

Supporting Land Conservation in California:

A Toolkit of Financial Incentives for Landowners and Communities

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Disclaimer:

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ACRONYMS AND ABBREVIATIONS

AB	Assembly Bill
AFT	American Farmland Trust
CAL FIRE	California Department of Forestry and Fire Protection
CARB	California Air Resources Board
CCI	California Climate Investments
CDFA	California Department of Food and Agriculture
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CNRA	California Natural Resources Agency
DOC	California Department of Conservation
EDF	Environmental Defense Fund
EO	Executive Order
ESG	Environmental, Sustainability, and Corporate Governance
FEMA	Federal Emergency Management Agency
GGRF	Greenhouse Gas Reduction Fund
GHG	Greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
MCA	Mitigation Credit Agreement
MPO	Metropolitan Planning Organization
MTCO_{2e}	Metric tons of carbon dioxide equivalent
NCCP	Natural Communities Conservation Plan
NBS	Nature-Based Solutions
NGO	Non-governmental Organization
NW	Natural and Working Lands
OPR	Governor's Office of Planning and Research
OSA	Open Space Authority
PPIC	Public Policy Institute of California
RCD	Resource Conservation District
RCIS	Regional Conservation Investment Strategies
RTP	Regional Transportation Plan
SALC	Sustainable Agricultural Lands Conservation
SB	Senate Bill
SCS	Sustainable Communities Strategy
SGC	California Strategic Growth Council
SGMA	Sustainable Groundwater Management Act
TDR	Transfer of Development Rights
TNC	The Nature Conservancy
USDA	United States Department of Agriculture
WUI	Wildland Urban Interface

EXECUTIVE SUMMARY

Land conservation is an essential strategy to combat and adapt to climate change and supports biodiversity, the food system, soil health, and many other values. Recent State policy has elevated the importance of natural and working lands and nature-based solutions for their role in mitigating the impacts of climate change. This report presents a collection of land conservation tools organized in four State priority areas: Biodiversity Protection, Agricultural Preservation and Working Lands Management, Infill Development and Avoided Conversion, and Climate Risk Reduction. The purpose of this toolkit is to explain the type and timeframe of financial benefit a landowner can accrue by implementing one or more of these strategies, how operational each tool is, and any barriers to implementation (both from a policy perspective, and the perspective of the participant). As shown in the summary table (below), the analysis indicates wide variation among what the tools do, what their financial incentive is, and how “ready” they are to use. This report concludes by presenting recommendations for State policy actions to better support land conservation, including: development of green finance mechanisms; working through local and regional processes and entities; combining multiple financial incentives; leveraging Federal policies and programs; creating incentive fact sheets to facilitate access and use; and continuing research and development of innovative mechanisms.

ABRIDGED LAND CONSERVATION TOOLKIT SUMMARY TABLE

Biodiversity Protection

Tool	Financial Incentive Type	Readiness
Conservation Easement	Income Tax Deduction; 16 years & Direct Proceeds; One-Time	Operational
Environmental Mitigation	Direct Proceeds; One-Time	Operational, Emergent
Habitat Exchange	Direct Proceeds; One-Time	Emergent

Agricultural Preservation and Working Lands Management

Tool	Financial Incentive Type	Readiness
Grants: Agricultural Conservation	Grant Payment; One-Time	Operational
Grants: Working Lands Management	Grant Payment; One-Time & Increased Profits; Ongoing	Operational
Tax Incentives: Williamson Act	Tax Assessment Reduction; Duration of Contract	Operational
Regenerative Agriculture	Increased Profits; Ongoing	Emergent
Voluntary Offsets (Soil Carbon)	Direct Proceeds; Ongoing	Speculative
Corporate & Investor Sustainability	Increased Profits; Ongoing & Direct Proceeds; Ongoing	Speculative

Infill Development and Avoided Conversion

Tool	Financial Incentive Type	Readiness
Transfer of Development Rights	Direct Proceeds; One-Time	Operational
Compliance Offsets (US Forest Protocol)	Direct Proceeds; Ongoing	Operational
Solar Energy Projects	Direct Proceeds; One-Time or Ongoing	Emergent

Climate Risk Reduction

Tool	Financial Incentive Type	Readiness
Parametric Insurance (Natural Inf.)	Avoided Damages; Ongoing	Speculative
Green Infrastructure	Avoided Damages; Ongoing	Speculative
Voluntary Buyouts of At-Risk Property	Direct Proceeds; One-Time	Speculative

Land conservation is an essential strategy to mitigate and adapt to the impacts of climate change and support biodiversity, the food system, soil health, and many other values. This report presents a toolkit of strategies that incentivize private land conservation in California by providing a financial benefit to landowners. It identifies tools that fulfill four different conservation objectives: Biodiversity Conservation, Agricultural Preservation and Working Lands Management, Infill Development and Avoided Conversion, and Climate Risk Reduction. This toolkit is specifically focused on strategies that provide a financial incentive to landowners through public policy, market forces, or a blend of the two. In addition to a basic description, each tool is analyzed for the co-benefits produced, the barriers to implementation (and recommendations to address them), and type of financial incentive it achieves. The goal of this research is to assist government bodies of all levels, non-governmental organizations, and landowners in weighing which tools best match their conservation objective and operational capacity.

THE CASE FOR LAND CONSERVATION

California is facing two connected crises: potentially catastrophic biodiversity loss, and climate change that is causing disasters as well as intensifying impacts to many aspects of human and natural systems. The following section provides some key scientific and policy context that builds the case for land conservation.

Across the landscape, we see activities that contribute to climate change, either through the creation of greenhouse gases (GHGs) - largely due to human activity - or through their sequestration by healthy natural systems. These processes are part of the carbon cycle, where carbon is released (by natural occurrence

or human activity, like fossil fuel burning) and then sequestered by the soil, vegetation, oceans, etc. Unfortunately the Earth's systems are under major stress due to anthropogenic global climate change which is likely to warm the planet 1.5°C above pre-industrial levels between 2030-2052 (Intergovernmental Panel on Climate Change [IPCC], 2018). Human existence depends on land and the food, fiber, timber, and energy derived from it; yet, these activities directly contribute to the loss of natural ecosystems, biodiversity, and soil. Their GHG emissions¹ also indirectly contribute to climate change-related processes (i.e. heat waves, drought, flooding, sea-level rise, and permafrost thaw) that further exacerbate land degradation and desertification (IPCC, 2019). With all this it is uncertain whether land will continue to be a carbon sink in the future, as negative effects like the loss of soil carbon could be partly mitigated by increased vegetation growth with the warming climate (IPCC, 2019).

Similarly to the observations at the global scale, the quality of California's natural and working lands (NWL), which cover more than 90% of the state, is deteriorating (California Air Resources Board [CARB] et al., 2019). NWL refers to forests, grasslands, rangelands, farmland, wetlands and coastal areas, and urban green spaces (consistent with the Nature-Based Solutions Executive Order²). According to the California Fourth Climate Change Assessment, the state already experiences a plethora of negative impacts from climate change that will continue in the future, including but not limited to:

- » Warming temperatures
- » Sea-level rise
- » Declining snowpack

¹ The IPCC estimates that 23% of human-related GHGs were produced by Agriculture, Forestry, and Other Land Uses between 2007-2016 (IPCC, 2019, p.6).

² See full description of EO N-82-20 on page 10

- » Increased frequency of drought, and
- » Increased acres burned by wildfire (Bedsworth et al., 2018).

Land conservation is needed to protect the intrinsic value of nature as well as specific processes that sustain Californians' livelihoods. Among many other benefits, preserving and managing California's NWL protects the state's biodiversity, the unique specialty agriculture industry, and the land's ability to sequester carbon. These systems are interconnected such that improvements in one will produce many co-benefits, which all together contribute to the larger goal of climate change mitigation.

JUSTIFICATION FOR THE PROJECT

The objective of this project is to highlight tools that can be used to encourage private land conservation. The focus is on private land because most non-federal forest, agricultural, and rangelands in the state are privately owned (CARB et al., 2019); therefore, a focus on these lands is critical to meeting State conservation goals. The importance of private land conservation calls for an examination of policy strategies and market-based tools for landowners and jurisdictions that (1) generate income or other financial benefit from activities on the land (helping owners remain in place), or (2) generate a financial benefit for landowners who exit the land but take action to ensure it continues to serve a conservation purpose and/or retains its low-intensity land use. This report relies on the assumption that even with the plethora of State and Federal land conservation goals, conservation activities need to make economic sense before landowners adopt them. Furthermore, this project underscores the fact that strategies implemented by individuals and NGOs can be as impactful for statewide land conservation efforts as legislative action.

On a more conceptual level, this project is important because it brings together tools that apply to different land conservation priorities. While there are studies and reports from government agencies, advocacy groups,

and non-profit organizations that discuss types of conservation tools aligned with their particular mission, this toolkit is one of the first to present them all together as a menu of options. As mentioned previously, biodiversity, water and agriculture, and carbon sequestration are just a few of the key functions of California's land that are threatened by the impacts of climate change. Though they are stressed by the current conditions, they also present opportunities for mitigation and adaptation.

RESEARCH AGENDA AND FINDINGS

The research questions guiding the selection and analysis of the tools included in this project are "What financial strategies are available to local jurisdictions, non-governmental organizations, and landowners to incentivize private land conservation to address climate change, biodiversity loss, and other State priorities?" and "What is the type and timeframe of the financial incentive accrued to landowners from the implementation of each tool, and how operational are they under current technological, political, economic, and other related circumstances?" These questions are addressed through qualitative research using both primary and secondary sources. A majority of the primary source interviews were conducted with staff and officials at state, regional and local agencies related to conservation and key environmental nonprofits that operate in California, nationally, and/or globally. These provided insight on the financial incentives for land conservation that exist (or are in development) in California or other parts of the world. Document analysis of secondary sources provided more factual information about how the tools work, as well as details about case studies that were not carried out by the interviewees.

Analysis of the tools, and even the process of selecting which ones would be included in this toolkit, lead to the finding that there are many barriers preventing the implementation of land conservation tools that create a financial incentive for landowners. There are few tools implemented at a large scale besides the grants and other State-run programs that are currently the mainstays

of California conservation efforts. Innovative tools that use more market-based mechanisms are faced with legislative constraints, deficiencies in scientific understanding and technology, and too much risk and uncertainty.

The rest of this report consists of an explanation of the regulatory context, the data and research methods, and a brief Literature Review about the different conceptualizations of the purpose and monetary value of land conservation. The “toolkit” portion of the report contains 15 tools categorized by planning priority: Biodiversity Protection, Agricultural Preservation and Working Lands Management, Infill Development and Avoided Conversion, and Climate Risk Reduction. Each tool contains an examination of the trade-offs of the financial incentive, including the type/timeframe of financial benefit, the tool’s relative readiness, the challenges and opportunities, and the implementation as illustrated by one real-world example. Lastly, there are recommendations for overall changes in State policy and general paradigms needed to make financial incentives for land conservation more feasible to implement at scale.



California is a leader in land conservation, climate change, and smarter development policies. The following chapter summarizes State-level policies from the last two decades which are foundational to current and future action.

STATE PLANNING PRIORITIES

Since 2002, California's planning priorities have been adopted to law and must be considered at all levels of government. These priorities can be summarized as: promoting infill development; protecting the state's NWL and environmental and agricultural resources; and limiting sprawl (Office of Planning and Research, 2017). The priorities officially recognize the connection between land conservation and urban development patterns and are as follows in Government Code §65041.1:

(a) To promote infill development and equity by rehabilitating, maintaining, and improving existing infrastructure that supports infill development and appropriate reuse and redevelopment of previously developed, underutilized land that is presently served by transit, streets, water, sewer, and other essential services, particularly in underserved areas, and to preserving cultural and historic resources.

(b) To protect environmental and agricultural resources by protecting, preserving, and enhancing the state's most valuable natural resources, including working landscapes such as farm, range, and forest lands, natural lands such as wetlands, watersheds, wildlife habitats, and other wildlands, recreation lands such as parks, trails, greenbelts, and other open space, and landscapes with locally unique features and areas identified by the state as deserving special protection.

(c) To encourage efficient development patterns by ensuring that any infrastructure associated with development, other than infill development, supports

new development that does all of the following: (1) Uses land efficiently; (2) Is built adjacent to existing developed areas to the extent consistent with the priorities specified pursuant to subdivision (b); (3) Is located in an area appropriately planned for growth; (4) Is served by adequate transportation and other essential utilities and services; and (5) Minimizes ongoing costs to taxpayers (Cal. Gov. Code §65041.1).

SB 32 (2016)

The California Global Warming Solutions Act of 2006: emissions limit (2015-2016) (SB 32) set the statewide target to reduce statewide GHG emissions to at least 40% below 1990 levels by 2030. This bill built on AB 32, The Global Warming Solutions Act of 2006, which set the target that GHG emissions be reduced to 1990 levels by 2020. SB 32 upholds the authority of ARB established by AB 32; in direct relation to this project, AB 32 allowed ARB to make regulations with market-based compliance mechanisms "after considering [their] potential for direct, indirect, and cumulative emission impacts" (California Senate Rules Committee, 2016, p. 2).

Importantly, AB 32 also requires CARB to make and update the Climate Change Scoping Plan. The 2017 update included NWL as a key component to meeting the State's GHG reduction requirements for the first time, leading to the creation of a NWL inventory and the Draft 2030 California Natural and Working Lands Climate Change Implementation Plan.

SB 375 (2008)

The Sustainable Communities and Climate Protection Act of 2008 (SB 375) requires coordination of regional transportation plans (RTPs), the Regional Housing Needs

Assessment (RHNA), and local general plan housing elements (Institute for Local Governments [ILG], 2011). To implement this, metropolitan planning organizations are required to have a sustainable communities strategy (SCS) in their RTPs. The SCS must map out the amount and placement of residential density in the region, while still providing sufficient transit connectivity and reducing GHG emissions (ILG, 2011). In practice SCS plans can encourage infill, which prevents the conversion of natural and working lands into urban sprawl.

SUSTAINABLE GROUNDWATER MANAGEMENT ACT (2014)

The Sustainable Groundwater Management Act (SGMA) is a piece of legislation to avoid significant impacts to groundwater levels, groundwater storage, seawater intrusion, water quality, land subsidence, and surface waters (Kearns et al., 2018). It identifies overdrafted groundwater basins and requires local agencies to balance their water pumping with natural recharge by 2040 or 2042, depending on the severity of overdraft (California Department of Water Resources, 2020).

EXECUTIVE ORDER B-55-18 TO ACHIEVE CARBON NEUTRALITY (2018)

Governor Brown issued the Executive Order (EO) that established a goal for the state to achieve carbon neutrality by 2045 in addition to the existing GHG reduction targets (CA Exec. Order No. B-55-18, 2018). It directed state agencies to investigate carbon sequestration as a way to meet that goal; those recommendations are contained in the CA 2030 Natural and Working Lands Climate Change Adaptation Plan, which is currently in draft form. Besides carbon sequestration, the EO requires that all implementation actions support climate adaptation and biodiversity.

EXECUTIVE ORDER N-10-19 AND THE WATER RESILIENCE PORTFOLIO (2019 AND 2020)

Governor Newsom issued the EO calling for actions to “equip California to cope with more extreme droughts and floods, rising temperatures, declining fish populations, over-reliance on groundwater, and other challenges” (Office of Governor Gavin Newsom, 2021). A team of State agencies listened to the input of many stakeholders and created a portfolio of 142 state actions for a climate-resilient water system. In addition to more traditionally water-related infrastructure, the Water Resilience Portfolio connects to the State’s NWL priorities.

NATURE-BASED SOLUTIONS EXECUTIVE ORDER N-82-20 (2020)

Governor Newsom issued the Nature-Based Solutions EO in October 2020. One component is conserving 30% of the state’s land and coastal water by 2030, known as a “30X30” goal (Exec. Order No. N-82-20, 2020). While details and implementation plans are under development, the intent is to protect the state’s biodiversity and maximize the climate benefits from natural and working lands. Conceptually, the EO is an official statement that actions on NWL are key to meet state environmental planning priorities moving forward.

New State level actions established by the Nature-Based Solutions EO include the Climate Smart Land Strategy being developed by the California Natural Resources Agency (CNRA) (California Natural Resources Agency, 2021). Another State action is the creation of the California Biodiversity Collaborative, an effort led by CNRA with other State agencies to “bring together experts, leaders and communities across California to advance a unified, comprehensive approach to protecting [the] state’s biodiversity” (California Biodiversity Collaborative, 2021).

RESEARCH QUESTION

The objective of this research is to survey and critically analyze tools that provide a financial incentive for the conservation of private land in California. The report explores the research questions:

- » **What financial strategies are available to local jurisdictions, non-governmental organizations, and landowners to incentivize private land conservation to address climate change, biodiversity loss, and other State priorities?**
- » **What is the type and timeframe of the financial incentive accrued to landowners from the implementation of each tool, and how operational are they under current technological, political, economic, and other related circumstances?**

This report is an exploratory study of land conservation strategies categorized by planning priority: Biodiversity Conservation, Agricultural Preservation and Working Lands Management, Infill Development and Avoided Conversion, and Climate Risk Reduction. The analysis of the individual tools is framed by the following sub-questions:

- » What conservation objectives does the tool fulfill?
- » What are the co-benefits of the tool?
- » What are the challenges in implementing the tool, and what market-based or policy changes would facilitate easier and more widespread adoption?

RESEARCH METHODS

The two qualitative research methods used in the project are semi-structured interviews and document analysis. Interviews provide personal insights from professionals in the field on what practices are emerging, what practices have been successful, and what challenges these professionals have experienced (or speculate about) when implementing them. This research approach is the best way to understand the practical application or potential of the tool in California, since the people who work on the ground engage with land conservation policies and stakeholders every day. Document analysis is conducted to provide factual evidence to verify and supplement the points brought up in the interviews.

The semi-structured interview method allowed the researcher to ask both standardized and unique questions of the participants, which was necessary because each was selected because of their work on a specific project or aspect of land conservation. The sample included 14 interviews with a total of 18 participants representing 13 state agencies, nonprofits/advocacy groups, land trusts, consulting firms, and local open space and planning agencies.¹ The interviews occurred from October through December 2020, though follow-up contact occurred as needed throughout the research and writing phases of the project. They were conducted over phone or video call and lasted between 45 minutes to an hour long.

