmental compliance can sometimes slow project implementation. Recognizing this, efforts to

enhance regulatory efficiencies and foster interagency collaboration have been galvanized with initiatives like the California Department of Fish and Wildlife's *Cutting Green Tape* (CGT) receiving broad support.

The CGT initiative proposes various recommendations, including amendments to certain environmental laws or regulations for qualifying projects. Examples include categorical exemptions under the California Environmental Quality Act (CEQA) and restoration projects exempted from California Endangered Species Act permitting. Additionally, CGT emphasizes the need to eliminate redundant and inefficient permitting processes and create a unified online permit application for state agencies. Several CGT recommendations have been implemented, including some that promote green infrastructure projects such as wetland, floodplain and meadow restoration. However, these recommendations are still generally limited to small scale habitat and fisheries restoration projects regulated under CEQA, the National Environmental Policy Act (NEPA), and the California and federal Endangered Species Acts, and do not include mitigation.

The CGT initiative offers several strategies that can be effectively adapted or expanded to boost green infrastructure projects.

The following recommendations are intended to provide different approaches within the existing regulatory framework to promote efficiencies for green infrastructure:

- 1. Adapt or expand existing laws, regulations and policies to further leverage regulatory efficiencies promoting green infrastructure projects and their broader deployment across sectors.**

Use statutory and categorical exemptions under CEQA to facilitate green infrastructure projects where appropriate.

- CEQA requires an in-depth analysis of environmental impacts for discretionary projects and approvals by local or state agencies. Statutory exemptions enacted by the Legislature exempt specific projects from CEQA review regardless of their potential environmental impacts. Categorical exemptions apply to a class of projects and are more limited. CEQA exemptions only exempt a project from CEQA and do not apply to other applicable local, state or federal laws. A categorical exemption for green infrastructure projects that meet certain criteria would be the most effective and efficient method to promote green infrastructure projects under CEQA.

Institute a CEQA-equivalent certified regulatory program for landscape-scale green infrastructure projects with a multi-benefit focus.

- Because CEQA exemptions do not apply to other laws governing projects, developing a regulatory program to combine CEQA review and other potentially applicable laws into a condensed process can make permitting landscape-scale green infrastructure projects more efficient than CEQA exemptions alone.

Use strategies in past Governor's Executive Orders (EOs) to promote green infrastructure laws and policies, and to embed equity into regulatory processes.



- EOs have also proven successful in facilitating certain time-sensitive and beneficial actions. The effectiveness of EOs lies in their ability to clearly articulate priorities, assign tasks to various agencies and, when necessary, sidestep regulatory barriers that would otherwise constrain or impede green infrastructure projects. For example, Executive Order N-4-23,<sup>14</sup> issued in response to heavy rainfall and a record-breaking Sierra snowpack in the winter of 2023, temporarily eased the requirements for water rights permitting in diverting stormwater for recharge. As a result, a total of 186,153 acre-feet of recharge was achieved as by March 2023.
- EOs have been an effective tool for imbedding diversity, equity and inclusion analysis into local and state government policies and practices. For example, EO N-16-22 mandated equity analysis and adoption of policies promoting diversity, equity and inclusion. EO B-10-11 and EO N-15-19 promoted Native American tribal engagement and inclusion. Strategies within these EOs can be adapted to integrate equity and inclusion into green infrastructure projects and decision-making.

Another example is Executive Order N-10-23,<sup>15</sup> signed in August 2023 to expedite critical levee repairs and debris removal to enhance flood protection for the next winter. The EO suspended certain laws, regulations and criteria in existing requirements while including several conditions to protect the environment and natural resources. A similar strategic approach could be effectively tailored to set clear priorities to incentivize green infrastructure.

## **2. Encourage early and equitable engagement to advise impactful initiatives and secure support from interested parties.**

Early and equitable engagement is another vital tool to advise impactful initiatives and secure support from interested parties. Providing clear guidelines on the objective of a statute or specific goals for an implementing agency to meet will promote accountability and provide a transparent framework for enacting a law.

These guidelines should be both strategic and cost-effective, with an emphasis on incentivizing multi-faceted benefits. The 2013 California Green Building Standards Code, for instance, adopted rules for incorporating environmental sustainability into new development and redevelopment projects. Local zoning ordinances could be amended to require low-impact development and onsite green infrastructure. Green infrastructure projects are more likely to succeed with adequate enforcement mechanisms in place to hold implementing agencies accountable.

