CARB 2022 Scoping Plan

Natural and Working Lands (NWL)

*Comment from 350 Ventura County Climate Hub*

The protection of working lands and waters requires solutions in these areas:

* Integrated water resource and stormwater management
* Eliminating pollution from pesticides and artificial nitrogen
* Climate change and wildfire mitigation and resilience
* Use of prime ag land for food and fiber production and climate adaptation, as opposed to growing energy crops
* Retirement and restoration of abused and marginal agricultural and grazing lands
* Healthy soils
* Increasing biodiversity
* Favoring farmer-led varietal and species selection and applying the precautionary principle to genetic modification of microbes, plants and animals.
* Increasing equity and outdoor access, including to safe, healthy working lands where people live, work, and regularly visit
* Green jobs

Working lands and waters for growing food, fiber, flowers, wood, and other biological products are located in all land use types and authorities, with special importance to tribal lands and to waters as well as lands. The presentations left out the potential for seagrass and marine kelp forest development, so we are including comments on that area of immense potential in our comment.

A steadily rising federal price on carbon should soon be expected to support increasingly localized food production and food security. Regenerative farming systems represent a high social and environmental value, because they aim to release the potential of whole natural systems. Regenerative systems hold potential for achieving climate mitigation and resilience **without toxic pesticides, fertilizer ammonia and livestock methane emissions, and dust and diesel exhaust from tillage.** These healthy farms have compatible land use in residential and commercial zoning, offering more proximal job opportunities, direct markets and agritourism.

Land use planning for ‘biodiversity islands’ is also important to protect habitats and prevent the loss of genetic and species diversity. An agricultural land use can be thought of as a biodiversity island when the amount of biological diversity is significantly higher than the baseline biodiversity of the surrounding area. Regenerative agricultural systems can conserve biodiversity as an integrated part of agricultural production and, thus, help mitigate or reverse detrimental human impacts on landscapes.

Developing the potential of biodiversity islands on working lands begins with a working lands inventory with a system for setting baselines and tracking outcomes. Outcomes from biodiversity islands can span all taxonomic kingdoms and vast numbers of classes and species within each.  In under-protected or disturbed ecosystems, habitat restoration in agricultural can be created using rewilding and traditional ecological knowledge that achieve both biodiversity and production goals.

Farming and grazing practices that **increase biodiversity** include intercropping, companion planting, combinations of perennial and annual crops, cover cropping, hedgerows and diverse edge plantings, managed grazing, and reduced agrochemical use. The selection of species that are rare, heirloom, underutilized, and have diverse genetics can harmonize biodiversity and agricultural production goals.

Examples of regenerative agriculture systems serving as biodiversity islands, where farm productivity and improved biodiversity are integrated, span a multitude of crops, regions, and cultures throughout the world.

Pesticide use reduction is a vital guiding principle for biodiversity conservation. Pesticides are one of the greatest causes of pollinator and biodiversity loss. Farming areas are 48 times more toxic to honeybees and other organisms than 25 years ago, due to pesticides. There is a precipitous and unsustainable decline in all pollinators (butterflies, bees, moths, flies, etc.), which are critical for our food supply and are the basis of our entire ecosystem. Insect-eating birds, fish, bats and reptiles have plummeted due to insect loss due to pesticides, affecting the entire food chain. The air and water pollution from pesticides has immeasurable consequences in airsheds and downstream. A rapid reduction in toxic inputs and pesticide use should be a priority of the 30x30 objectives because their ecological harm cascades and expands into protected and conserved lands. Fortunately, solutions exist to cultivate lands without toxic inputs.  Biologically based agricultural systems can reduce the negative externalities of toxic inputs and allow for the agricultural system itself to build fertility and harbor significant amounts of biodiversity.

A new study “Pesticides and Soil Invertebrates: A Hazard Assessment”, Gunstone, T., et. al., 2021, found that in 71% of cases studied, pesticides across all classes studied, kill or harm soil invertebrates including earthworms, ants, beetles and ground nesting bees. The review shows “extensive evidence that pesticides pose a serious threat to soil invertebrates and the essential ecosystem services that they provide” and supports “inclusion of a soil health analysis in the US pesticide risk assessment process.” This common sense principle is now validated by an abundance of science. It should be a condition for grantees of California’s Healthy Soils Program to be organic or otherwise provide evidence that toxic inputs are not applied.

We need to help consumers understand that buying products with the organic label generally is more ‘climate-friendly’. The organic label generally empowers consumers to discriminate between farms that use toxic inputs and those that don’t. CARB could help by educating the public about those organic label products that are not so ‘climate-friendly’. For example, Roundup is apparently allowed for use under hydroponic containers and the products still qualify for the organic label. Hydroponically grown products qualify for the organic label even though they do not build life and carbon in soil. Many farms are exemplary regenerative systems, and so successful that tthey do not need to invest in organic certification. To address this anomaly we recommend that all fees and inspections should be waived for organic certification Qualified farms should not have to pay more than non-qualified farms to show the organic label. These anomalies should have top priority attention to make the most of the organic label to identify climate-friendly products. Supporting and promoting organic agriculture is the best policy for achieving climate and biodiversity goals on working lands. (CCOF, Roadmap to Organic-Policy Report, 2020).