Interviewees were selected because they are directly involved with policymaking in the state or are leaders in the field, indicated by their involvement in high-profile conservation efforts. Because professionals in California's conservation sphere are well connected, interviewees were also contacted through "snowballing," where they were referred by other participants.

¹ For a full list of interviewees, see Appendix 2 on page 69

All the interviewees have expertise in California land conservation, though many also know about national and global conditions because their organizations operate at a larger scale (like The Nature Conservancy and American Farmland Trust). The sample is biased towards policymakers and practitioners, as no landowners or community-based organizations were interviewed. However, many of the organizations do work directly with landowners, such as the Carbon Cycle Institute and the Sequoia Riverlands Trust.

The interviews were analyzed using an inductive approach, where the most salient points were highlighted and organized based on common themes that emerged. Key themes that came from the interviews were:

- » Conservation objective: Biodiversity Conservation, Agricultural Preservation and Working Lands Management, Infill and Avoided Conversion, and Climate Risk Reduction;
- » Challenges in the implementation of existing programs or the creation of innovative programs, including scientific limitations, risks, and costs; and
- » Opportunities for change.

This research informed the framing of the overall project and the key points analyzed for each tool. The interviews also provided descriptive content such as how the tools work, what policies they relate to, and where the tool has been successfully implemented. The interviewees' direct recommendations and the conclusions drawn from the analysis then lead to the collection of secondary sources to "ground truth" those findings.

The project's second research method is analysis of documents including books, academic journals, agency reports, research publications from nonprofit organizations, and news articles. A large portion of the literature was directly referred from interviewees, as they were materials they worked on directly or that their organization produced. Another major source was the websites of federal, state, and local agencies. These supplied guidelines, fact sheets, and status reports on the programs they administer. Other sources including articles and peer-reviewed journals were sourced

through Google, GoogleScholar, and the UCLA Library. This enormous library of documents provided factual context and technical details to the interview data.

UNDERSTANDING PRIVATE LAND CONSERVATION

A majority of the literature about private land conservation include analyses of either fee-title or easement acquisition. For instance, Merenlender et al. (2004) conducted a meta-analysis of the literature on private land conservation incentives provided through land trusts (which they identified as fee-title acquisition and conservation easements). The authors concluded that there is not enough information to understand “what to expect from the most popular type of incentive-based conservation practice - what it can protect, what it cannot, and what the long term consequences may be” (Merenlender et al., 2004, p. 73). Another meta-analysis of 284 peer-reviewed articles about private land conservation globally found that “easement” was the most frequently occurring topic and policy instrument analyzed in the literature (Capano et al. 2019). This is not to discount the importance of easements, as a report by Adam Livingston for The Nature Conservancy found that easements are successful strategies to achieve NWL conservation in line with Sustainable Communities Strategies throughout the state (2016). However, this report takes a broader view of what land conservation is than previous literature.

This analysis focuses on financial incentives and other market-based approaches that can directly benefit landowners in addition to achieving public goods like biodiversity, recreation space, and environmental quality. These approaches expand the scope of land conservation to include management, which are activities for land’s use and development. Land management means the land and its natural values are being used, but in a way that maintains or enhances the ecological system. This conceptualization also emphasizes that both natural and working lands are inextricably connected to human activity (urban development, farming, etc.) whereas pre-

vious iterations focused on acquiring land to preserve it in a relatively natural state. When lands are productively occupied as farms, rangelands, or habitat, they serve the purpose of avoiding conversion to urban development and are able to keep producing ecosystem services. The land does not develop into more intense urban or suburban uses (avoiding their associated climate change impacts), so it is considered within the scope of land conservation for this report. However, it is important to acknowledge that the conversion of natural lands to agricultural uses results in significant GHG emissions and loss of carbon stocks/sequestration potential. This illustrates that this project’s definition of land conservation, which attempts to balance preservation and productivity - in both the ecosystem services and financial sense, is inherently about trade-offs.

Of the literature reviewed, the most comprehensive analysis of existing strategies for private land conservation is “Conservation on Private Land: A Review of Global Strategies with a Proposed Classification System” by Kamal et al. (2015). The article reviews global voluntary and compulsory strategies for private land conservation analyzed for their level of enforceable protection, duration of the protection, impacts on owners’ property rights, and the purpose of the associated land management actions (Kamal et al., 2015, p. 584). This source provides an excellent framework for understanding the main characteristics of land conservation tools, but its analysis is focused specifically on the tools’ relationship to biodiversity conservation. It lacks information on the financial impacts of the tools, which is what this project seeks to expand upon.

HISTORICAL CONCEPTS OF THE VALUE OF LAND AND NATURE

This report's focus on financial incentives for land conservation is a continuation of the enduring philosophical question of value of land. When formal American land conservation policy was crystalizing in the early 1900's, the conceptualization of how land could be valued - if at all - was debated by the nature preservationists and the resourcists (Callicott, 1993). The preservationists, spearheaded by John Muir, was based on Ralph Waldo Emerson and Henry David Thoreau's transcendentalist philosophy that "wild nature" is of "psycho-spiritual" value; that contact with it "invigorates and strengthens the body... and provides an occasion for transcending finite human consciousness" (Callicott, 1993, p. 11). Thus, the preservationists advocated for land to be preserved in its "wild" state because of its intrinsic value.² At the same time, the so-called resourcists (represented by Gifford Pinchot) equated land's value to the natural resources it provides for people (Banzhaf, 2019). For this camp, "conservation" meant using resources to provide the largest benefit to the most people, and for the longest time (Callicott, 1993). This utilitarian view ended up being enshrined in Progressive Era³ land conservation policy at the Federal level through the US Forest Service and other natural resource agencies, which used conserved lands for timber extraction and water supplies (most famously, the flooding of the Hetch Hetchy Valley in Yosemite to establish a dam).

In opposition to the resource extraction philosophy, Aldo Leopold's 1949 essay "Land Ethic" presented a new way to conceptualize the value of land as part of a symbiotic relationship between humans and the natural environment (Callicott, 1993). He believed that it is impossible to assign economic value to objects in nature, because they play a part in such a complex system of

² This idea of "virgin wilderness" is based on the obsolete idea that man is separate from nature, and ignores the impacts of early humans and later indigenous people on the land (Callicott, 1993).

³ The Progressive Era was the period of American politics between 1900-1920 that was marked by societal, economic, and environmental reforms that focused on morality and efficiency (Library of Congress, n.d.).

living things that "no man can say where utility begins or ends" (Leopold, 1939, quoted in Banzhaf, 2019, p. 33). With this, Leopold advocated for human economic activity that has a neutral or positive impact on ecological integrity (Callicott, 1993).

STUDIES ON THE MONETARY VALUE OF CONSERVATION

The works of John Krutilla presented groundbreaking economic arguments about the value of land and conservation. In his seminal work "Conservation Reconsidered" (1967), he argues that people are "willing to pay for keeping the option open to use an area of facility that would be difficult or impossible to replace and for which no close substitute is available" (Krutilla, 1967). This notion, called option demand, means the preservation of living things and the land they inhabit (such as plants and soil microbes) is valuable because they can be used or scientifically studied in the future. Furthermore, he asserts that and is more valuable for its environmental quality (as in its intrinsic "existence value") than for its natural resources (Banzhaf, 2019).

Recent studies have linked the value of land to the "ecosystem services" it provides: water filtration, soil that produces plants, pollination, etc. A study by the Paulson Institute, The Nature Conservancy, and Cornell Atkinson Center for Sustainability (2020) equates biodiversity and natural systems to a capital stock like financial, built, or human capital. The authors cite an estimate that \$44 trillion of global GDP relies on natural processes (C. Herweijer et al., 2020 cited in Paulson Inst., 2020), yet they state the true value is a greater number that is impossible to truly calculate. They quantify the value of ecosystem services as the "biodiversity funding gap" - the difference between current global funding for biodiversity conservation and the amount needed to reverse the decline of biodiversity by 2030 - at an average of \$711 billion per year (Paulson Inst., 2020). In a California example, the Santa Clara Valley Open Space Authority estimated that the county's open space "provides at least \$1.6 billion to \$3.9 billion in benefits to people and the

local economy every year” and asserts that investments in natural capital have a high rate of return that increases over time because of their long lifespan (Batker et al., 2014).

Others illustrate the value of conservation in relation to the urban-rural gradient. A case study conducted by the Sacramento Area Council of Governments (n.d.) found that a development scenario protecting 10,000 acres of farmland from urbanization protected \$31 million worth of crops per year. It also found that when lands are conserved for farming, they produce more revenue for local governments than they consume in public resources (the opposite is true if they undergo urban development) (SACOG, n.d.).

This project acknowledges that there are a multitude of ways to conceptualize the value of land: for its intrinsic qualities, resources, biodiversity, ecosystem services, carbon sequestration, and many more. This project has a broader view of the actions that count as land conservation in order to capture as many of those values as possible. Local governments, NGOs, and private landowners should implement the tools presented in this report that align with their own philosophy and objectives.





Chapter 5

Financial Incentives for Land Conservation Toolkit

The following chapter contains the analysis of tools that provide a financial incentive to landowners for the conservation of private land. As discussed in the Introduction, the tools are policy and market-based strategies that (1) generate income or other financial benefit from activities on the land (helping owners remain in place), or (2) generate a financial benefit for landowners who exit the land but take action to ensure it continues to serve a conservation purpose and/or retains its low-intensity land use. There are many tools that contribute to land conservation in general, but this project specifically focuses on ones where the landowner accrues some type of financial benefit. As indicated by the Literature Review, there are so many different reasons and ways to value conservation. This toolkit is based on the assumption that landowners will be motivated by financial incentives regardless of their own views on those issues and the objectives of local, State, and Federal programs.

The chapter is divided into four sections: Biodiversity Protection, Agricultural Preservation and Working Lands Management, Infill Development and Avoided Conversion, and Climate Risk Reduction. Each section contains an introduction that gives an overview of the issue, explains its connection to climate change and the other State focal areas, and describes related efforts in the state. Each tool contains a description, an analysis of the challenges to implementation (in some cases with possible recommendations to address them), and a case study of the tool being used in California or elsewhere. The sidebar on the right side of the page contains a “snapshot” of the tool: what type of financial incentive it provides, what the timeframe of the financial incentive is, how operational the tool is, and the co-benefits created by the tool. The following section is a summary of all those components.

Toolkit Summary



BIODIVERSITY PROTECTION

TOOL	DESCRIPTION	INCENTIVE TYPE	READINESS
Conservation Easement	Donation or sale of a conservation easement to a land trust, agency, or other qualified organization. With an easement the landowner still holds title but no longer has the right to develop certain higher-intensity uses.	Income Tax Deduction; 16 years Direct Proceeds; One-Time	Operational
Environmental Mitigation	Replacing habitat or other environmental resources that are significantly impacted by development projects, either through advance mitigation or on a project-by-project basis.	Direct Proceeds; One-Time	Operational, Emergent
Habitat Exchange	Sale of credits representing habitat generated for specific species. Credits are verified and the transactions are conducted on the exchange platform.	Direct Proceeds; One-Time	Emergent

AGRICULTURAL PRESERVATION AND WORKING LANDS MANAGEMENT

TOOL	DESCRIPTION	INCENTIVE TYPE	READINESS
Grants: Agricultural Conservation	Grant funds to purchase agricultural easements or purchase land in-fee to preserve the agricultural use in perpetuity.	Grant Payment; One-Time	Operational
Grants: Land Management	Grant funds to implement practices that improve soil health, save water, etc. that eventually save money for farmers and ranchers and benefit the environment.	Grant Payment; One-Time Increased Profits; Ongoing	Operational
Tax Incentives: Williamson Act	Reduction of property tax assessment for entering into a contract that restricts the land to commercial agriculture or related open space use.	Tax Assessment Reduction; Duration of contract	Operational
Regenerative Agriculture	Farming and ranching practices that focus on nourishing the land. Cost savings are realized over time from improved soil health, better water retention in the soil, reduced use of pesticides, etc. Can also generate more revenue because of higher-tier crops and/or the ability to charge a premium.	Increased Profits; Ongoing	Emergent

AGRICULTURE CONT.

TOOL	DESCRIPTION	INCENTIVE TYPE	READINESS
Voluntary Offsets from Carbon Sequestration	Sale of voluntary offsets for sequestered carbon through land management practices.	Direct Proceeds; Ongoing ¹	Speculative
Corporate and Investor Sustainability Goals	Corporations trying to meet self-imposed sustainability goals have demand for products made with sustainable management practices and are prompting the development of ecosystem services markets.	Increased Profits; Ongoing Direct Proceeds; Ongoing	Speculative

INFILL DEVELOPMENT AND AVOIDED CONVERSION

TOOL	DESCRIPTION	INCENTIVE TYPE	READINESS
Transfer of Development Rights	Sale of a sending property's development rights to a developer for the purposes of increasing the density of a project located in a receiving zone.	Direct Proceeds; One-Time	Operational
Compliance Offsets	Sale of offsets as part of the Cap-and-Trade program. CARB's US Forest Protocol contains a project type that generates credits from avoided conversion of forest land	Direct Proceeds; Ongoing	Operational
Solar Energy Projects	Construction of utility-scale solar as a source of income for owners of fallowed or operational agricultural land.	Direct Proceeds; One-Time or Ongoing	Emergent

CLIMATE RISK REDUCTION

TOOL	DESCRIPTION	INCENTIVE TYPE	READINESS
Parametric Insurance on Natural Infrastructure	Trigger-based insurance where the payout is used to restore or repair natural infrastructure that is damaged in an event.	Avoided Damages; Ongoing	Speculative
Green Infrastructure	Green infrastructure interventions on NWL that can be used to directly protect communities from risk and achieve overall climate benefits through GHG reductions and the provision of ecosystem services.	Avoided Damages; Ongoing	Speculative
Voluntary Buyouts of At-Risk Property	Buying properties in an area that faces climate-related disaster risks so landowners can relocate to safer areas.	Direct Proceeds; One-Time	Speculative

¹ Even though an "offset" is retired when it is purchased, a project that sequesters carbon can be used to generate offsets every year; thus, while each offset results in a one-time financial gain, an offset project for carbon sequestration has the potential to generate income on an ongoing basis. The same applies to compliance offsets, though in that case they quantify the avoided GHG emissions.

The following is an explanation of the terms used to classify the type and timeframe of the tool's financial incentive mechanism, the definitions of tools' implementation readiness, and the co-benefits achieved.

TYPE OF FINANCIAL INCENTIVE

DIRECT PROCEEDS

Funds that are obtained directly from an event or activity, typically related to commerce. In the scope of this project, this includes the sale of various types of credits, sale of easements, sale of land in-fee, leasing income, etc.

INCREASED PROFITS

Earning increased profits from activities taking place on the land. For instance, an agricultural operation can have increased profits due to reduced operating expenses and/or increased revenue.

GRANT PAYMENT

Funds received as an award from a grant program. This is distinct from "direct proceeds" because proceeds are typically a profit or return from an activity, whereas a grant is something an entity applies for and can receive if they meet the conditions of the program.

INCOME TAX DEDUCTION

The subtraction of certain expenses from a person's taxable income. This lowers the amount of taxes the individual would owe to the government.

PROPERTY TAX ASSESSMENT REDUCTION

Property taxes are the product of the tax rate and the property's estimated value. When the property is reassessed at a lower value, the amount of property tax a landowner pays will be lower too.

AVOIDED DAMAGES

Saving money that would have otherwise been spent on repairing damages to infrastructure (built and/or natural) from climate change impacts. May include avoiding high insurance premiums in the future by reducing risk.

TIMEFRAME

ONE-TIME

An activity that generates a single payment.

ONGOING

An activity that generates a financial benefit continuously.

DURATION OF CONTRACT

This is specifically in relation to the two types of contracts under the Williamson Act, which have minimum terms of 20 and 10 years but can be renewed indefinitely.

VARIES

Some tools can be used a specific number of years or are subject to another condition that sets their timeframe.

IMPLEMENTATION READINESS

OPERATIONAL

A tool that is part of an existing local, State, or Federal program. Or, a market-based tool that is widely used at this time. However, this does not mean the tool works perfectly. In many cases there are innovative ways to help the tool be applied more widely or meet its objectives more effectively.

EMERGENT

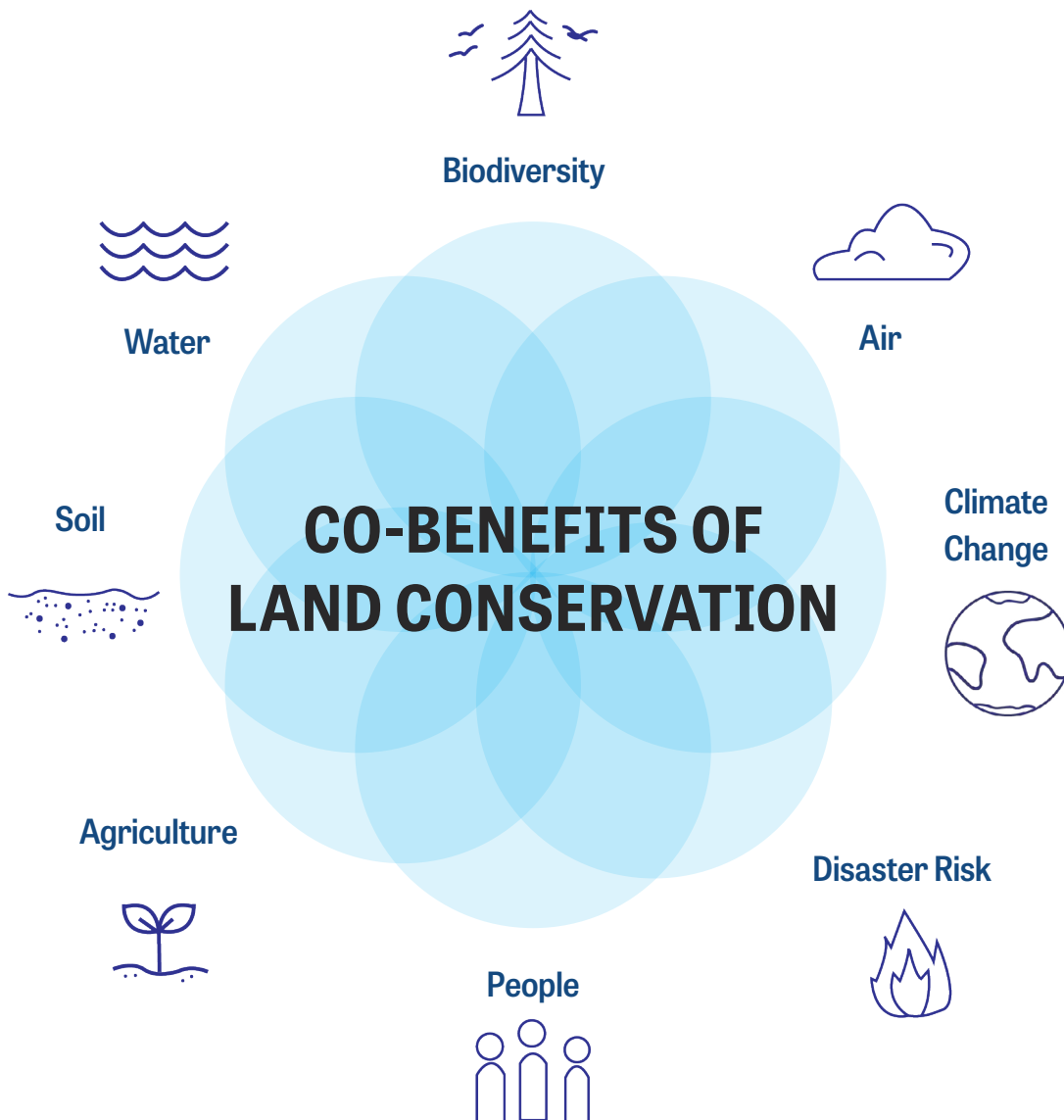
A tool that was considered experimental until relatively recently but is being successfully implemented with increasing frequency in California and/or other geographies. Policy or market shifts may still be needed to expand the tool's applicability and ability to achieve conservation objectives.