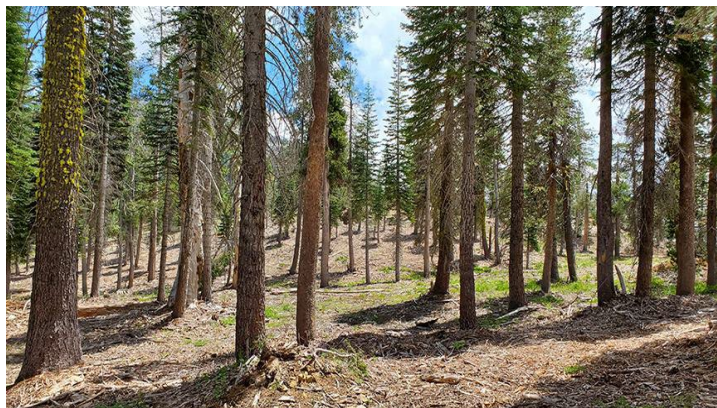
## **3. Increase interagency collaboration**

Interagency collaboration can speed up the permitting process for reviewers. The prevailing system often inhibits collaboration between agencies due to varied information presented and a sequential routing approach involving multiple people for different aspects of review and approval.<sup>16</sup> One way to minimize regulatory barriers in approving beneficial projects is to establish a consolidated online permit application portal for state agencies such as the California Department of Fish and Wildlife, the State Water Resources Control Board, the Department of Water Resources and the Department for Conservation. Adapting or instituting laws and policies that streamline permitting processes and

encourage interagency collaboration will help garner early project endorsement and establish holistic, multi-beneficial initiatives.

## Case Study #2: French Meadows Restoration Project, Placer County (The Upper Watershed)

The French Meadows Restoration Project in Placer County, about 15 miles west of Lake Tahoe, is an example of what can be achieved through innovative funding, partnership and legislation. The \$17 million project – collaboratively planned and funded by private, local, state and federal entities – focuses on forest thinning and meadow restoration across 28,000 acres. The project was developed



shortly after the passage of Assembly Bill 2480, which recognized and defined source watersheds as integral components of California’s water infrastructure. More than 60% of the developed water supplies in California come from the upper watersheds in the Sierra Nevada, where high elevation meadows and forests act as natural reservoirs, storing snowpack that later becomes runoff in streams and rivers.

Photo Credit: Roger Bales

## Recommendation 3: Data and Information

*Establish a Statewide Green Infrastructure Database to promote transparency, accountability and effectiveness.*

Data is a powerful tool in supporting green infrastructure solutions for water resources in California. By incorporating these data-driven policy recommendations, California can harness the power of information to drive the successful integration of green infrastructure projects into water resources management. The use of data will not only enhance decision-making but also increase transparency, accountability and effectiveness in achieving sustainable water management goals across the state.

Presently, there is a lack of standardized data available for green infrastructure projects. A comprehensive, publicly accessible database that contains all ongoing and implemented projects in California can be used to track their costs and benefits, and compile data on water availability, demand, disaster risk, climate projections and hydrological models. Such a database would aid decision-making, planning and development of new green infrastructure projects. The database should be used to maintain a list of funding sources and links to additional resources and toolkits. Additionally, this database should be regularly updated to ensure decision-makers have access to the most current and relevant information, and feature case studies profiling various types of green infrastructure.

## Case Study #3: California EcoRestore, multiple Delta counties (Bay-Delta)

California EcoRestore is a multi-agency initiative that pursues complex multi-benefit habitat restoration projects to support the Sacramento-San Joaquin Delta and its native fish and wildlife. A matrix of performance measures<sup>17</sup> is applied under the Delta Plan.<sup>18</sup> Performance measures identified in the Delta Plan provide a foundation for measures that may be considered in the Green Infrastructure Database.<sup>19</sup>



Photo Credit: CA Department of Water Resources 2019

The following policy recommendations are intended to promote transparency, accountability and effectiveness for green infrastructure solutions across California:

- 1. Establish a Green Infrastructure Database Task Force responsible for development and implementation.**

The Green Infrastructure Database Task Force would be composed of experts in environmental science, data management, water resources management and policy analysis. They would collaborate on designing the Green Infrastructure Database to ensure it is accessible, user-friendly and capable of storing various types of data related to green infrastructure.