Analysis must include **all** costs and **all** benefits. For example, enteric methane emissions in a life cycle analysis of agriculture practices must be counted in calculating goals and targets for herd size reduction of cattle and dairy cows. The enteric methane associated with carbon farming using manure compost amendments must further use best available science, e.g. the 20-year Global Warming Potential of 84-87 for methane. Science requires better life-cycle analysis of manure bio-digesters that clearly thwart climate goals by essentially subsidizing continuation of both cattle herd size and natural gas infrastructure. Science requires re-evaluation of pesticide toxicity studies if they are the basis of looking at the health and environmental impacts of pesticides, because they have been done by pesticide companies that are suspect because of inherent conflict of interest. The influence of vested interests must be part of this public discourse as it affects numerous public policy decisions affecting conservation and climate action.

Trade policies in a context of systematic globalization and widespread poverty hinder resilient and sustainable regional and local farms and markets globally. The UN Conference on Trade and Development, 2013, p. 273 recommends: “As a guiding principle…as much regionalized/localized food production as possible; as much traded food as necessary.” Small-holders need markets in thriving local economies and should not have to compete by specializing in a few cash crops for export and be affected by extremes of price volatility and dumping. Monoculture is incompatible with sustainable practices that build soil health; increased crop diversity is essential.

Many policy avenues can shift market forces away from monoculture exports and toward integrated diverse farm plans for climate and food resilience, such as**,**

* The government should not provide any form of support for producers and processors of dairy products for export, such as dry milk and ingredient powders.
* Waiving of fees for organic farms and requiring public kitchens to buy a majority local organic food as in the Denmark Organic Plan.
* Organic farmers meeting local needs for plant-based diets should be the primary beneficiaries of policies and programs with attention to supporting young, new, gender-diverse and BIPOC farmers.

As a summary introduction, we urge attention to these guiding principles--regenerative systems, the role of biodiversity islands, negative impacts of pesticides on biology, the value of the organic label for scaling conservation and climate benefits, thorough data-driven analysis, and resilience by localizing food production along with reducing exports.

These principles apply to climate programs in six types of working lands and waters:

1. Farmland
2. Grazing land
3. Marine aquaculture
4. Landscape Management in Inhabited Areas - Gardens, Businesses, and Parks
5. Urban forests and trails
6. Fisheries

The necessary policy for forest management is well covered by the comments of Ara Marderosian of Sequoia Forestkeeper so we do not cover that in our comment. More complete citations and links are provided in the Reference Materials List. Our research and analysis will continue.

**1. Farmland**

**What does farmland conservation mean?**

* Profitable farm businesses and healthy farm communities
* Protect farmland zoning; avoid conversion to hardscape development
* Retirement and restoration of marginal farmland
* Increase soil health; avoid bare dirt
* Fertilizer use restricted to supply plant needs
* Restoration of small water cycles; avoid stormwater runoff
* Integrated Pest Management; avoid toxic inputs (Roadmap for IPM in CA)
* Science-based, data-driven goals, analyses, policies and programs within a vision of prosperity and health for all and anticipating an uncertain future
* Registration of pesticides based on science in service to the public
* Increase biodiversity and rotational cropping; avoid monoculture
* Species/varieties selected by farmers per changing environmental conditions and market opportunities; no external promotion of genetically modified varieties
* Integration of habitat for protection of threatened species on farms

**Examples of progress:**

* Increasing acceptance of Healthy Soils Program concept and goals
* Drip irrigation
* Adapting crop selection to climate change and water availability
* Biological pest control
* Microbial and botanical pesticides
* Many farmers don’t want to use pesticides and are open-minded, but are caught on a pesticide treadmill needing to learn how to transition to more resilient, regenerative biological systems
* Organic farming promotes carbon sequestration. See p.20  [NSAC “Agriculture and Climate Change: Policy Imperatives and Opportunities to Help Producers Meet the Challenge”](https://sustainableagriculture.net/wp-content/uploads/2019/11/NSAC-Climate-Change-Policy-Position_paper-112019_WEB.pdf) citing a nationwide sampling of 659 organic and 728 conventional fields showing 13 percent more total Soil Organic Matter and 53 percent more stable SOM in organic fields (Ghabbour et al., 2017) with even greater results from two meta-analyses of 79 studies (Gattinger *et al*., 2012) and (Lori *et al.*, 2017). Most recently a meta-analysis examined 528 studies which each compared at least one organic farm to at least one conventional farm (Sanders and Hess, 2019). On average, soils managed organically had 10 percent more organic [Carbon] content and sequestered 256 kg more [Carbon] /ha than other farms.
* Organic farms retain soil and water. Aggregate stability in soil was on average 15 percent higher (median) in organic farming; infiltration differed by 137 percent. Higher infiltration reduces soil erosion and soil loss, which means that organic farming reduces these occurrences by ‐22 percent and ‐26 percent, respectively (Sanders and Hess, 2019).
* Organic farms mitigate GHG emissions, e.g. they release 24 percent less nitrous oxide for a cumulative 1,082 kg CO equivalents per hectare per year.
* Food as Medicine programs promoting health through better nutrition, e.g.as envisioned by Clinicas Del Camino Real and working examples in other states described here <https://nfpnchicago.org/2019/10/28/food-as-medicine-part-three/>