SPECULATIVE

A tool that requires shifts in policy, scientific understanding, technology, and/or market conditions to be operational in California. There may be one or two pilot projects, but it is unknown how applicable the tool is more broadly in the state.

CO-BENEFITS

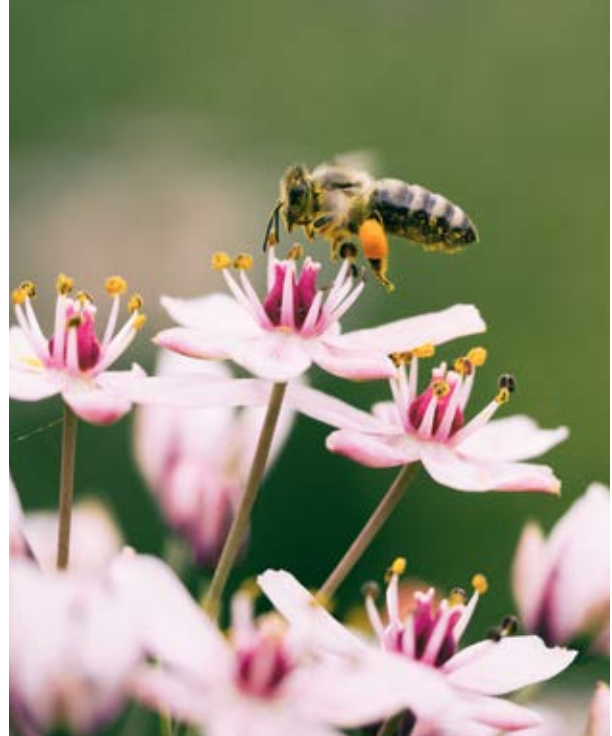
- » Support biodiversity
- » Support wildlife movement
- » Protect open space
- » Reduce GHGs through avoiding conversion
- » Preserve carbon stocks
- » Increase carbon sequestration
- » Improve soil quality
- » Prevent soil erosion
- » Support agricultural operations
- » Retain agricultural revenue
- » Protect the food system
- » Conserve water
- » Improve water quality
- » Reduce water pollution
- » Improve air quality
- » Facilitate groundwater recharge
- » Support State clean energy goals
- » Reduce wildfire risk
- » Provide educational opportunities
- » Provide recreational opportunities
- » Promote green jobs



Biodiversity Protection

Land conservation is critical to protect biodiversity and ecosystem functions. California is one of the 36 “biodiversity hotspots” on the planet, meaning it has a concentration of incredible species richness. The state has 158,000 square miles of habitat that supports more than 7,700 species of flora and fauna (California Biodiversity Collaborative, 2021). With climate change, at least 686 of [California’s] species are at risk of extinction and nearly 250 of them are formally listed as threatened or endangered (Natural Resources Defense Council, 2020). Native plants are particularly vulnerable to climate change impacts such as changes in snow accumulation and snow melt; rising sea levels; increased temperatures; and decreased water availability (California Department of Fish and Wildlife [CDFW], 2021c). Those changes will drastically impact plants’ range of suitable habitat (which may shrink up to 80% in the next 100 years) and may alter plant life stages (CDFW, 2021c). Other climate-related stressors that affect both plants and animals are invasive species (which tend to be hardier to changes in climate), prolonged drought, and wildfires.

Conserving land to protect biodiversity helps plants and animals exist in a changing climate. Land conservation increases the area of habitat and can connect habitat patches to create wildlife corridors. Corridors facilitate animal movement and plant dispersal both as they would naturally, and as their habitable range shifts with climate change (Keeley et al., 2018). They are also climate refugia - “areas where today’s climate will persist into the future and places with low climate velocity” - that can buffer species to some extent from the most extreme climate impacts (Keeley et al., 2018 p. iv). At the same time, plants and wildlife maintain crucial ecosystem services. For example, seagrasses (which themselves are highly vulnerable to climate change) store and sequester more carbon than most terrestrial ecosystems (IPCC, 2016). They also physically buffer the coast from erosion, which is a product of climate change-induced sea level rise.



Conservation Easement: Donation or Sale to a Qualified Organization

DESCRIPTION

A conservation easement is a voluntary legal agreement that restricts part of the property owner's "bundle of rights" - the right to develop the land - to preserve and protect its conservation values in perpetuity.¹ Conservation easements can be donated or sold to qualified organizations (who become the easement holder);² the landowner still retains ownership but the easement holder's interest stays with the land even if ownership changes (Internal Revenue Service [IRS], 2021). The easement holder is responsible for managing the land and monitoring for compliance with the terms of the easement. In relation to biodiversity, easements can require specific habitat management activities in the contract itself or in a separate management plan (Adam Livingston, personal communication, December 1, 2020).

DONATION

Donation of a conservation easement to a land trust, government agency (such as a city or an open space authority), or other qualified charitable organization can result in tax incentives for landowners. A donated conservation easement can qualify as a gift and is eligible to receive Federal income tax deductions under the Internal Revenue Code §170. It is important to note that conservation easements in California can only receive a Federal deduction, as there is no State conservation

1 A majority of conservation easements are in perpetuity, though temporary easements do exist.

2 This project includes interviews with organizations who are significant easement holders in California: The Nature Conservancy, Sequoia Riverlands Trust, and Santa Clara Valley Open Space Authority. See Appendix B on page 69 for full list of interviewees.

FINANCIAL INCENTIVE

Easement Donation: Income Tax Deduction; Current Year and Following 15 Years

Easement Sale: Direct Proceeds; One-Time

Fee-Title: Direct Proceeds; One-Time

READINESS

Easement Donation: Operational

Easement Sale: Operational

Fee-Title: Operational

CO-BENEFITS

Support biodiversity

Support wildlife movement

Protect open space

Reduce GHGs through avoiding conversion

Preserve carbon stocks

Increase carbon sequestration

Improve soil quality

Prevent soil erosion

Conserve water

Improve water quality

Reduce water pollution

Facilitate groundwater recharge

Provide educational opportunities

Provide recreational opportunities

easement tax deduction.³ In order to claim the Federal deduction, the contribution must be “(A) of a qualified real property interest, (B) to a qualified organization, [and] (C) exclusively for conservation purposes” (Internal Revenue Code [IRC], §170(h)(1)).⁴ The value of the conservation easement (which can then be deducted from income taxes) is “the difference between the [fair market value] of the underlying property before and after the easement is granted” (IRS, 2021 p. 14). In general, landowners can deduct up to 50% of their annual income for the donation year and the following 15 years (IRS, 2021).⁵ Of course, a landowner cannot deduct more than the fair market value of the easement; still, this example from the Land Trust Alliance illustrates how significant this incentive can be:

A landowner earning \$50,000 a year who donated a \$1 million conservation easement could... deduct \$25,000 (50% of income) for the year of the donation and for each of an additional 15 years. This would result in a total of \$400,000 in deductions (2016 p. 2).

In 2020 the IRS introduced new regulations where the Federal income tax deduction would be reduced if a donor also receives a State income tax deduction. California does not have a conservation easement tax deduction so this does not apply.

SALE

Land trusts and other organizations purchase conservation easements from landowners using their endowment, grants, philanthropy, and mitigation dollars. The difference between selling and donating an easement is that the landowner simply gets paid when the easement is sold instead of receiving tax benefits over time.

FEE-TITLE

A distinct but related process to donating or selling a conservation easement is fee-title conservation. A land trust or other qualified organization can buy property and make it into a preserve, and in this case both owns the land and is responsible for the easement. The previous private landowner simply earns money from selling the land, which could be millions of dollars if it faces high development pressure and has very high conservation value.

CHALLENGES

For donated easements, in recent years it has come to light that the Federal tax deduction is being abused in schemes that use conservation land to evade taxes. Put simply, conservation easement syndications purchase land (that often has little to no conservation value) and then inflate appraisal values to claim outside tax deductions (Elkind, 2017). Though the IRS has flagged this as an issue and has taken legal action against some perpetrators, it is another factor that organizations, landowners, and investors must be aware of.

For purchasing easements or land in fee-title, it can be a challenge for local agencies, land trusts, and other qualified organizations to obtain the necessary amount of capital. This is exacerbated by the fact that some of the most valuable lands for conservation are those that are at the highest risk of being developed; with this, they have very high property values and are even more difficult to purchase an easement or in fee. Local agencies can pursue new sources of funding for conservation such as impact fees, using more flexible funding streams, or using different green finance mechanisms. NGOs can pursue funding from the philanthropic sector as well.

3 The Natural Heritage Preservation Tax Credit Act of 2000 provided a State tax credit of 55% of the fair market value of the donation to landowners for donating land, conservation easements, and other rights. The program expired in June 2020, but either way was not a standard tax deduction process because participants had to be pre-approved and have a committed funding source.

4 Tax policies for conservation easements change periodically. This description reflects the 2020 update but is dramatically oversimplified. Verify with IRC and/or tax professionals.

5 Farmers and ranchers can deduct 100% of their income for 15 years.

CASE STUDY

In 2018 the Santa Clara Valley Open Space Authority (Authority) was gifted a 112-acre property with very high conservation values by the Julian McPhee family (Santa Clara Valley OSA [OSA], 2018). The donated property is part of a redwood forest and links habitat in the Santa Cruz Mountains to the Gabilan Range. Another important characteristic for biodiversity is its water resources that provide habitat for native fish and threatened amphibian species. The land will be protected in perpetuity and its multiple conservation values will be maintained by the Authority. Though the value of the easement is not publicly available, since the landowners donated it they could deduct 50% of their total income in 2018 and the following 15 years, or until the full value of the easement was met.

The Authority has recently used innovative funding and public-private partnerships to carry out fee-title conservation in the Coyote Valley, one of the last open space areas left in the Silicon Valley, and a critical wildlife linkage between the Diablo Range and Santa Cruz Mountains. The Authority, the Peninsula Open Space Trust, and the City of San Jose worked together to purchase 937 acres of land to protect water resources and critical wildlife corridors (OSA, 2019b). The property sold for a fair market value of \$93.5 mil, with about half funded by the City of San Jose's Measure T bond for water resources. The Authority is responsible for the land's management and stewardship, but the other project partners and stakeholders are still involved in planning the future of the North Coyote Valley Conservation Area. The conservation of Coyote Valley was unique because the City of San Jose recognized nature-based solutions as infrastructure that offers water, wildlife, economic, and public health benefits to the city's residents (OSA, 2019a, b). In relation to water resources, floodplain restoration around the creeks in Coyote Valley could "reduce the likelihood, severity, and extent of downstream flooding," like floods that occurred in 2017 that caused \$100 mil in damages (OSA, 2019a p. 6). It is also critical for groundwater recharge, as the valley "contains half of Silicon Valley's remaining undeveloped aquifer recharge area" (OSA, 2019a p. 6).



Environmental Mitigation

DESCRIPTION

Environmental mitigation is action to avoid, minimize, reduce over time, and/or compensate for negative impacts to the environment. Projects may require mitigation because of the California Environmental Quality Act (CEQA) and/or other State or Federal resource protection laws. Though mitigation can be required for a variety of impacts, the ones most relevant to this project are biological resources (wildlife habitat) and specific ecosystems (wetlands, forests). Some local governments also have their own farmland mitigation programs that can require the purchase of easements to address farmland loss. With all these different impacts that must be mitigated, landowners can profit when projects need to provide substitute resources through the establishment of conservation easements.

ADVANCE MITIGATION WITH A REGIONAL OR LANDSCAPE SCALE

Mitigation and Conservation Banking

Mitigation banks are private or public instruments that generate credits from creating, protecting, and restoring endangered species, endangered species habitat, and wetland habitats (CDFW, 2021a). There are also Federal mitigation banks which offset impacts from wetland loss and other impacts to endangered species. If necessary, developers purchase the mitigation credits before their project starts as a condition for receiving the permits necessary to implement the project (Emily Tibbott, personal communication, February 18, 2021). In California key habitats in mitigation banks include wetlands, vernal pools, and oak riparian woodland (CDFW, 2021b). They also provide credits for State and/or Federally listed endangered or threatened species such as Swainson's hawk, California tiger salamander, and

FINANCIAL INCENTIVE

Mitigation Bank: Direct Proceeds; One-Time
NCCP: Not Applicable
RCIS/MCA: Not Applicable
Permittee Responsible Mitigation: Direct Proceeds; One-Time

READINESS

Mitigation Bank: Operational
NCCP: Operational
RCIS/MCA: Emergent
Permittee Responsible Mitigation: Operational

CO-BENEFITS

Support biodiversity
Support wildlife movement
Protect open space
Reduce GHGs through avoiding conversion
Preserve carbon stocks
Increase carbon sequestration
Improve soil quality
Prevent soil erosion
Conserve water
Improve water quality
Reduce water pollution
Facilitate groundwater recharge
Provide educational opportunities
Provide recreational opportunities

chinook salmon (CDFWb, 2021).

An owner whose land has those valuable habitats or specimens can undertake a conservation project on their own to generate mitigation credits, which project proponents purchase directly from the owner (with the mitigation bank as a sort of broker). Or, private mitigation banks such as Wildlands purchase important land, restore it, and manage it themselves to generate mitigation credits to sell to project proponents (Emily Tibbott, personal correspondence, February 18, 2021). Though prices of credits vary widely and are not publicly available, they can range from tens to hundreds of thousands of dollars per acre. Prices are driven up by a few factors: (1) scarcity of the habitat type, which creates competition between buyers; (2) the ratio of mitigation required by the regulatory agency, which may require a project to conserve double or triple the amount of acreage they are impacting; and (3) the requirements for habitat conditions¹ (Erik deKok, personal communication, February 18, 2021).

Natural Community Conservation Plans (NCCP)²

NCCP is a long-term conservation plan where local governments in California designate large swaths of habitat to protect species beyond the scope of the Federal and State Endangered Species Acts (Fulton and Shigley, 2012). These plans identify natural communities and species to protect at the landscape scale before they become endangered.³ Rather than trying to protect individual species in individual locations, NCCP focuses on habitat connectivity and wildlife corridors (Fulton and Shigley, 2012). CDFW must approve the plan by issuing an NCCP permit, which is typically in place for a 50-year term or longer (CDFWc, 2021). While NCCP is not a land use plan, it does identify where urban and economic development can occur compatibly with protected

1 For example, sensitive species such as Giant Garter Snake may require more restoration work and ongoing maintenance requirements than foraging habitat for a Swainson's hawk.

2 NCCP does not necessarily produce a financial benefit in and of itself but is a key legislative tool that greatly affects the efficacy of environmental mitigation.

3 The equivalent of NCCP for the Federal Endangered Species Act is called a Habitat Conservation Plan, or HCP. Many plans are both NCCPs and HCPs.

ecosystems. The NCCP streamlines the permitting of individual projects because they can be approved locally (since State review is already covered by the overarching permit from CDFW). This produces a financial benefit for landowners who want to develop their land and developers. Because an NCCP by avoiding the cost of doing individual environmental assessments and permitting.

Resource Conservation Investment Strategies (RCIS)/ Mitigation Credit Agreements⁴

RCIS has a purpose similar to NCCP but it is a “voluntary, non-regulatory, and non-binding conservation assessment” rather than a permit (CDFWd, 2021). The first component of RCIS is a Regional Conservation Assessment, which is an analysis of the ecoregion's conservation values (species, ecosystems, linkages). Those findings lead to the second component, the RCIS, which is an advisory plan to guide public agency conservation investments and actions. The last component is Mitigation Credit Agreements (MCA), which do not have official program guidelines as of Spring 2021. MCA will be a form of advance mitigation, meaning a person or entity can create credits to fulfill mitigation credits that will be required by a project in the future (CDFWd, 2021). In theory it can reduce the costs of doing mitigation because doing more at once (rather than project-by-project) is a more efficient use of time and resources. The credits should also be able to be sold or transferred, resulting in a financial gain from the payment.

PROJECT-SPECIFIC MITIGATION

Permittee-Responsible Mitigation

Laws including CEQA and the Federal Clean Water Act require infrastructure project agents to compensate for any significant impacts their project causes to a variety of environmental factors. In relation to biodiversity, this includes impacts to biological resources (e.g. habitat, wetlands, sensitive species, native wildlife), and agriculture and forestry resources (California Environmental

4 RCIS produces a financial benefit when it has the MCA component. However, without MCA it is similar to NCCP in that it better facilitates environmental mitigation.