- 2. Implement data-driven performance monitoring and reporting:**

All green infrastructure projects should incorporate monitoring systems that collect relevant data and regularly report to a central authority. Monitoring programs must use the best available science, maximize its ability to answer relevant management questions, and identify gaps and priorities. In addition to standard economic metrics, public health and safety impacts should be included, with the impacts on DACs highlighted.

- 3. Incentivize continued data reporting with performance-based incentives and streamlined data ingestion:**

The future of the Green Infrastructure Database relies on the continuous reporting of parties involved in green infrastructure. Reporting should therefore be as streamlined as possible, with CEQA applications and regulatory inspections feeding directly into the Green Infrastructure Database. Additionally, financial incentives should be considered for local governments, businesses and communities that

contribute to the database, and regular updates should be a legal requirement for any project funded by public bonds.

**4. Ensure equitable access to Green Infrastructure Database and promote education and engagement:**

Ensure the Green Infrastructure Database is available in multiple languages and is digitally accessible. Organize public workshops, webinars and engagement events to inform communities about green infrastructure projects, its benefits, and the accessibility of the Green Infrastructure Database with a focus on DAC and Native American interest groups.

## Case Study #4: Great Valley Grasslands Floodplain Restoration Project, Merced County (Valleys and Floodplains)

The Great Valley Grasslands Floodplain Restoration Project would reconnect the San Joaquin River to its historical floodplain north of Los Banos by removing an outdated levee system. This \$2.1 million project is funded by the California Department of Fish and Wildlife (CDFW) Proposition 1 Watershed Restoration Grant.<sup>20</sup> Project proponents worked closely with the Northern Valley Yokuts and the Amah Mutsun Band to steward their traditional lands through prescribed burns to reduce hazardous amounts of invasive vegetation, supporting the larger floodplain restoration effort.<sup>21</sup> Projects like these have substantial benefits to habitat restoration, especially providing food and safe havens for birds, juvenile fish and other wildlife. They also help to spread and slow flood water, significantly benefiting downstream communities.



Photo Credit: River Partners

## Conclusion

California's water resources drive the state's economy and meet a variety of critical needs. Due to variable hydrology and large distances between population centers, California has one of the most engineered water supply systems in the world. While traditional gray infrastructure has proven efficient in the transport and storage of water, it often comes at the expense of natural systems that aid in boosting water quality, supply and habitat. More extensive and effective implementation of green infrastructure can help better manage California's water resources while augmenting gray infrastructure.

The 2023 Water Education Foundation Water Leaders Class developed three key recommendations for leveraging green infrastructure to manage California water, which focus on improving funding for green

infrastructure, creating regulatory efficiencies and establishing a statewide database. These recommendations should be implemented equitably, and we encourage engagement and education for all interested parties throughout California to better manage water resources across the state.

Now is the time to make meaningful changes that will benefit the environment and future generations of Californians.