Quality Act [CEQA] Appendix G, 2021). In California, under CEQA projects can mitigate significant environmental impacts by “replacing or providing substitute resources or environments, including through permanent protection of such resources in the form of conservation easements” (CEQA §15370, 2021). One method is directly conserving land through fee-title, which means buying property that contains the type of resources a project would negatively impact, thus mitigating for the deterioration or loss of those resources. This is an avenue for landowners to make a one-time profit from conservation without having to conduct ongoing restoration or land management. Landowners can also sell conservation easements, where they still own the land but it is subject to permanent restrictions on use and development.

CHALLENGES

One of the main challenges of achieving effective land conservation through environmental mitigation is it can create a “patchwork” of habitat when conducted on a project-by-project basis. As described in the previous section, NCCP can remedy that by taking a landscape-scale approach instead. However, it is a major undertaking of time and labor for a jurisdiction to create one of those plans. For instance, San Diego County’s North County Multiple Species Conservation Plan was started in the early 2000’s but is still in drafting stages 20 years later (CDFWc, 2021). RCIS (often referred to as a “lite” version of NCCP) is easier to create because it is completely voluntary. A challenge for both NCCP and RCIS is that by design, they are collaborative efforts involving many parties: the local agency, landowners, scientists, environmental organizations, CDFW, and even the US Fish and Wildlife Service to some extent (CDFWb, 2021). The “diversity of political motivations, attitudes, and local buy-in” and more specifically “understanding the needs of different agencies with different missions and goals” are ongoing challenges facing the implementation of these kinds of plans (O’Donoghue et al., 2020).

Secondly, though an RCIS is a promising land conservation strategy it is still an emerging program.

Currently, there are four jurisdictions with adopted RCIS plans, and others in the process of making one,⁵ though they appear to be effective tools for better conservation planning, it remains to be seen how they can be integrated with other programs to actually incentivize private land conservation (O’Donoghue et al., 2020). However, one recent development to watch is the Mid-Sacramento Valley RCIS, which integrates the Central Valley Habitat Exchange⁶ as an incentivization mechanism (Ann Hayden, personal communication, December 20, 2020). Practitioners see this strategy of incorporating carbon credits and/or biodiversity credits as a way to add monetary value to the lands that an RCIS identifies as important. Another challenge is the guidelines for MCA have not been made by CDFW as of Spring 2021. Though there is one pilot of the program, at this point developers of RCIS have to speculate what will count as a credit. For instance, professionals are currently looking into if it could allow temporary habitat mitigation credits and if this tool can be used to bypass mitigation banks (Ann Hayden, personal communication, December 20, 2020).

5 E.g. Santa Clara County (approved), Yolo (approved), Mid-Sacramento Valley (approved), Santa Cruz (in development), and West San Bernardino (in development) (O’Donoghue et al., 2020).

6 Habitat Exchange is explained in more detail on page 29

CASE STUDY

Efforts in Orange County, California show how projects can satisfy environmental mitigation requirements in line with regional conservation objectives to protect biodiversity. The Transportation Agency (OCTA) runs the OC Go Freeway Environmental Mitigation Program that “allocates funds to acquire land and fund habitat restoration projects to offset the environmental impacts and streamline the approval of OC Go freeway projects” (Orange County Transportation Agency [OCTA], 2021). This required the development of the OCTA NCCP/HCP, which was approved by CDFW and US Fish and Wildlife in 2017. The Freeway Environmental Program selects properties that will satisfy biological resource mitigation requirements using the priority conservation areas identified by the NCCP.

The program uses funds from a half-cent tax for transportation called OC Go (Measure M) to acquire 1,300 acres in seven open space preserves, conduct 12 restoration projects, and restore 350 acres of open space land to date (OCTA, 2021). One of the preserves is the Pacific Horizon Preserve, a 151-acre parcel that contains chaparral, grassland, and coastal sage scrub habitat. It supports 15 special status plants and animals, is an important wildlife corridor, and links existing open spaces in the area to the Pacific Ocean (OCTA, n.d.).



Biodiversity Tool 3

Habitat Exchange

DESCRIPTION

Habitat exchange is a system where private landowners can generate credits for creating and/or maintaining habitat of a certain at-risk species. The credits can then be sold to private and public investors who need to meet mitigation requirements when their development activities impact habitat (Environmental Defense Fund [EDF], 2014). For example, the credits can be used by energy companies to meet Bureau of Land Management and US Fish and Wildlife Service mitigation requirements (Lamb et al., 2019). It is important to note that habitat exchanges are considered to be a developing land conservation strategy, so there are not formal standards for valuing credits. However, in general a habitat credit measures “the ability of a parcel of land to support a particular species or natural community” as measured by factors including its habitat quality and the surrounding landscape (EDF, 2014 p. 2). Quantifying the amount of credits is a complex calculation using scientific habitat modeling and scenario planning for that particular species (Galik et al., 2017).

Habitat exchange is an opportunity for farmers and ranchers to earn money by restoring and preserving habitat to support biodiversity. It is similar to the process of mitigation banking, but the sale of credits is a transaction between the producer and the buyer with the Exchange as the platform. With that, the profit from selling credits goes to the landowners instead of the mitigation banker. In addition to achieving biodiversity objectives, habitat exchange is another source of income that can help farmers stay on the land and prevent the conversion of agricultural land. It also improves other ecosystem services, for instance carbon sequestration, by enhancing wetlands, planting shrubs, or whatever other improvement is appropriate for a certain species.

FINANCIAL INCENTIVE

Direct Proceeds from Sale of Credits; One-Time

READINESS

Emergent

CO-BENEFITS

- Support agricultural operation
- Support biodiversity
- Support wildlife movement
- Protect open space
- Reduce GHGs through avoiding conversion
- Preserve carbon stocks
- Increase carbon sequestration
- Improve soil quality
- Prevent soil erosion
- Conserve water
- Improve water quality
- Reduce water pollution
- Facilitate groundwater recharge
- Provide educational opportunities
- Provide recreational opportunities

CHALLENGES

Uncertainty limits the uptake of habitat exchange at the moment. From a regulatory perspective, there is no guarantee “that purchase of credits will satisfy future regulatory obligations in the event that a species is listed” under State or Federal Endangered Species Act (Galik et al., 2017 p.46). There are also not enough conservation plans that could inform credit producers where and how much habitat restoration or preservation would prevent a species from being listed - if it is even possible to determine that at all (Galik et al., 2017). These factors impact participation because landowners have to create or restore the habitat before they can quantify and sell credits. One way to reduce the uncertainty about the investment is to calculate the costs and revenue potential of different scenarios before the landowner starts the project. This helps them know what interventions will result in the best habitat outcomes for their money, and it can attract investors looking to fund projects with the best return on investment. The Monarch Butterfly Habitat Exchange described in the following “Case Study” section has a tool called Habitat Quantification Tool that does just that.



CASE STUDY

The Monarch Butterfly Habitat Exchange was created by EDF and other partners to restore monarch butterfly habitat in the hopes of preventing it from being listed under the Endangered Species Act. Eligible practices include: planting milkweed (the monarch caterpillar’s only food source); prairie restoration to foster wildflowers and other pollinator friendly plants; and prescribed burns to limit woody and invasive plant encroachment (Monarch Butterfly Habitat Exchange, 2021b). Credits are calculated by the Habitat Quantification Tool as “functional acres,” where one can support an estimated 70 additional monarchs in their migration. “Functional acres” is the product of the number of acres restored or created and habitat quality; habitat quality is the product of threats, site capacity (for breeding and foraging habitat) and conservation priority (Monarch Butterfly Habitat Exchange, 2021a).

The Exchange is administered by a non-profit Biodiversity Works and is currently active in Texas, Missouri, Iowa, and California’s Central Valley. It matches investors to projects, either to provide start-up funding (based on the project cost estimated by the Habitat Quantification Tool) or to purchase verified functional acres that are registered to the Exchange. Of the six projects currently listed on its Exchange Registry, the only one in California is Davis Ranches in Colusa County. The project will restore 100 acres of native monarch habitat on the rice, walnut, and row crop farm (Monarch Butterfly Habitat Exchange, 2019).

Agricultural Preservation and Working Lands Management



California naturally has wet winters and dry summers, but the amount of precipitation that occurs in different seasons, months, and years is highly variable. This is largely due to atmospheric rivers that cause extreme precipitation events, which are expected to become more intense in the future due to climate change (Bedworth et al., 2018). Warmer air temperatures due to climate change have also diminished the spring snowpack in mountain ranges that serve as the headwaters for California's watersheds and prolonged normal summer dryness into drought events (Bedworth et al., 2018). These temperature and precipitation changes affect farmers' ability to grow certain key crops such as avocados, oranges, and almonds, which could have production declines of 40%, 20%, and 20% by 2050 (California Climate & Agriculture Network, 2021). Water shortages and SGMA's imperative to bring groundwater basins into balance are projected to impact landowners' ability to remain on the land, especially in parts of the Central Valley that have been over-pumping groundwater (Mount and Hanak, 2019).

Preserving agriculture and improving the management practices on all the types of working lands protects many interconnected processes that sustain people and nature. Protecting the agricultural sector maintains the food system (a vital ecosystem service) that more than 39.5 million Californians, and the rest of the world, rely on. It is also of great economic importance to the state. California's farms and ranches received more than \$50 billion in cash receipts for their output in 2019 (CDFA, 2021). There are additional co-benefits realized through management practices on farms and rangelands that enhance environmental quality. One is biodiversity protection through the creation or enhancement of wildlife habitat. Many working lands are already key habitat for birds and fish, such as rice fields that serve as wetland habitat for migrating waterfowl and alfalfa fields that serve as hunting grounds for the State endangered

Swainson's hawk (Seavy et al., 2015).

The American Farmland Trust found that the biggest threats to agricultural land were development activities such as paving over land and converting it to low-density residential. (Freedgood et al., 2020). In California, 465,900 acres of rangeland, cropland, pastureland, and woodland were developed or compromised in that 15-year time period (AFT, 2020). However, SB 375 and the State's planning priorities¹ encourage infill and compact development patterns that conserve NWL. Maintaining productive agriculture can also be a financial incentive for jurisdictions not to develop. Agriculture contributes to the local economy with crop revenue, on- and off-farm jobs, and local tax revenue, whereas greenfield development requires costly new infrastructure and municipal services that add up over time (Sacramento Area Council of Governments, n.d.). Preventing conversion of working lands to more intensive uses also prevents the loss of carbon stocks.² For example, converting an orchard to residential development releases the carbon in the trees, removes the trees' future carbon sequestration potential, and disturbs the soil. Conversely, when agriculture is conserved, the soil and vegetation can continue sequestering carbon dioxide from the atmosphere and storing it in woody biomass and other organic/ matter.

¹ See CA Government Code 65041.1.

² Annual herbaceous crops are not counted in CARB's inventory of carbon stock because they do not sequester carbon over time. However, converting herbaceous cropland results in a net GHG increase because the new development leads to higher vehicle miles traveled (VMT) and GHG emissions.

Grants: Agricultural Land Conservation

DESCRIPTION

A variety of programs provide grant funding for agricultural lands conservation to cities, counties, nonprofit organizations, Resource Conservation Districts (RCDs), regional park or open space districts and authorities, and Native American tribes.³ They allow entities to purchase permanent easements and/or conduct fee title purchases. In general, an easement is a legal agreement where the property owner gives up the right to use the land in ways that harm its conservation or agricultural value; the easement holder (a land trust, local government, etc.) is responsible for monitoring and enforcing the easement (Sundberg, 2013). Grant programs typically require the easement be in perpetuity. Fee title purchases mean that the entity owns the land outright and is responsible for managing it in accordance with the program's objectives.

At the federal level, the USDA's Natural Resources Conservation Service (NRCS) offers the Agricultural Conservation Easement Program to prevent the conversion of agricultural land. It provides matching funds - up to 50% of fair market value or up to 75% for grasslands of special environmental significance - to the entity purchasing the easement (Donovan et al., 2020). In California, the Department of Conservation's California Farmland Conservancy Program (CFCP) provides grants for the acquisition of conservation easements on Prime Farmland, Farmland of Statewide Importance, Unique Farmland, Farmland of Local Importance, and commercial grazing land (California Department of Conservation [DOC], 2021). The program can fund up to 90 or 95% of the fair market value of the easement and there is no maximum limit on the amount (DOC, 2021). Another key

³ Refer to Program Guidelines for complete lists of eligible applicants.

FINANCIAL INCENTIVE

Grant Payment; One-Time

READINESS

Operational

CO-BENEFITS

- Support the food system
- Retain agricultural revenue
- Facilitate groundwater recharge
- Support wildlife movement
- Protect open space
- Preserve carbon stocks
- Reduce GHGs through avoiding conversion

California program is the Strategic Growth Council's Sustainable Agricultural Lands Conservation Program (SALC), which provides planning and acquisition grants “to protect at-risk agricultural lands from sprawl development in order to promote growth within existing jurisdictions, ensure open space remains available, and support a healthy agricultural economy” (California Strategic Growth Council [SGC], 2020a, p.1). Under the Round 6 Program Guidelines, the program awards “up to 75% of the value of an agricultural conservation easement” and “up to 75% of the agricultural conservation easement value of the property’s fair market value “ for three pilot projects of fee acquisition (SGC, 2020a). Since its establishment in FY 2014/15, SALC grants have enabled the permanent conservation of agricultural land on 92 properties totalling nearly 112,000 acres (SGC, 2020b).

These grant programs do not provide a direct financial benefit to landowners in and of themselves. However, when a qualified entity purchases a conservation easement (with the help of the grant funding), they provide a direct payment to the landowner. Landowners are free to use those funds as they wish, though a survey of 37 landowners found that they wanted to use the cash for personal use (like retirement income or building a house), to help younger family members purchase the parcel, to improve the agricultural operation, and reduce farm debt (Rilla and Sokolow, 2000). This illustrates how grant programs contribute to landowners’ ability to stay on their property or pass it on to other people who will keep it in agricultural use. This avoids conversion to higher-intensity uses that generate more GHGs.

CHALLENGES

Grant programs may have variable amounts of funding available each year. In California, the California Climate Investments grant programs are funded by appropriations from the Greenhouse Gas Reduction Fund (GGRF) (which holds the revenue from Cap-and-Trade auctions). Per SB 862 (2014), “60% of the GGRF proceeds [are continuously appropriated] for certain transportation and sustainable communities programs,” leaving 40% for discretionary programs whose funding must be approved in the State Budget (California Climate Investments, 2021).

Another challenge is that grant programs for acquisition typically require the applicant to secure match funding. For example, an applicant for a SALC grant would need to secure at least \$1.25 mil for an easement valued at \$5 mil. Ways to obtain funding for acquisition include increasing connections with philanthropy (all applicants), establishing a land conservation fund leveraging municipal fees (local governments), or even finding new ways to divert transportation dollars to a more flexible funding stream that can be used for conservation (local governments) (Elizabeth O’Donoghue, personal communication, October 16, 2020). Applying for grants can also be a burdensome process and requires technical expertise. Application packages typically require many components including the application forms, title documents, maps, and an appraisal. However, some grant programs including SALC have robust technical assistance programs that can increase the communities that can apply. Resource Conservation Districts are another potential source of technical assistance for potential grant applicants, though it depends on their area of expertise and operational capacity.

CASE STUDY

The Santa Clara County Open Space Authority acquired a 30-acre olive grove property called Frantoio Grove with the help of a \$2.97 mil SALC grant (Santa Clara Valley Open Space Authority [OSA], 2020). The purchase preserved the productive agricultural operation and prevented its development as a residential subdivision. In addition to protecting prime farmland, conserving the land with the easement provided flood protection, groundwater recharge, and habitat co-benefits (OSA, 2020). Along with the SALC grant, the Open Space Authority leveraged close to \$1 mil from a \$5 mil pot of funds allocated by Santa Clara County through a Memorandum of Understanding (OSA, 2020). That funding is specifically set aside for the purchase of agricultural easements in the San Martin and Coyote Valley Areas as part of the innovative Santa Clara Valley Agricultural Plan. The plan, which was developed using SALC planning grant funds, lays out a comprehensive regional framework that acknowledges the importance of working lands for the long-term sustainability of the county (OSA, 2020). Establishing the Frantoio Grove easement fulfills the plan's objective to avoid agricultural land conversion at the edge of urban communities, which reduces GHGs from VMT and preserves the carbon stocks in the groves (OSA, 2020).



Grants: Land Management

DESCRIPTION

There are a variety of programs that provide financial assistance and incentives to farmers, ranchers, and Native American tribes to implement management practices on working lands.⁴ Key Federal programs are the Environmental Quality Incentives Program (EQIP) and the Conservation Stewardship Program (CSP), which are both administered by the USDA NRCS. The California Department of Food and Agriculture (CFDA) administers the Healthy Soils Program (HSP) Incentives Program, which provides grants for the implementation of on-farm practices that improve soil health for the purposes of sequestering carbon and reducing GHGs (CFDA, 2020). HSP grants are capped at \$100,000 and must implement eligible practices⁵ such as compost application, cover cropping, contour buffer strips, and riparian forest buffers (CDFA, 2020). All of these programs provide an upfront financial incentive by covering a portion of the cost to implement new practices that conserve natural resources, but they also provide a long-term benefit because good stewardship can eventually reduce landowner costs and improve agricultural/business operations.

FINANCIAL INCENTIVE

Grant Payment; One-Time &
Increased Profits; Ongoing

READINESS

Operational

CO-BENEFITS

Increase carbon sequestration
Preserve carbon stocks
Support the food system
Retain agricultural revenue
Facilitate groundwater recharge
Support biodiversity
Support wildlife movement
Conserve water
Improve water quality
Protect open space
Reduce GHGs through avoiding conversion
Provide educational opportunities

⁴ Refer to applicable program guidelines for complete lists of eligible applicants.

⁵ Refer to HSP Program Guidelines for list of eligible agricultural management practices.

CHALLENGES

Part of EQIP and CSP is helping applicants plan what improvements they will implement on their farms, but some grant programs require full project proposals to apply. The Healthy Soils Incentive Program requires applicants to create a plan implementing specified eligible practices and estimate their GHG benefits. Though there are tools such as COMET-Planner that can make some of the calculations, potential applicants may not be familiar with how to prepare a plan that meets the grant requirements. In this case, nonprofits and RCDs are key partners and sources of shared, local information. One such organization is Carbon Cycle Institute, which has created a process to develop Carbon Farm Plans with farmers and ranchers in partnership with RCDs and NRCS (Carbon Cycle Institute [CCI], 2021). These plans “assess all the opportunities for GHG reduction and carbon sequestration on their property” and guide producers to “[use] carbon as the organizing principle to manage their land” (CCI, 2021).



CASE STUDY

The Australian Government's Department of Agriculture and Water Resources ran a three-part grant program from 2012-2017 called Carbon Farming Futures that addressed land management as a process of learning and application. It gave out \$74 mil in grants to support research into new technologies and practices (Filling the Research Gap), \$44 mil to conduct on-farm trials (Action on the Ground), and \$21 mil for education on how to enhance productivity, reduce GHGs, and increase soil (Extension and Outreach) (Australian Government Department of Agriculture and Water Resources [AU DAWR], 2017). The research, trials, and education efforts were supposed to be implemented as separate and sequential grant solicitations so that the sustainable practices and technologies could develop with each step. (AU DAWR, 2017). This structure (1) allows researchers to come up with new ideas, (2) tests those ideas on farms and ranches, then (3) publicizes the research and demo projects to encourage others to adopt the practices and take part in the Emissions Reduction Fund Program (generate carbon credits). Unfortunately all three parts of the Carbon Farming Futures had to be implemented concurrently due to funding reductions that cut the program short after only five years. However, the sequential aspect is something that could be applied in the context of our State and Federal land management programs. It may be a more definitive way to see what kind of impacts new practices generate, since it can take years for carbon, water, and plant health benefits to manifest.

Tax Incentives: The Williamson Act

DESCRIPTION

The California Land Conservation Act of 1965, more commonly known as the Williamson Act, allows local governments to establish agricultural preserve areas where private landowners can enter contracts to restrict parcels as agriculture or related open space uses (DOC, 2019c). Under a Williamson Act contract, which has a minimum term of 10 years, property taxes are assessed based on generated income instead of the property's potential market value. Williamson Act contracts are automatically renewed and can only be terminated by a landowner by applying for non-renewal with their jurisdiction, cancellation (which is only allowed in limited circumstances and if specific statutory findings are met, and requires payment of a fee),⁶ easement exchange, or if the land is acquired through eminent domain. Contracts can also be terminated by the jurisdiction if there is a breach of contract, or if the land is annexed and the LAFCo allows a city to refuse the succession of the contract (DOC, 2019b).

Farmland Security Zones (FSZ) can also be created by a local government within their agricultural preserve area. Only land designated as Prime Farmland, Farmland of Statewide Importance, Unique Farmland, or Farmland of Local Importance on the Farmland Mapping and Monitoring Program's Important Farmland Maps may enter into a FSZ contract (DOC, 2019a). Like the Williamson Act contracts, their purpose is to restrict the land to agriculture or open space uses. However, FSZ contracts result in an even larger tax reduction because they allow the property to be assessed "at 65% of its Williamson Act valuation or 65% of Proposition 13 valuation, whichever is lower" (DOC, 2019a, p. 1). FSZ contracts have a longer

⁶ Local governments have their own regulations in addition to those in the CA Government Code.

FINANCIAL INCENTIVE

Property Tax Assessment Reduction;
Ongoing

READINESS

Operational

CO-BENEFITS

- Support the food system
- Retain agricultural revenue
- Facilitate groundwater recharge
- Support wildlife movement
- Protect open space
- Preserve carbon stocks
- Reduce GHGs through avoiding conversion

20-year minimum term and also have higher standards of findings required to cancel than a Williamson Act contract.

Both types of contracts provide landowners a financial incentive to keep the land as agriculture or related open space through the mechanism of lower tax assessments. At the parcel level, they limit sprawl by forbidding the conversion of the land to higher-intensity uses. In the larger scheme of urban development patterns, the establishment of an agricultural preserve makes jurisdictions identify large swaths of areas that are worth preserving, hopefully encouraging them to focus on infill development instead. Because of the long contract periods and restrictive cancellation policies, the land conserved through agricultural contracts is relatively protected from rezoning and subdivision⁷ in the case that jurisdictions do want to pursue development.

CHALLENGES

Until 2010, local governments received an annual payment (called a subvention payment) from the State to compensate for tax revenue lost from properties' participation in Williamson Act contracts (DOC, 2019c). Because jurisdictions face different budgetary constraints, some counties ended participation in the program or placed a temporary moratorium on new contracts (Wetzel et al., 2012). However, local government leadership can decide to reinstate the program in line with their local finances and planning priorities. For example, the Tulare County Board of Supervisors lifted its moratorium and its Resource Management Agency began accepting applications for the program again in 2020 (Tulare County Resource Management Agency, 2020). The County of San Diego had also placed a moratorium on the program in 2010, but it was lifted just a year later in 2011 and continues to be a significant aspect of the County's land use, conservation, and climate change strategy (County of San Diego, n.d.).

⁷ Local governments must find that subdivision "is incidental to the production of agricultural commodities for commercial purposes on the particular parcel" (62 Op. Atty Gen. Cal 233 (1979))

CASE STUDY

A UC Agriculture and Natural Resources survey of 244 cattle ranchers with Williamson Act contracts in the Central Valley and neighboring Sierra foothills found their median annual property tax reduction was \$10,000, with a range from \$1,000-\$120,000 (Wetzel et al., 2012). For 71% of respondents, ranching profits were less than or equal to the tax savings from their Williamson Act contract; this illustrates the importance of the program in keeping California ranching operations afloat (Wetzel et al., 2012). Furthermore, when the researchers proposed a hypothetical situation where Williamson Act contracts were eliminated, a quarter to one third of respondents said that they would try to sell their land because development pressure would drive up resale value and property taxes (Wetzel et al., 2012). The ranchers understood that a majority of the hypothetical sold land would be commercially developed into housing or other non-open space uses (Wetzel et al., 2012). In conclusion, this example shows how the Williamson Act is directly connected to ranchers' ability to stay on the land and keep sprawl at bay.



Regenerative Agriculture

DESCRIPTION

Though regenerative agricultural practices are promoted through grants,⁸ regenerative agriculture is its own tool because it creates financial benefits in and of itself. Regenerative agriculture, which is often used interchangeably with carbon farming, is a collection of practices that enhances the land for its carbon, biodiversity, and other values. The practices focus heavily on improving soil quality, which directly contributes to carbon sequestration and sustains other ecosystem services. Its overarching principles include not tilling the soil, not leaving the bare soil exposed, having a diversity of plants, and integrating livestock and crops on the land (LaCanne and Lundgren, 2018). Sample practices include compost application, windbreaks, hedgerow planting, and silvopasture.

Regenerative agriculture practices provide a financial incentive for land conservation because it can be more profitable than conventional farming methods. In a study of corn fields on 10 farms, researchers found that regeneratively managed corn fields⁹ had lower yield but generated nearly twice the profit (LaCanne and Lundgren, 2018). This outcome was driven by reduced input costs and higher crop value. The study found that improving the soil biology, soil organic matter, and biodiversity reduced the need for insecticides and fertilizers. It also allowed farmers to market their products for a higher price and have multiple sources of income on one field (LaCanne and Lundgren, 2018). These practices support the long-term health and productivity of the land, which also helps to preserve agricultural operations' profitability.

⁸ See "Grants: Land Management" on page 35

⁹ Fields were never-till, did not use insecticides, and had livestock grazing.

FINANCIAL INCENTIVE

Increased Profits; Ongoing

READINESS

Emergent

CO-BENEFITS

Increase carbon sequestration

Preserve carbon stocks

Improve soil quality

Prevent soil erosion

Conserve water

Improve water quality

Reduce water pollution

Facilitate groundwater recharge

Support biodiversity

Support wildlife movement

Protect open space

Support the food system

Retain agricultural revenue

Reduce GHGs through avoiding conversion

Provide educational opportunities

They also have a direct positive impact on land's ecosystem services beyond increasing soil's ability to sequester carbon. In relation to biodiversity, practices such as cover cropping and multi-story cropping introduce a mixed plant community to fields that would otherwise be monoculture, which also benefits wildlife. In relation to water, better quality soil has better water retention (leading to conservation) and reduces the need for synthetic fertilizers (reducing pollution from runoff).

CHALLENGES

Operators may view it as a risk to implement new practices, even if the benefits will be plentiful in the long run. Regenerative agriculture requires an initial investment and ongoing costs to purchase seeds for cover cropping, purchase and spread compost, and maintenance. Even when the practices are installed, it could take five years for carbon to accumulate in the soil and produce many of the cost-saving benefits (Pelayo Alvarez, personal communication, October 30, 2020). While the financial assistance from the grant programs mentioned above are one response to that, there are some other incentives that can support farmers and ranchers who implement regenerative practices.

Crop insurance is an existing mechanism to help farmers deal with risks to their crops, especially bad weather. Since regenerative practices improve soil resiliency and reduce those risks, offering a discount in crop insurance premiums can be a financial incentive. For example, Illinois has implemented a policy that gives farmers a \$5 per acre discount in their crop insurance for planting cover crops (Reynolds, 2019). This can help reassure farmers who are worried implementing new practices will hurt their bottom line (Katie Patterson, personal communication, December 11, 2020). Another solution related specifically to cover crops is if local governments, marketing orders, or nonprofits offer discounted or free supplies like cover crop seeds to farmers. An example is Project Apis m's Seeds for Bees project, which gives farmers enrolled in its program \$2,000 and \$1,000 discounts on cover crop seed purchases in

their first and second years respectively (Project Apis m, 2020). Furthermore, the Almond Board of California partnered with the organization to provide free seeds to 100 almond growers in its efforts to promote pollinator health and biodiversity in the state's almond orchards (Almond Board of California, 2020).

Realizing the highest potential profits with regenerative agriculture is hindered by the lack of an official "Regenerative Agriculture Certification" for products. While agricultural producers who use regenerative practices may qualify for USDA Organic certification, indicating the use of regenerative practices specifically could be a good marketing tool and help increase profits. There are examples of certifications made by nonprofits that recognize specific management practices; one is the Fibershed Certification, which is granted by the nonprofit Fibershed to recognize fiber-based goods that are harvested in North Central California and follow a list of sustainable practices (Fibershed, 2019). Another is Bee Friendly Farming, which is a certification program from Pollinator Partnership that recognizes farmers and growers with "bee friendly agricultural practices" such as providing nesting places and flowering plants for bees (Pollinator Partnership, 2021).

CASE STUDY

The AFT's Bay Area Food and Farming Program profiled Mark Lyon of Lyon Vineyard, Eco Terreno Wines about his costs and benefits from using regenerative agriculture practices in his operation. As mentioned previously, it can take five years to realize the cost savings; this analysis was conducted in 2019 based on practices instated on the vineyard in 2014. On 92 acres of wine grapes in Sonoma County, his implementation of nutrient management, conservation cover, mulching and prunings, and compost application reduced a total of \$1,268/acre/year and increased the wine grape revenue by \$1,231/ac/yr (Lum, 2020). Though it was not his biggest cost saving, Mark was able to reduce his water use by 40% because the practices improved water retention (Lum, 2020). Though it cost \$704/ac/yr to carry out the practices, Mark's net benefit was \$1,795/ac/yr. (Lum, 2020). There were also benefits to natural systems that were not fully captured by the financial gain including reduced sediment loss, reduced GHG emissions, and carbon sequestration.



Voluntary Offsets from Soil Carbon Sequestration

DESCRIPTION

Voluntary offsets are carbon credits that are purchased voluntarily by companies, governments, and even individuals to mitigate their GHG emissions and support other co-benefits. Though they are conceptually related to compliance offsets,¹⁰ they do not have anything to do with fulfilling regulatory requirements of California's Cap-and-Trade program. There are many marketplaces (with varying levels of quality and credibility standards) that deal in voluntary offsets, including American Carbon Registry (ACR), Climate Action Reserve (CAR), Verra, and Chicago Climate Exchange (CCE) (Greenhouse Gas Institute and Stockholm Environment Institute, n.d.).¹¹ The range of projects includes ones that reduce emissions (i.e. renewable energy projects, building weatherization, and methane capture) or others which sequester carbon (mainly forest projects).

A project type that could be very significant in relation to land conservation is soil carbon sequestration, which can be achieved through regenerative management practices. CCX has a soil carbon sequestration project that uses conservation tillage, which is a method of "managing the amount, orientation, and distribution of crop and other plant residue on the surface" between strips where crops are grown (Chicago Climate Exchange, 2008). Another is ACR's Compost Additions to Grazed Grasslands protocol, which calculates the carbon sequestered from the increased soil organic carbon and the increased carbon stocks held in the improved plant growth (American Carbon Registry, n.d.).

In theory the sale of voluntary offsets for soil carbon sequestration can be an ongoing source of income for farmers and ranchers. This could help them stay on the

FINANCIAL INCENTIVE

Direct Proceeds; One-Time

READINESS

Speculative

CO-BENEFITS

- Preserve carbon stocks
- Increase carbon sequestration
- Reduce GHGs through avoided conversion
- Support agricultural operations
- Improve air quality
- Protect open space
- Support biodiversity
- Support wildlife movement
- Improve soil health
- Prevent soil erosion
- Conserve water
- Improve water quality
- Reduce water pollution
- Facilitate groundwater recharge
- Reduce wildfire risk
- Promote green jobs

¹⁰ See "Compliance Offsets" on page 50

¹¹ ACR, CAR, and Verra also interact with the compliance market.

land and prevent its conversion to higher intensity uses. However, the next subsection details the challenges that currently make the costs of implementing these types of projects outweigh the potential profits.

CHALLENGES

The main barrier to the use of voluntary offsets for soil carbon sequestration is that it is difficult to implement them at a scale that would be profitable for landowners. One reason is there are many steps leading to the sale of voluntary offsets generated from a project, all of which cost money. These include fees to register the carbon offset registry, as well as costs to implement, verify, market, monitor, and audit the project. With all this, some project types are more costly than others. Because soil carbon sequestration is a very new project type, it could cost between \$50,000 to \$100,000 to go through the whole process, while more common projects such as landfill biogas could be a fraction of that (John McDougal, personal communication, 10/27/2020). Then, the cost of a ton of carbon is quite low; offsets from the voluntary market typically sell for even less than compliance offsets (which are less than \$20). Given the high input costs and low profit, it would be very difficult for a soil carbon project to sequester enough tons of carbon to yield meaningful returns for a landowner.

The following points are mostly speculation, as no soil carbon sequestration voluntary offset projects have been registered as of the writing of this report. First, a way to improve this system is through aggregation. If multiple farmers and ranchers worked on a project together, they could divide the costs discussed in the previous paragraph and achieve a larger volume of offsets, theoretically resulting in higher profits. Farmer co-ops, Resource Conservation Districts (RCDs), and nonprofit/advocacy organizations are potential organizing forces. The second opportunity is on the buying side of the voluntary market. Now that corporations are beginning to care more about their carbon footprints,¹²

¹² See “Corporate and Investor Sustainability Goals” on page 44

project proponents could connect with them and line them up to buy their offset credits. This could reduce the uncertainty of the process from the landowner perspective, but whether or not it would reduce project costs warrants further research.

CASE STUDY

ACR’s Compost Additions to Grazed Grasslands protocol was developed with research from two locations in California that participated in the Marin Carbon Project. The research “demonstrated that a one-time application of compost can sequester almost 1,000 pounds of carbon per acre per year” (Environmental Defense Fund, 2014). However, there are no implemented projects using this protocol or the one or two others that exist at this time.



Corporate and Investor Sustainability Goals

DESCRIPTION

Corporations are becoming increasingly conscious of their overall climate impact and GHG emissions, leading them to set voluntary sustainability targets. For example, a 2019 analysis by Natural Capital Partners found that 114 of the Fortune 500 companies have pledged to achieve one more of the following goals by 2030: carbon neutrality, 100% renewable energy, and science-based targets (measurable targets to keep global warming below 2 or 1.5 degrees Celsius) (Natural Capital Partners, 2019). That number represents a 400% increase in commitments from 2015, which was when the Paris Agreement was signed (Natural Capital Partners, 2019). From a business operations standpoint, climate change impacts such as wildfire, drought, and land degradation threaten corporations' supply chains and efficiency. Now that climate change is a priority in public discourse, corporations are facing pressure from customers and the general public to be better stewards of the environment.

The risks that climate change poses to corporations can result in significant financial losses, which has led companies to follow Environmental, Sustainability, and Corporate Governance (ESG) standards. According to S&P Global, the "E" portion of ESG shows investors "how a company performs as a steward of the environment" and "takes into account a company's utilization of natural resources and the effect of their operation, both in their direct operations and across their supply chains" (2019). A speculation about how this could affect farmers and ranchers is that companies there will be higher demand for products that were made with regenerative practices or created other benefits, such as habitat and water conservation. Perhaps this could result in higher profits, or at least give more financial certainty to farmers and ranchers using new environmentally beneficial practices on their operation.

FINANCIAL INCENTIVE

Increased Profits; Ongoing &
Direct Proceeds; Ongoing

READINESS

Speculative

CO-BENEFITS

Improve soil quality
Prevent soil erosion
Support agricultural operations
Retain agricultural revenue
Protect the food system
Increase carbon sequestration
Conserve water
Improve water quality
Reduce water pollution
Support biodiversity
Improve air quality
Facilitate groundwater recharge
Promote green jobs

Another potential source of revenue related to corporate and investor sustainability goals is through an ecosystem services marketplace where participating farmers and ranchers could earn direct proceeds from the sale of “assets.” Two marketplaces are being developed right now by Ecosystem Services Market Consortium (ESMC) and are expected to launch in 2022. One is essentially the same as the voluntary offset market (Scope 1); the other is a Scope 3 marketplace, where emissions are reduced from the steps throughout the company’s value chain (including purchased goods, capital goods, processing, etc.) (ESMC, 2021; US Environmental Protection Agency, 2020). Scope 3 reductions are not subject to rigorous quantification and verification standards, but they must come from the sources related to the company (ESMC, 2021). With this, corporations with carbon neutrality, water conservation targets, or other goals can essentially pay their suppliers to implement management practices they need to achieve them.

CHALLENGES

Because corporate sustainability is only just starting to become popular, it is difficult to understand how much of an impact it will have on farmers and ranchers at this time. In regards to the ecosystem services marketplace, theoretically Scope 3 emissions circumvent many of the complexities related to verification and quantification. However, this topic is definitely an opportunity for further research as the practice becomes more widespread and ecosystem marketplaces start operating.