# References

- <sup>1</sup> Brown, Hannah Jane. 2016. US Green Building Council. "Green Infrastructure." August 2016. <https://www.usgbc.org/sites/default/files/green-infrastructure-brief.pdf>
- <sup>2</sup> California Department of Water Resources (DWR). 2023. Water Year 2023: Weather Whiplash, From Drought To Deluge. October 2023. [https://water.ca.gov/-/media/DWR%20Website/Web%20Pages/Water%20Basics/Drought/Files/Publications%20And%20Reports/Water%20Year%202023%20wrap%20up%20brochure\\_01?utm\\_medium=email&utm#:~:text=The%20theme%20of%20Water%20Year,part%20of%20the%20water%20year](https://water.ca.gov/-/media/DWR%20Website/Web%20Pages/Water%20Basics/Drought/Files/Publications%20And%20Reports/Water%20Year%202023%20wrap%20up%20brochure_01?utm_medium=email&utm#:~:text=The%20theme%20of%20Water%20Year,part%20of%20the%20water%20year)
- <sup>3</sup> NOAA National Environmental Satellite, Data, and Information Service (NESDIS). 2023. "Atmospheric Rivers Hit West Coast." January 25, 2023. <https://www.nesdis.noaa.gov/news/atmospheric-rivers-hit-west-coast>
- <sup>4</sup> National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI). 2023. U.S. Billion-Dollar Weather and Climate Disasters. DOI: 10.25921/stkw-7w73
- <sup>5</sup> California DWR. 2023. "DWR Supports Flood Fight Efforts at Pajaro River Levee Break." March 17, 2023. <https://water.ca.gov/News/Blog/2023/Mar-23/DWR-Supports-Flood-Fight-Efforts-at-Pajaro-River-Levee-Break#:~:text=A%20drone%20provides%20a%20view,Pajaro%20in%20Monterey%20County%2C%20California>
- <sup>6</sup> Quintanilla, Esther. 2023. KVPR. "Tule River Indian Reservation recovering after storms disrupt infrastructure." April 5, 2023. <https://www.kvpr.org/local-news/2023-04-05/tule-river-indian-reservation-recovering-after-storms-disrupt-infrastructure>
- <sup>7</sup> Public Policy Institute of California (PPIC). 2018. "Paying for water." PPIC Water Policy Center. November 2018. <https://www.ppic.org/wp-content/uploads/californias-water-paying-for-water-november-2018.pdf>
- <sup>8</sup> Revesz, R.L. and Prabhakar, A. "Accounting for Ecosystem Services in Benefit-Cost Analysis." White House Briefing Room, August 1, 2023. <https://www.whitehouse.gov/omb/briefing-room/2023/08/01/accounting-for-ecosystem-services-in-benefit-cost-analysis>
- <sup>9</sup> Pub. Res. Code §71154(c).
- <sup>10</sup> Executive Order 14008 (Biden, 2021). Executive Order on Tackling the Climate Crisis at Home and Abroad. January 27, 2021. <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/27/executive-order-on-tackling-the-climate-crisis-at-home-and-abroad>
- <sup>11</sup> County of Los Angeles. 2023. "LA County's Safe, Clean Water Program." 2023. <https://safecleanwaterla.org>
- <sup>12</sup> <https://safecleanwaterla.org/awards-and-accomplishments/>
- <sup>13</sup> US Fish and Wildlife Service. 2019. Conservation Banking: Incentives for Stewardship. September 2019. <https://www.fws.gov/sites/default/files/documents/conservation-banking.pdf>; California Department of Fish and Wildlife. 2023. "Endowments and Mitigation Land Management." Last updated June 5, 2023. <https://wildlife.ca.gov/Conservation/Planning/Endowments-Mit-Land-Mgmt>
- <sup>14</sup> State of California Office of Governor Gavin Newsom. 2023. "Governor Newsom Issues Executive Order to Use Floodwater to Recharge and Store Groundwater." March 10, 2023. <https://www.gov.ca.gov/2023/03/10/governor-newsom-issues-executive-order-to-use-floodwater-to-recharge-and-store-groundwater/>
- <sup>15</sup> Executive Department State of California. 2023. Executive Order N-10-23.
- <sup>16</sup> California Landscape Stewardship Network. 2020. Cutting Green Tape: Regulatory Efficiencies for a Resilient Environment. November 2020. [https://calandscapestewardshipnetwork.org/sites/default/files/2020-11/GCT\\_FINAL\\_hires.pdf](https://calandscapestewardshipnetwork.org/sites/default/files/2020-11/GCT_FINAL_hires.pdf)
- <sup>17</sup> Delta Stewardship Council. 2023. Delta Plan Performance Measures Guidebook. September 2023. <https://deltacouncil.ca.gov/pdf/delta-plan/2023-08-31-delta-council-performance-measures-guidebook.pdf>
- <sup>18</sup> Delta Stewardship Council. 2023. Delta Plan. <https://deltacouncil.ca.gov/delta-plan/>
- <sup>19</sup> California DWR. 2022. California EcoRestore. Last updated August 2, 2022. <https://water.ca.gov/Programs/All-Programs/EcoRestore>
- <sup>20</sup> California Department of Fish and Wildlife. 2023. Proposition 1 Restoration Grant Programs. <https://wildlife.ca.gov/Conservation/Watersheds/Prop-1>
- <sup>21</sup> American Rivers. 2022. Great Valley Grasslands Floodplain Restoration Project. <https://www.americanrivers.org/great-valley-grasslands-floodplain-restoration-project/>





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