CASE STUDY

Consumer food industry titan General Mills has made a commitment to “reduce its absolute GHG emissions by 28% across its full value chain by 2025.” (General Mills, 2020). With that it also has the goal to “advance regenerative practices on 1 million acres of farmland by 2030” because climate change’s threats to agriculture will impact the crops and livestock the company relies on to make its products (and profit) (General Mills, 2020). In 2020, the company launched a 3-year pilot program with 24 wheat growers in Kansas to implement regenerative agriculture and share best practices. This pilot program is also meant to align with efforts by the Ecosystem Services Market Consortium (ESMC), the organization discussed in the “Description” subsection. Farmers in the pilot who agree to data tracking and field measurements will also be paid for the carbon sequestration and water quality improvements when the ESMC’s ecosystem service market becomes operational. If these pilots are successful, they will show how corporations’ sustainability goals can result in financial benefits for farmers and ranchers: first, the increased profitability from regenerative agriculture practices, and second direct proceeds from the sale of credits in an ecosystem services marketplace.

Infill Development and Avoided Conversion



As described in Chapter 2: Policy Context, California's planning priorities center infill development and the protection of natural and working lands. Infill development is reuse and redevelopment in areas that were previously developed and thus already has access to infrastructure and services (Shirazi et al., 2017). This means the natural and working lands that otherwise would have been developed as greenfield sprawl are not converted, which is known as avoided conversion. SB 375 operationalizes those concepts by requiring MPOs to include Sustainable Communities Strategies in their RTPs.

Avoided conversion protects habitat, open space, and agricultural production on the land. Those lands can continue providing ecosystem services such as biodiversity, food production, water filtration, and air purification. It also has a two-fold benefit in regards to GHGs (more specifically carbon). First, placing development such as housing and jobs in places with existing infrastructure reduces the amount of driving people do, typically measured as vehicle miles traveled. This lowers GHG emissions, since the burning of fossil fuels for driving emits GHGs (primarily carbon dioxide). Second, the land that is conserved continues to hold its carbon stock in the soil, trees, and other organic matter. With proper management activities as described in the "Agriculture Preservation and Working Lands Management" section, it can continue sequestering carbon as well.

This topic is particularly important in the San Joaquin Valley, where the Public Policy Institute of California (PPIC) has made a conservative estimate that 780,000 acres of irrigated agricultural lands (almost 15% of the total in the Central Valley) would have to be fallowed to end groundwater overdraft (Escriva-Bou et al., 2019).¹ The question is if so much important farmland may be lost, what type of land use will it be converted to?

Infill and avoided conversion also relate to climate risk reduction especially in relation to wildfire. 32% of homes in California are located in the Wildland-Urban Interface (WUI), the area where development and wildlands mix and increase the potential for and intensity of wildfire damage (Mowery et al., 2019). At the same time, climate change exacerbates the factors that turn wildfires, which started as a natural characteristic of the state's landscape, into deadly mega-fires. Concentrating development in existing urban areas instead of further into the wildlands can keep people safer and avoid costly damages.

Greenprints are a way to map out the conservation values and benefits produced by a region's NWL. The two largest in California, the Bay Area Greenprint and the SoCal Greenprint (in development), provide analysis on approximately 65% of the state's lands (Grieg Asher, personal communication, December 15, 2020). Though the findings of these tools are not legally binding, the intent is to make policymakers and the public aware of the full spectrum of values provided by the land. For example, the Bay Area Greenprint maps the location of key benefits such as riparian corridors; prime farmland; groundwater recharge potential; aboveground live carbon storage; and regional trails (Bay Area Greenprint, n.d.). This knowledge can guide policymakers towards infill and land conservation when making land use decisions, especially when updating an SCS or deciding on General Plan Amendments that would create sprawl.

¹ The 780,000 acre estimate is based on a scenario where farmers have no flexibility to trade water or change crop choices.

Infill Tool 1

Transfer of Development Rights

DESCRIPTION

Transfer of Development Rights (TDR)² is a market-based mechanism that allows developers to purchase the development rights of a parcel where conservation is preferred and apply them as bonus density on their project. TDR programs are implemented at the local government level, as the jurisdiction uses its land use regulations to designate the sending areas (where development is limited) and the receiving areas (where development is encouraged) (Pruetz, 2020). Jurisdictions select sending areas based on their particular objective, which could include historic preservation, water quality protection, and preserving wildlife habitat (Reimherr, 2020). They all essentially fulfill the purpose of avoided conversion, but the model of rural TDR programs is most directly applicable for NWL conservation at scale. These programs downzone a large swath of rural parcels and restrict their use to agriculture; then, landowners who opt-in receive TDRs that they can sell to compensate for the previously permitted density (Kendig, 2021). In theory this results in a development pattern of infill in urban areas and preservation of NWL consistent with SB 375.

The financial incentive of this tool is landowners receiving proceeds directly from the sale of TDRs. Landowners can use the proceeds to enhance their agricultural operation and make it easier for them to stay on the land. Unfortunately it is impossible to make a blanket estimate of how much a TDR is worth in California because it depends on each individual program and the market pressures of their area. However, the success of a rural TDR program (and the amount of potential profits) depends on a complex web of market and land use planning factors. On the supply side, landowners in the

FINANCIAL INCENTIVE

Direct Proceeds; One-Time

READINESS

Operational

CO-BENEFITS

Reduce GHGs through avoided conversion

Protect open space

Preserve carbon stocks

Support biodiversity

Support wildlife movement

Retain agricultural revenue

Improve water quality

Reduce water pollution

Provide recreational opportunities

² "TDR" refers to both the Transfer of Development Rights as a program and a property's development rights.

sending area must feel that “the sale of TDRs [is] comparable to the value to develop or redevelop” (Kendig, 2021 p. 2). Demand for development rights depends on (a) sufficient market demand for housing and commercial in the receiving area that will increase developers' revenue; (b) the price of the TDRs; and (c) if the baseline density allowed by the zoning of the receiving area is too low to meet that demand (Pruetz, 2020).

CHALLENGES

As indicated by the previous subsection, TDR programs are very complicated to administer. In many cases rural TDR programs (which seek to shift development to existing urbanized areas) are challenged by too much supply from the sending areas. This is caused in part by the sending properties not being down-zoned enough, and the inclusion of too many sending properties in the program (Kendig, 2021). Demand is another factor, where there needs to be enough development pressure to motivate developers to purchase additional TDR. However, rural TDR programs take place in agricultural counties, which may not have much development pressure compared to the more urbanized ones in the state.

These challenges show that TDR as it stands is not well-suited for the massive development shifts needed to preserve California's NWL at the landscape scale. A potential solution is the creation of a statewide TDR bank in California, which would allow the State to establish sending and receiving areas that align with conservation and climate goals. For instance, making areas of high fire hazard severity zones senders could incentivize developers to not build in the WUI and put people at risk from wildfires. Though this is purely speculative and would be a massive State undertaking to establish the zones, existing tools (such as regional greenprints) and plans (such as each MPO's RTP/SCS, and NCCPs) could be a good starting place. They already outline where important conservation values are and what areas are best equipped with the infrastructure to support development.



CASE STUDY

The Lake Tahoe Region was one of the earliest adopters of a TDR program, starting with the Tahoe Regional Planning Agency's (TRPA) growth management strategy in the 1960's through 1980's; since 1987, every property has to obtain development rights to build. Under the region's Development Rights Strategic Initiative, the development rights that can be transferred from sending parcels to receiving parcels "include commercial floor area (CFA), tourist accommodation units (TAUs), and single and multi-family residential units" (Tahoe Regional Planning Agency [TRPA], 2021a). The objective is to transfer development potential from environmentally sensitive areas (especially to protect the region's water resources) and encourage it in areas that already have access to services. Five new measures were adopted in 2018 to improve and streamline the program:

1. Allows for the conversion between use types, for instance one tourist accommodation unit development right is equivalent to 1.5 multi-family residential development rights;
2. Does not require the approval from local jurisdictions when transfers go across boundaries (only requires TRPA approval);
3. Partnering with land banks, one in California and one in Nevada, to provide another avenue for acquiring, selling, and banking development rights;
4. Creating a more user-friendly TDR system; and
5. Using residential bonus units to incentivize development of housing below median prices (TRPAa, 2021).

With these, the TRPA TDR program goes beyond promoting infill and avoiding conversion. Because the Lake Tahoe Region is almost completely built out, transfers are typically between properties that both have structures or coverage of some kind already (as opposed to the classic example where the sending parcel is greenfield). One way to generate development rights is by literally removing existing development from a sending parcel; the two land banks can acquire properties, remove the structures, driveways, etc. that were on it, restore and revegetate the land, and then sell the development rights (TRPA, 2021a). While avoided conversion alone passively results in ecosystem services, this aspect of the TRPA program is a more deliberate restoration and management effort as well.

From the landowner perspective, the price of TDR is completely market-based but references can be viewed on the TRPA TDR Marketplace webpage. One entry for Commercial Floor Area asks for \$25 per square foot, while one for Tourist Accommodation asks for \$20-\$30 per square foot (TRPA, 2021b). Assuming the sender does find a receiving property, with transfers ranging from hundreds to thousands of square feet there is the potential for a very large amount of direct proceeds.



Infill Tool 2

Compliance Offsets

DESCRIPTION

The Compliance Offset Program is a component of the Cap-and-Trade Program administered by CARB to meet California's GHG reduction goals. Entities covered by Cap-and-Trade can meet their compliance obligation³ with allowances (which are distributed via quarterly auctions, free allocation to eligible industrial sources to prevent emissions leakage, or traded with other entities), but a small portion are met through offset credits issued by CARB. That portion, called the quantitative usage limit, was 8% through 2020 emissions and has dropped to 4% for the years 2021-2025 (CARB, 2021a). Offsets are "real, quantifiable, enforceable, permanent, additional, and verified [GHG] reductions." (CARB, 2021c). To support full transparency in the development and issuance of offset projects, projects must first list with one of the three CARB approved Offset Project Registries.⁴ These registries must post project documentation on their public websites.

While all of the six of CARB's approved Compliance Offset Protocols reduce GHGs, the US Forest Projects is the only one that counts avoided conversion of privately owned lands as a project type. The projects must:

[Prevent] the conversion of privately owned forest-land to a non-forest land use by dedicating the land to continuous forest cover through a qualified conservation easement or transfer to public ownership, excluding transfer to federal ownership (CARB, 2015 p.14).

3 "Compliance obligation" simply refers to what is needed to meet program requirements. With Cap-and-Trade, there is a cap on GHG emissions that declines every year. In general, facilities that emit 25,000 MTCO₂e or more per year must use one permit (allowance or offset) for each ton of GHGs they emit (CARB, 2012).

4 American Carbon Registry, Climate Action Reserve, and Verra.

FINANCIAL INCENTIVE

Direct Proceeds; Ongoing

READINESS

Operational

CO-BENEFITS

Reduce GHGs through avoided conversion

Preserve carbon stocks

Increase carbon sequestration

Improve air quality

Protect open space

Support biodiversity

Support wildlife movement

Prevent soil erosion

Conserve water

Improve water quality

Facilitate groundwater recharge

Reduce wildfire risk

Promote green jobs

To prove that conversion of the land to a higher intensity use is truly being prevented, project proponents must provide documentation that the local land use policies permit the anticipated conversion, that the forest owner obtained approval for a development project, and/or that similar forestlands were recently able to get approval for development (CARB, 2015). The offsets are calculated based on the difference between the onsite carbon stocks that would have been removed due to conversion, and the stocks that would exist under a 100-year baseline business-as-usual scenario (CARB, 2015). Lands that can generate a large amount of offsets (each offset is equivalent to one MTCO_{2e}), meaning ones that face the most significant development threats and have the most trees, are more valuable. For instance, the default calculation is that agricultural and commercial conversion would lead to the loss of 90% and 95%, respectively, of the carbon stored in the forest (CARB, 2015). In a well-stocked forest this preserves an enormous amount of carbon stock, which can result in many offset credits generated per acre. For all of 2020, the average price for a US Forest Project Offset was \$13.66 (CARB, 2021e)⁵. This can be a source of income on top of timber harvesting revenue, which could be allowed subject to the terms of the easement and applicable forest management plan.

In addition to reducing GHGs, US Forest Projects avoided conversion projects can produce co-benefits such as improving the health of the forest and connecting wildlife habitat. Forests may contain riparian habitat, in which case the project could help improve water quality and support aquatic species. Furthermore, when paired with forest management activities they have the potential to reduce wildfire risk by reducing flammable material accumulated through years of neglect. It also reduces people's exposure to wildfire risk by preventing expansion of WUI development.

⁵ For all offset types, the weighted average price was \$13.47 per offset in the fourth quarter of 2020 (CARB, 2021d).

CHALLENGES

The CARB US Forest Projects protocol is well established, but there are challenges to making technical and practical protocols related to avoided conversion and new protocols related to carbon sequestration. When the CARB Compliance Offsets Protocol Task Force⁶ considered if the existing ACR voluntary offset for compost application to rangeland could be recommended as a compliance offset protocol, they determined that while they believed it met all the AB 32⁷ standards, the expense of transporting and spreading compost was not currently economic. Ultimately, this Task Force recommended against adopting the protocol unless the economics can be improved. (CARB Compliance Offsets Protocol Task Force, 2021).

From the landowner perspective, developing a project to generate offsets requires technical expertise and funds. It may be necessary to hire a consultant to design the offset project, conduct the baseline inventory, and help with yearly monitoring and reporting requirements. There are also transaction fees, as it costs money to obtain the required third-party verifications and conduct monitoring.

CASE STUDY

The ARB Offset Credit Issuance Table indicates that there are numerous avoided conversion US Forest Projects that are generating ARB offset credits. One is the Green Assets Middleton Avoided Conversion Project, which prevents conversion of approximately 3,700 acres of woodlands near Charleston, South Carolina (Floyd, 2019). The project has been issued nearly 245,000 compliance offset credits from ARB since the project was approved in 2015 through the most recent offset issuance in March 2021 (CARB, 2021a). According to the landowners, the revenue from the project has given them the financial support they needed to stay on the land.

⁶ Established by CARB pursuant to AB 398

⁷ Real, additional, quantifiable, permanent, and verifiable.

Infill Tool 3

Solar Energy Projects

DESCRIPTION

Development of solar energy projects⁸ can combat land conversion in two ways. The first is by establishing a use on land that would otherwise be taken out of agricultural production to help end groundwater overdraft in the Central Valley. The second is by creating additional revenue on agricultural operations when solar is co-located (called agrivoltaics), which is a way to help farmers and ranchers stay on the land.

UTILITY-SCALE SOLAR

The PPIC estimates that as many as 50,000 acres in the San Joaquin Valley could be used for solar development (Hanak et al., 2019). In this situation, solar projects would be sited on retired cropland and non-irrigated rangeland⁹ (Hanak et al., 2019). Landowners can derive financial benefit from a solar operation by leasing their land to a solar developer, by permitting and selling “shovel-ready” projects to solar developers, or by developing their own project. With a lease, landowners would receive rent payments from the solar developer for the duration of their contract. Similarly, with “shovel ready” projects (like the one described in this tool’s Case Study subsection) the landowner sells the land to solar developers, who then sell the project to a power company. If the landowner decides to take on the difficult process of permitting and installation themselves, they will receive the profits from selling the energy generated onsite. Another potential source of revenue is trading the surface and/or groundwater rights that are left un-

8 For the purposes of this toolkit, “solar projects” refers to utility-scale solar (larger projects where the energy generated is sold to utility buyers) rather than distributed generation (smaller projects that provide energy onsite or to a microgrid).

9 Solar projects on non-irrigated rangeland are not considered “avoided conversion” because they are not taken out of production in relation to water shortages.

FINANCIAL INCENTIVE

Direct Proceeds; One-Time or Ongoing

READINESS

Emergent

CO-BENEFITS

Facilitate groundwater recharge

Support State clean energy goals

Promote green jobs

Prevent soil erosion

Maintain soil health

Preserve carbon stocks

Improve air quality

Support agricultural operation

used due to the absence of crops. Though local surface water trading has existed in California since the 1980s, groundwater markets are an emergent opportunity in light of SGMA. Local and valley-wide water trading has the potential to reduce fallowed acreage to 750,000 and 725,000 acres, respectively, and would help keep the most valuable farmland in production (Hanak et al., 2019).

AGRIVOLTAICS

A second type of solar project is agrivoltaics, in which the solar infrastructure is co-located with crops and/or livestock. This method is not well suited for large-scale operations like the ones in the Central Valley due to the use of heavy equipment that creates dust (Cox, 2020). But it is an option for smaller agricultural operations to increase and diversify their revenue stream, which can help them stay on the land. A study also found that solar panels reduce water use, protect plants from high heat, and increased yields of the crops that were tested (US National Renewable Energy Laboratory [NREL], 2019).¹⁰

Both types of solar projects can be harmful to wildlife, vegetation, water, and soil, but there are ways to reduce its impact to the environment. But, using fallowed agricultural land would have fewer impacts than natural lands because the ecosystem has already been disturbed. Low-impact solar development is a way to install solar power equipment¹¹ using low-impact site preparation methods including but not limited to: leaving existing vegetation or low-growing crops in place; leaving the soil intact by minimizing grading; and using driven piles to support panels instead of concrete foundations (NREL, 2020). These measures can mitigate potential negative effects of fallowing land such as dust/topsoil loss and soil compaction. They can also support pollinators of nearby agricultural operations.

¹⁰ Chiltepin pepper, jalapeno, and cherry tomato.

¹¹ The two main kinds are primary photovoltaics (PV) and concentrating solar power (CSP). The latter is only used for utility-scale projects.

CHALLENGES

One of the drawbacks of utility-scale solar in general is the harm caused to wildlife, either as direct mortality or longer-term issues such as changes in microclimate and habitat fragmentation (Smithson-Stanley and Bergstrom, 2017). As mentioned in the previous subsection, low-impact solar development strategies can reduce some of the negative effects to habitat. For example, it maintains existing vegetation, which supports plant biodiversity and serves as insect habitat. A more impactful solution is to conduct landscape-scale analyses that include habitat and farmland values in addition to the typical solar siting considerations (which focus on energy potential, transmission infrastructure, etc.). The Nature Conservancy has conducted this analysis at the state level incorporating ecological, cultural, and agricultural siting criteria under different environmental land protection scenarios (Wu et al., 2019). However, it would not be easy for a local government agency to replicate this model if they wanted to make an ecologically-focused solar siting plan for their area. A connection that should be explored is whether the habitat planning tools that already exist - NCCPs, RCISs, and Greenprints - can be used to site solar projects in a more ecologically conscious manner.

The PPIC created a process of mapping least-conflict areas that can be applied to other jurisdictions looking to comprehensively plan utility-scale solar. It was a stakeholder-led effort of mapping that explored how to balance the need for renewable energy, the protection of prime farmland, and biodiversity (Pearce et al., 2016). Agricultural and environmental stakeholders used an online mapping platform to create their own maps of where they thought solar PV should be sited. An agricultural map and an environmental map were produced from the individuals, then both were combined to make a composite map of least-conflict solar (Pearce et al., 2016). Local governments could follow this process either to produce least-conflict maps to make into formal policy, or simply as an exercise to understand the motivations of different stakeholder groups around solar projects.

For a landowner or project proponent, a challenge is that solar projects are becoming less profitable due to market saturation. Because renewable energy is seen as a stable investment, there are so many investors that they are willing to accept lower returns (Merchant, 2019). Additionally, Power Purchase Agreements (how the solar plant sells the power it generates) are becoming shorter and are paying less per megawatt hour than ever before (Merchant, 2019). While this is just a general trend, people who pursue solar projects should be aware of the financial uncertainties and potential risks.

CASE STUDY

Maricopa Orchards was a piece of undeveloped, private agricultural land in Kern County that is now the site of the 700-megawatt Maricopa Sun Solar Complex. In this case, the landowner did not develop the solar themselves, but rather “pre-permitted [properties] for solar development, and then sold or leased to solar developing interests” (QK, 2020). In order to develop the project the landowner had to cancel the Williamson Act contract on all parcels, a total of 6,047 acres that were classified as prime farmland, unique farmland, and farmland of statewide importance (Kern County Planning Commission, 2011). However, the project moved forward because the property did not have any water rights since 2003 (so no possibility of procuring irrigation for agriculture) and the groundwater was degraded and contaminated (Kern County Planning Commission, 2011). Currently the only project built is the 160-acre, 20 megawatt Maricopa West, but nearly 80% of the solar lands have been sold (QK, 2020; Roth, 2019). The project was required to make a habitat conservation plan to cover the entire site and sets aside 2,000 acres of environmental mitigation lands for at-risk species that is managed by Sequoia Riverlands Trust (Roth, 2019; Hanak et al., 2019). Furthermore, the solar lands will be transitioned to conservation lands when the solar project is decommissioned in the future (QK, 2020).



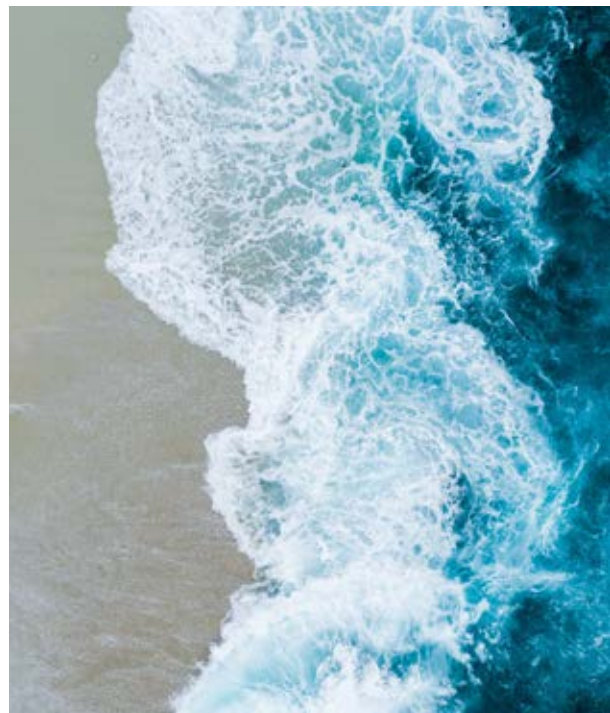
Climate Risk Reduction



Tools in the other three categories relate to climate risk reduction by reducing GHGs and preserving or enhancing the land's ecosystem services, the tools in this one have the direct objective of reducing the amount of climate risk (and damages) experienced by communities. This is in the context of "natural"¹ disasters that are made more frequent and/or intense by climate change. Land conservation can be a way to buffer people and infrastructure from climate impacts and/or shift them out of harm's way as part of a "managed retreat" strategy.

To understand the extent of economic damage disasters can cause, the reinsurance company Munich Re estimated that "hurricanes, wildfires and other disasters across the United States caused \$95 billion in damage last year... almost double the amount of 2019 and the third-highest losses since 2010" (Flavelle, 2021). Though hurricanes and storms were the most costly type of disaster in the US, the record-smashing wildfire season in California caused \$16 billion in losses that even extended beyond the state boundaries (Flavelle, 2021). According to the California Department of Forestry and Fire Protection (CAL FIRE), during the 2020 fire season over 4.25 million acres were burned and nearly 10,500 structures were damaged or destroyed (CAL FIRE, 2021). Sadly, 33 fatalities occurred as well. In addition to the loss of human life, homes, and infrastructure, climate-induced disasters affect natural systems. For instance, the food system can be directly affected (as in the destruction of crops) or impacted over time from temperature variability. They can also impact the water system, such as when there is runoff after a wildfire that carries ash and contaminants into rivers and other bodies of water. As a whole, tools to reduce climate risk reduction achieve every co-benefit identified in this project.

¹ Disaster events involve natural phenomena but they are disasters because of the way development comes into contact with it. Anthropogenic climate change has also pushed natural phenomena to new extremes.



Parametric Insurance on Natural Assets

DESCRIPTION

Parametric insurance is a type of insurance that immediately pays out when a “trigger event” occurs, regardless of the amount of damage incurred by the insured (Kousky and Light, 2019). Trigger events include natural disasters like earthquakes, cyclones, and floods, where the exposure parameter that triggers the payout is a certain magnitude, wind speed, or feet of water (SwissRe, 2018). The parameter must be an objective, consistent measurement that can be verified by an independent body (SwissRe, 2018). Given these requirements, parametric insurance is currently a disaster response tool. However, scholars and nonprofits (notably, The Nature Conservancy) are beginning to explore if nature itself can be insured. This approach, “spatially delineated natural areas could be insured against possible damage or degradation just like real property” (Kousky and Light, 2019 p. 362). This idea is being explored especially in relation to mangroves and coral reefs, which are types of natural infrastructure that protect coastal ecosystems.

The financial incentive to conserve and restore the natural systems is avoiding catastrophic environmental, economic, and infrastructural costs in the future. Organizations, private landowners, and/or governmental bodies with an insurable interest² can buy a parametric policy on an ecosystem and be responsible for paying the premiums (Kousky and Light, 2019). This discussion is currently mostly hypothetical because these policies are not part of insurance companies’ regular portfolio yet. Anyway, when the trigger event occurs the beneficiary receives a previously agreed-upon payout to compensate for damage to the ecosystem. They do not have to assess the cost of damages after the event, which

² Insurable interest means the entity would incur financial loss if the asset is damaged.

FINANCIAL INCENTIVE

Avoided Damages; Ongoing

READINESS

Speculative

CO-BENEFITS

Support biodiversity

Support wildlife movement

Protect open space

Preserve carbon stocks

Increase carbon sequestration

Prevent soil erosion

Conserve water

Improve water quality

Reduce water pollution

Provide recreational opportunities

would be costly and time consuming because ecosystem services are hard to put a value on (Kousky and Light, 2019). It is necessary to point out that “insurance is just a mechanism to transfer risk; it is not a source of funding... for ecosystem conservation and restoration than might otherwise be available” (Kousky and Light, 2017 p. 375). But, it does show that there is a monetary value for the protective qualities of natural infrastructure.

CHALLENGES

A key aspect of an “insurable trigger” is modellability (SwissRe, 2018). To create a parametric insurance strategy on a piece of natural infrastructure, there has to be a clear connection that damage to that infrastructure reduces its ecosystem services, which then results in damage to certain assets. It is difficult to draw that connection because it needs extensive high-resolution environmental data and sophisticated models. For instance, the coral reef example in the Case Study subsection relied on a meta-analysis of over 200 sites over 20 years to understand the effect of wind speeds on reefs that then became their trigger metric (The Nature Conservancy [TNC], n.d.). While regular parametric insurance can rely on existing earthquake and hurricane models, unfortunately the scientific understanding of the impacts of ecosystem services is not as developed.

A trigger also has to be a fortuitous event, meaning it occurred by chance. Many impacts of climate change build up over time and thus do not meet this condition. But as the following Case Study shows, through extensive collaboration between insurance companies, governmental partners, and conservation advocates it is possible to craft a broader application of parametric insurance. One way forward is to insure an asset (built infrastructure or an industry) that would be damaged if an ecosystem was being degraded by climate change (Sarah Heard, personal communication, November 16, 2020).

CASE STUDY

The Nature Conservancy (TNC) has helped create a groundbreaking parametric insurance policy on the Mesoamerican coral reef and beach on Mexico's Yucatan peninsula. The project was a public-private partnership between Mexican governmental agencies, reinsurance company SwissRe, TNC, and other partners. (TNC, n.d.). Like a regular parametric insurance policy, the beneficiary³ receives a payout when wind speeds exceed the trigger point of 100 knots (in a Category 3 and above hurricane) (TNC, n.d.). However, it is unique because the funds will be used to restore the reefs and beaches (natural infrastructure) instead of built infrastructure after a storm. Up to \$3.8 mil⁴ will be paid out to cover immediate and long-term restoration efforts carried out by a team called the Reef Brigades, who will conserve the ecosystem by removing debris from the reefs, fixing broken parts of the reef, and setting up coral nurseries (TNC, n.d.). The healthy reefs can then protect the coastline by reducing wave energy by 90% during a storm and 60% under typical conditions (TNC, n.d.). This insurance policy recognizes the value of the reef and beaches for protecting people's livelihoods and the very economically important tourism industry. The reefs themselves are an important attraction that generates \$60 mil per year, and the greater coastal tourism industry generates \$9 bil for the region (TNC, n.d.).



- 3 The Mexican state Quintana Roo's Trust for Coastal Zone Management, Social Development and Security purchased the policy.
- 4 The trust receives 40%, 80%, or 100% of payout depending on wind speed.

Green Infrastructure

DESCRIPTION

With Governor Newsom's EO N-82-20, nature-based solutions (NBS) are now a priority in the State's agenda to combat and adapt to climate change. NBS refers to actions on NWL that reduce GHGs, enhance ecosystem services, produce environmental and societal co-benefits, and promote adaptation (Chamberlin et al., 2020). There is a huge range of NBS that can be applied in California, including but not limited to agroforestry, compost application, rice cultivation, and riparian restoration. Green infrastructure is under the umbrella of NBS, but it is not as broad because it addresses a particular impact at specific sites, which can vary in scale but are still more place-based. For example, restoring a sand dune on a beach to prevent beach erosion is a green infrastructure response to sea level rise-induced flooding. Another example is building a park and designing it in a way that allows for natural percolation, which is a green infrastructure response to stormwater runoff issues.

The speculative financial benefit accrued to landowners is avoiding damages (direct or indirect) that they would otherwise experience from a climate change-related hazard. This could include property damage, lost revenue, loss of livestock, etc. Another speculation is whether the implementation of green infrastructure projects to reduce risk could result in lower insurance premiums for residents of hazard-prone areas. As mentioned in the "Voluntary Buyouts of At-Risk Properties" tool, insurance is becoming more expensive (or not even available) in areas that the companies see as too much of a risk, particularly in relation to wildfire. As climate change-related hazards intensify, perhaps there can be efforts in the future where local agencies and NGOs collaborate with insurance companies to create a framework where the implementation of certain green infrastructure strategies can result in lower premiums.

FINANCIAL INCENTIVE

Avoided Damages; Ongoing

READINESS

Speculative

CO-BENEFITS

- Support biodiversity
- Support wildlife movement
- Protect open space
- Preserve carbon stocks
- Increase carbon sequestration
- Improve soil quality
- Prevent soil erosion
- Support agricultural operations
- Retain agricultural revenue
- Protect the food system
- Conserve water
- Improve water quality
- Reduce water pollution
- Facilitate groundwater recharge
- Provide educational opportunities
- Provide recreational opportunities
- Reduce GHGs through avoiding conversion

CHALLENGES

Because there are so many potential green infrastructure strategies that can be applied to address adaptation to different climate risks, local governments and NGOs can pursue projects as large or small scale as their capacity allows. However, because green infrastructure projects are more comprehensive solutions than those that have traditionally been carried out by governments, they often require intense coordination with many different agencies. The segmented nature of planning, public works, parks, emergency operations departments, etc. within a city or county (not to mention the complexity of overlapping special districts and regional governance structures) can definitely be a barrier to project implementation. A potential solution is to convene local working groups that bring together representatives from many different departments and disciplines. These groups can present ideas for collaborative projects and hopefully cut through some of the bureaucratic back-and-forth when projects are in progress.

CASE STUDY

In response to the deadly Camp Fire (2018), the Conservation Biology Institute, TNC, and the Paradise Recreation and Parks District conducted an analysis of Wildfire Risk Reduction Buffers (WRRB) as a way to protect the town of Paradise from future fires. If they come to fruition, they will be examples of NBS because they are partially composed of “greenbelts” of recreational uses, working lands, and other uses that could help reduce fire risk. The analysis of buffer locations balanced the complexities of public and private interests including the timber industry, the US Forest Service, and Bureau of Land Management, Pacific Gas and Electric, the Paradise/Butte County agencies, and Paradise community members (Conservation Biology Institute, 2020). The WRRB model represents a new way to think about resilience to fire in WUI communities that combines land use and urban design, land/natural resource management practices, and an understanding of natural fire regimes.



Voluntary Buyouts of At-Risk Property

DESCRIPTION

Disasters such as floods, hurricanes and wildfires are increasing in frequency and intensity as the climate changes. Though there are numerous strategies that can help communities carry out “managed retreat” from geographic areas that face inevitable damage from climate change-related disasters, voluntary buyouts is one that provides a financial incentive to landowners and facilitates land conservation. In its most basic sense, a voluntary buyout is when an entity (typically a State or local government) purchases a property that is subject to hazard impacts from a willing seller. This gives the selling landowner the opportunity and funding to relocate somewhere safer. Buyouts can occur at the individual parcel level or even the community scale, as discussed in the Case Study sub-section (Georgetown Climate Center, n.d.). Then, in the ideal scenario the buyer demolishes the existing structures, restores the land to an open space use, and keeps the land conserved in perpetuity through deed-based restrictions or conservation easements (Georgetown Climate Center, n.d.). The land may be transferred to a conservation nonprofit or a land trust.

When nature-based solutions are implemented on the bought-out land, this tool both removes people from direct harm and supports ecosystem services that help reduce the progression of climate change. The type of restoration and management activity depends on the hazard faced by the area; for instance, land at risk of hurricane-induced flooding and sea level rise may undergo wetland restoration, while land at risk of river flooding may undergo floodplain restoration. Both of those activities increase carbon sequestration, improve water quality, and provide habitat for wildlife. Recreational open space such as trails, parks, and community gardens are another potential use for bought-out land.

FINANCIAL INCENTIVE

Direct Proceeds; One-Time

READINESS

Speculative

CO-BENEFITS

Protect open space

Provide recreational opportunities

Support biodiversity

Support wildlife movement

Increase carbon sequestration

Improve water quality

From the landowner perspective, the financial incentive gained from a buyout is direct proceeds from the sale of the property and the avoidance of future costs from the inevitable flood, fire, etc. The amount of compensation offered for the property is typically the pre-event fair market value, though programs can also offer the damaged, post-disaster value (Freudenberg et al., 2016). The landowner can then use the funds to relocate, such as by placing a downpayment on a new house located out of danger. However, even the pre-disaster value of the property may not be a financial incentive to a homeowner, for instance those “who owe more on their mortgage than the property’s value” (Freudenberg et al., 2016 p. 31). The other financial incentive is avoiding costs associated with staying on the property through disaster events. Besides the potential for loss of life, costs experienced by landowners include depreciated property values, structural damage to homes, and new or higher insurance premiums (Barrett, 2018). Insurance premiums are especially relevant in the context of wildfires in California. With wildfires costing reinsurance companies tens of billions of dollars in losses over the past few years, insuring high wildfire risk areas has become too risky and has resulted in less coverage available to residents (Kasler, 2020). This has pushed homeowners to “wrap around” insurance policies, translating to yearly costs going from \$2,000 to \$6,000 (or more) for homeowners in wildfire-prone areas (Kasler, 2020).

CHALLENGES

There are many barriers to implementing voluntary buyout programs in response to climate change-induced hazards. To start, the strategy of “managed retreat” is often dismissed by government officials “as an option to be averted at any cost” and is used instead as a “threat to encourage alternate courses of action, such as timely reductions in greenhouse gas emissions or investments in the ‘hard’ defenses of levees and seawalls” (Koslov, 2016 p. 361). It is a difficult change for residents and officials to accept a process of “unbuilding” and understand that “retreat is neither a passive act nor a defeatist one”

(Koslov, 2016 p. 378). Even assuming the State or local government recognizes retreat as a legitimate climate adaptation strategy, funding and administering the program are key challenges.

A majority of buyout programs are administered locally but rely on funding from the Federal Emergency Management Agency (FEMA) and the Department of Housing and Urban Development (Freudenberg et al., 2016). Unfortunately, an analysis of 30 years of FEMA flood buyout data found that the median time between the disaster event and the completion of a buyout is just over 5 years (Weber and Moore, 2019). It takes so long because FEMA, the State government, the local government, the homeowner, and the National Flood Insurance Program (in the case of flood) coordinating the application, approval, and implementation process (Weber and Moore, 2019). This leaves homeowners in a state of uncertainty, which can put them at risk and lead them to drop out of the program. For example, homeowners may not know whether or not to make repairs on their homes (in case they will not be reimbursed); this especially impacts low-income residents who cannot absorb costs while waiting for a buyout to finalize (Weber and Moore, 2019).

As indicated in this entire tool section, voluntary buyouts are an established strategy to respond to coastal and riparian flooding. Buyouts are not currently used in the context of wildfire, but in the future they can be a significant opportunity to incentivize landowners to relocate out of high-fire risk areas and WUI. Similarly to FEMA’s flood maps, CAL FIRE adopts Fire Hazard Severity maps for State Responsibility Areas and requires each county to make their own maps that identify Very High Fire Hazard Severity Zones. Using those maps and taking into account fire history of areas that burn repeatedly, the State, local jurisdictions, and communities can at least begin to consider the feasibility of voluntary buyouts (and managed retreat overall) as a tool to preemptively adapt to wildfires that are increasing in frequency and intensity with climate change.

CASE STUDY

The New Jersey Blue Acres Program is regarded as one of the most successful state-run voluntary buyout programs in the US. The program helps municipalities identify and buy “developed properties that have been or will be damaged by storms or storm-related flooding, or that buffer... other lands from flooding” (Spidalieri et al., 2020 p.2). It prioritizes neighborhood-wide buyouts, facilitating the creation of larger-scale interventions that achieve maximum environmental and community benefits. To achieve such unified participation, a key problem the program staff works with to address is securing debt forgiveness for homeowners who owe more on their home than its fair market value (which would prevent them from accepting the buyout). In addition to staff and caseworkers who engage directly with participants, another element of Blue Acres’ success is the program director’s strong relationships with municipalities, within the State government, and with the Federal government (Spidalieri et al., 2020).

The program was initially established and funded by a \$15 mil bond act in 1995, with two more passed in 2007 and 2009 (\$12 mil and \$24 mil, respectively). After Hurricane Sandy occurred in 2012, Blue Acres also received funds from FEMA and HUD. In 2019, the State passed a constitutional measure allocating six percent of the state’s Corporate Business Tax to Blue Acres and Green Acres (which purchases undeveloped land for open space and recreation) annually. This ensures the program can be sustained in the long-term, and can help New Jersey expand the use of buyouts as a preventative measure rather than only in direct response to a disaster (Spidalieri et al., 2020).

Though Blue Acres has to do with flood buyouts, the fact that the buyouts are relatively proactive and operate at the community scale can be applied in the context of California wildfires. One key lesson is the importance of dedicated caseworkers to help homeowners and communities navigate the complex voluntary buyout process. Even though buyouts and managed retreat in general are viewed incredibly negatively, if caseworkers successfully achieve one it may inspire other members of the community to participate. Another lesson is the importance of a consistent, dedicated funding source. Since FEMA funding is mostly given in a post-disaster scenario, having a pot of State or local funding means buyouts could occur before the community burns for the second or third time.



Though the 15 tools discussed in this toolkit vary widely, the project brings to light six policy recommendations that can help California sustain and improve its own programs, support efforts in the nongovernmental sphere, and encourage landowner participation.

UTILIZE GREEN FINANCE

Land conservation and management programs require consistent and large amounts of funding. Green finance mechanisms such as resilience bonds and green bonds may be good options for the State (and even local governments) to pursue as new sources of funding for existing programs, and to create programs related to the more innovative and/or speculative tools discussed in this project. Resilience bonds already have some precedent in the California legislative process; though the Climate Resilience Bond¹ initiated in 2019 did not end up on the 2020 ballot, its is a concept worth re-examining. In general, resilience bonds “provide coverage against climate impacts and extreme events, but they also provide financing for adaptation and resilience projects that reduce risk” (Keenan, 2019 p. 41). Green bonds also can be issued to fund environmental benefits, which “[includes] projects that don’t directly reduce greenhouse gas emissions - for example, water management, pollution control, toxic waste cleanup, or climate adaptation such as seawall construction.” (California State Treasurer’s Office [CA STO], 2017 p. 7). Since 2016, “the California Infrastructure and Economic Development Bank has issued over \$1.3 billion in green bonds,” but their potential as a tool to fund climate adaptation efforts is currently underutilized (Keenan, 2019 p. 43). In the future policy-makers should consider them as a funding mechanism

¹ More formally referred to as “Wildfire Prevention, Safe Drinking Water, Drought Preparation, and Flood Protection Bond Act of 2020.”

for nature-based solutions

An in-depth analysis of the investor trade-offs with these bonds can be found in *Climate Adaptation Finance and Investment in California* (2019) by Jesse M. Keenan and reports from the California State Treasurer’s Office. Putting those aside, issuing resilience and/or green bonds is a “[statement] of [a] longer-term fiscal and environmental commitment that [goes] beyond the scope of short-term fiduciary responsibility” (CA STO, 2017 p. 10). This means that even if the bond is not particularly profitable to the issuer in the short term, it is still vastly preferable to the significant future costs of climate change that would occur in a scenario without action and investment (CA STO, 2017). Having a stable source of funding from green finance mechanisms also ensures that sustainability and climate resilience efforts continue even when the budget takes an unexpected hit (such as the next global pandemic).

WORK THROUGH LOCAL AND REGIONAL PROCESSES

In reviewing the case studies highlighted in this report, it is clear that a majority of the existing, emerging, and speculative land conservation tools rely on a combination of land use policy and conservation activities. Because local agencies have land use authority, local and regional efforts essentially determine whether or not the State’s goals will be met. For example, Councils of Governments and Metropolitan Planning Organizations are responsible for allocating housing to the jurisdictions in their area in accordance with the Regional Housing Needs Assessment. Their decisions affect the quantity and location of land that can be conserved for biodiversity and agriculture; they also impact TDR by affecting demand for development rights in areas slated for infill; they encourage or discourage development in areas

facing climate disaster risks; and the list could go on. At the regional level, greenprints can be a powerful informational tool to for local policymakers to support infill development, conserve NWL and maximize co-benefits.

The State should continue to recognize the importance of local agencies' ability to engage with stakeholders and respond to local concerns and conditions. This includes the local government, regional governance bodies, special districts, Resource Conservation Districts, and Tribal governments. An excellent example of coordination among agencies and responding to unique local conditions is in the Bay Area, where land use planning, open space preservation, tax policies, and Silicon Valley industry interests have collaborated across multiple levels of government for action in Coyote Valley (including the Santa Clara Valley OSA, the City of San Jose, and Santa Clara County, and others).

INTEGRATE MULTIPLE FINANCIAL INCENTIVES

Even though this toolkit separated the tools into four categories, they can (and should) be combined so that landowners achieve the maximum financial benefit from their land and conservation outcomes are enhanced. An example that scholars and policymakers already speculate about is combining the trading of water credits with utility-scale solar in the Central Valley. Further, the State and local jurisdictions could think about how to combine tools with a one-time financial benefit with ones that produce an ongoing benefit. For example, any of the six tools in the Agriculture and Working Lands section² could be combined with TDR. Before these combinations become a reality, State and local laws must clarify how they interact. For example, if a landowner of a sending property transfers their development rights (earning direct proceeds), would they also be able to establish a Williamson Act Contract and receive a tax benefit? Other tools require no real policy change but could require outreach and education for landowners. For example,

2 Section begins on page 31

helping owners of TDR sending properties incorporate regenerative agriculture or habitat exchange areas on their land. These efforts will increase the efficiency of conservation efforts because one landowner (and piece of land) can generate a larger quantity and variety of ecosystem services.

LEVERAGE FEDERAL POLICY AND FUNDING

The change in Federal Administration presents an excellent opportunity for greater State-Federal alignment. The Biden Administration has already begun acting on its climate change agenda; for example, on the first day of his presidency President Biden initiated the official process to rejoin the Paris Climate Accord. Federal agencies are anticipated to focus more on conservation and climate change. The historic appointment of Deb Haaland, the first Native American to serve as the US Secretary of the Interior, signals a commitment to protect public lands, natural resources, and the rights of Indigenous peoples. With this, there is definitely potential for the creation of Federal grant programs and policies that better support California's land conservation efforts.

In direct relation to the State policies described in Chapter 2 of this report, President Biden set a goal to protect 30 percent of US lands and ocean territories by 2030. This complements the "30 x 30" goal that is part of Governor Newsom's Nature-Based Solutions Executive Order.³ State policymakers should closely monitor the programs and funding opportunities that emerge from Federal agencies to support our own programs. Additionally, because Federal policy often follows California's lead when it comes to environmental policy, it is quite possible that the successful implementation of innovative land conservation strategies in California can influence the national action.

3 See page 10.

CREATE PROGRAM FACTSHEETS TARGETED FOR LANDOWNERS

The process of collecting data for this project revealed two issues related to outreach and communications. First, many programs do not have information available that specifically addresses how a landowner or other participant directly benefits. A second related point is that information for a single program is spread across many webpages, which can be difficult for people to find unless they are familiar with different State agencies. Because of these hurdles, the State should create factsheets about programs so landowners and other potential participants can know: “What does being a part of this program do for me?” Clearly indicating the potential financial benefits for individuals could encourage them to participate.

The reason for this recommendation is that a large, diverse swath of Californians need to engage with land conservation and management efforts in order to meet State conservation and climate change goals. The first issue is more conceptual; this project has shown that there are many different ways that land conservation might be important to people, in line with State priorities. On the other hand, some people may not care at all about biodiversity, agriculture and working lands, infill and avoided conversion, or climate risk reduction. In this case, focusing on the potential financial benefit could be a better motivator. The second issue is more about organization, since information for a single program is often spread over multiple webpages (as evidenced by the enormous amount of citations in this project). This may be challenging for the public to navigate, especially those who do not understand which State agencies relate to land conservation and climate change, and in what capacity.

The logical place for these kinds of documents is the Adaptation Clearinghouse (ResilientCA.org), which already has a curated collection of resources and case studies for the public. Perhaps the “ICARP Case Studies” or “Resources by Topic” tabs could have a collection called “Participant Outreach” that contains one to two page fact sheets on State-run programs and practices

that may not have programs yet. They should focus more on how programs can benefit participating individuals’ operations, property values, etc. instead of the high-level State goals. Though of course no specific claims can be made, it would be helpful to provide an example of a landowner’s experience moving through the steps of the program to eventually receiving a type of financial incentive. In conclusion, fact sheets summarizing program information and highlighting participant benefits should be produced as an extension of this project.

CONTINUE RESEARCHING INNOVATIVE LAND CONSERVATION STRATEGIES

In the initial scoping phases of this report, it seemed like a straightforward task to catalogue innovative land conservation tools. However, the research process revealed that most of them except for the longstanding ones (conservation easements, land management grants, etc.) are not well-developed or face major barriers to implementation. To help the research in this report have a lasting impact on land conservation in California, staff at relevant State agencies should analyze the actions they could take to reduce the barriers identified for each tool. Key examples include all the tools in “Climate Risk Reduction” section (which at this point are only “Speculative,” even as climate disasters intensify) and strategies that have to do with quantifying soil carbon sequestration (which at this time face scientific and cost barriers that NGOs and industry partners cannot overcome on their own). TDR is another area that policymakers should concentrate their efforts on, for example developing policy to support a statewide TDR program. An important next step is partnerships; for example, working with research institutions to study the scientific and economic aspects of the tools, and strengthening partnerships with Tribal communities. Another is providing more grants for pilot programs of innovative strategies, which may produce empirical evidence about the financial and ecosystem services benefits they create.

CONCLUSION

Previous conceptualizations of land conservation centered on a delineation between nature and human development. Conservation meant the preservation of “pristine” landscapes or important natural resources. Now, given the climate change crisis this paradigm is shifting towards a more reciprocal relationship; where “conservation” is also an active effort in which people (through institutional, community, and individual levels) attempt to sustainably manage and enhance the environment so it can continue to produce the ecosystem services upon which we rely. This view of land conservation supports nature and people while also providing financial benefits. Though the tools collected in this project are organized into categories related to State Planning Priorities -- Biodiversity Protection, Agricultural Preservation and Working Lands Management, Infill Development and Avoided Conversion, and Climate Risk Reduction -- each is analyzed for the type of financial incentive it produces for a landowner. For California to get anywhere near the scale of mitigation and adaptation called for by State legislation, and (in the bigger picture) change the course of climate change trends, land conservation programs must incorporate market incentives and/or better highlight the financial benefits they already produce. This report does the initial research to present the “lay of the land,” but the work of increasing policy integration (among local government agencies, between the State and local governments, and between the State and Federal government), scientific research, and public-focused messaging must continue.

Appendix 1

State Resource List

CLIMATE CHANGE

CALIFORNIA'S FOURTH CLIMATE CHANGE ASSESSMENT

<https://www.climateassessment.ca.gov/>

This document is the scientific foundation for State action to protect California from climate change. It also identifies local vulnerabilities and potential adaptation solutions through nine regional reports.

INTEGRATED CLIMATE ADAPTATION AND RESILIENCY PROGRAM (ICARP) TECHNICAL ADVISORY COUNCIL

<https://opr.ca.gov/planning/icarp/tac/>

This multi-disciplinary council supports OPR's work coordinating state, regional, and local climate change efforts.

STATE ADAPTATION CLEARINGHOUSE

<https://resilientca.org/>

This website is a hub of climate adaptation and resilience information and resources to support State, regional, and local decision makers.

BIODIVERSITY PROTECTION

CALIFORNIA BIODIVERSITY COLLABORATIVE

<http://biodiversity.ca.gov/>

This collaborative of State agencies, experts, and communities was established by Governor Newsom to advance comprehensive action to preserve California's biodiversity.

NCCP PLAN SUMMARIES

<https://wildlife.ca.gov/Conservation/Planning/NCCP/Plans>

This webpage shows the NCCPs permitted by the California Department of Fish and Wildlife or in progress.

CALIFORNIA ENDANGERED SPECIES ACT

<https://wildlife.ca.gov/Conservation/CESA>

This is the webpage for the California Endangered Species Act. It contains lists of California's threatened or endangered plant and animal species and has links to related programs.

AGRICULTURAL PRESERVATION AND WORKING LANDS MANAGEMENT

CDFA FARMER RESOURCE PORTAL

<https://www.cdfa.ca.gov/farmerresources/>

This webpage is a collection of information for farmers and ranchers, CDFA grant programs, and USDA programs.

SUSTAINABLE AGRICULTURAL LAND CONSERVATION (SALC) PROGRAM

<https://sgc.ca.gov/programs/salc/>

This webpage contains information about the SALC program, including application materials, awarded projects, etc.

HEALTHY SOILS INITIATIVE

<https://www.cdfa.ca.gov/healthysoils/>

This webpage houses information about healthy soils and contains the Healthy Soils Program information.

INFILL DEVELOPMENT AND AVOIDED CONVERSION

COMPLIANCE OFFSET PROGRAM

<https://ww2.arb.ca.gov/our-work/programs/compliance-offset-program>

This webpage houses resources about the Cap-and-Trade Program and the Compliance Offset Program.

AIR RESOURCES BOARD OFFSET CREDITS ISSUANCE MAP

<https://webmaps.arb.ca.gov/ARBOCIssuanceMap/>

This interactive map viewer shows the location and details of projects that have produced ARB offset credits for compliance with Cap-and-Trade.

SUSTAINABLE COMMUNITIES AND CLIMATE PROTECTION PROGRAM

<https://ww2.arb.ca.gov/our-work/programs/sustainable-communities-climate-protection-program>

This webpage contains resources stemming from SB 375.

CLIMATE RISK REDUCTION

CAL OES MYHAZARDS

<https://myhazards.caloes.ca.gov/>

This interactive map viewer shows what hazards areas are at risk for (including wildfire, earthquake, flooding, etc.) and identifies recommended actions for the public to reduce their risk.

FIRE AND RESOURCE ASSESSMENT PROGRAM (FRAP) PRIORITY LANDSCAPES

<https://calfire-forestry.maps.arcgis.com/apps/MapSeries/index.html?appid=f767d3f842fd47f4b35d8557f10387a7>

This interactive map viewer shows the priority landscapes for “[Reducing] Wildfire Risk to Forest Ecosystem Services,” “[Reducing] Wildfire Risk to Communities,” “Restoring Pest and Drought Damaged Areas,” and “Restoring Fire Damaged Forests.” It also identifies disadvantaged/low-income communities and marks which communities have Community Wildfire Protection Plans or are Firewise Communities.

Appendix 2

List of Interviewees

Pelayo Alvarez, Carbon Cycle Institute
Director of Outreach and Partnerships
(30 October 2020) Phone Call

Grieg Asher, Southern California Association of Governments
Program Manager, GHG/Sustainability
(15 December 2020) Video Call

Kaeli'i Bright, California Department of Conservation
Assistant Director, Division of Land Resource
Protection
(9 November 2020) Video Call

Matthew Botill, California Air Resources Board
Assistant Division Chief, Industrial Strategies Division
(3 December 2020) Video Call

Joe Caves, Conservation Strategies Group
Principal and Founder
(19 October 2020) Video Call

Kim Delfino, Earth Advocacy
Founder and President
(19 November 2020) Video Call

Jennifer Dempsey, American Farmland Trust
Director of Farmland Information Center and
Senior Advisor
(11 December 2020) Video Call

Ann Hayden, Environmental Defense Fund
Senior Director, Western Water and Resilient
Landscapes
(20 December 2020) Video Call

Sarah Heard, The Nature Conservancy
Director of Conservation Economics &
Finance Economics
(16 November 2020) Video Call

Kate Gordon, California Governor's Office of Planning
and Research
Director
(20 October 2020) Video Call

Claire Jahns, US Climate Alliance
Senior Advisor
(19 November 2020) Phone Call

Marc Landgraf, Santa Clara Valley Open Space Authority
External Affairs Manager
(19 November 2020) Phone Call

Adam Livingston, Sequoia Riverlands Trust
Director of Planning and Policy
(1 December 2020) Video Call

Andrea Mackenzie, Santa Clara Valley Open Space
Authority
General Manager
(19 November 2020) Phone Call

John McDougal, Element Markets
Vice President of Environmental Products
(27 October 2020) Phone Call

David Moore, Element Markets
Environmental Products Associate
(27 October 2020) Phone Call

Elizabeth O'Donoghue, The Nature Conservancy
Director of Sustainable Development Strategy
(16 October 2020) Phone Call

Katie Patterson, American Farmland Trust
California Policy Manager
(11 December 2020) Video Call

David Shabazian, California Department of Conservation
Director
(9 November 2020) Video Call

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