**What are the greatest challenges to conservation and nature-based solutions to climate change on farms?**

* Drought and groundwater overdraft
* Water pollution, with irrigation and rainfall sweeping fertilizers and pesticides into adjoining waters that leach into groundwater and impair roughly 8,000 miles of rivers and streams and 300,000 acres of lakes, bays, and wetlands
* Lack of knowledge among regulatory agencies about alternatives to toxic pesticides (Risk and Decision: Evaluating Pesticide Approval in California, 2014)
* 200+ million pounds of pesticides used in California each year harms climate, biodiversity and environmental justice
* 20+ million lbs of fumigants leading to 7-100 fold increase in nitrous oxide (300X more potent GHG than CO2)
* Pesticides reduce soil carbon sequestration (Gunstone, T., et. al., 2021)
* Pesticides harm soil microbes that help plants access nutrients
* Widespread denial of the impact of pesticides on California's climate and biodiversity efforts
* IPM under prioritized and underfunded
* Lack of labor for more labor-intensive biological methods
* Ensure that carbon markets do not lock in monoculture crop systems and industrial-scale animal operations that degrade the environment and make it harder for smaller farms to compete
* Farmland expansion exempt from CEQA; habitats of threatened species destroyed by ministerial approval of farm expansion

**What are the greatest challenges to equitable access to nature on farms?**

* Property owner attitudes and farmer organization “right to farm” advocacy
* Lack of land access and technical assistance for young, new, gender-diverse and BIPOC farmers
* Dust
* Heavy equipment use
* CA counties of similar population and size with majority Latinx use 906% more pesticides per square mile than counties with fewer than 24% Latinx residents
* Heavy use of pesticides in areas with more Latinx people (in the eleven counties with a majority Latinx population, there were 22 pounds of pesticides used per person in 2018, or 2,373 pounds per square mile, whereas in 25 counties with the lowest proportion of Latinx residents (< 24%), just 2.4 pounds per person, or 262 pounds per square mile
* Fresno, Kern, Tulare, San Joaquin and Madera Counties use 108 million pounds of pesticides, 33 pounds per person and half the state’s use
* Pesticides can cause cancer, reproductive harm, damage to the nervous system, asthma and other respiratory ailments, and behavioral and learning disorders
* Latinx communities are disproportionately exposed to pesticides (in eleven counties with a majority Latinx population there is 14 times (1,362%) more risk to exposure from carcinogenic agricultural pesticides and 11 times more reproductive and developmental toxicant pesticides are applied per person compared to the 25 counties with the lowest Latinx populations by percentage

**What does long-term success look like for nature based climate solutions on farms?**

* Public investment as needed to address risks from drought, e.g. vegetative fallow on farmland where there is insufficient water and resources for management, cover crops with native mustards and purslane, restoration to native ecosystems, or analogous agroforestry systems.
* Voluntary conservation efforts are incentivized and rewarded and farmers are more concerned about collaboration for conservation than about their property rights
* Support for families and communities to keep local ownership of farmland
* Earthworks, amendments and vegetation to hold and sink stormwater on the land where it falls, especially fallow land
* Develop vocational education, incubator hubs, impacting investing, local markets, and fair pay for the food workforce towards more smaller farms that use less toxic inputs and help local food security (described in the Santa Barbara County Food Action Plan, 2014)
* Integrated Pest Management is the norm and starts with practices that prevent pests and disease, maximize biological methods and minimize disruptive pesticides that harm the soil food web
* Required minimum 200 ft pesticide free buffer zones
* Waiving costs for organic certification, inspections, and technical support for farmers to become organic
* Banning or beginning to phase out of the 85 pesticides that have already been or being banned in the EU, China or Brazil
* Phase out of hazardous pesticides that emit GHGs and hurt biodiversity
* Training for new and under-resourced and farmers of color in regenerative organic farming systems
* Land grant universities prioritize research and extension that serves the public and not vested interests, i. e. small diversified farms vs industrial agriculture
* Land managers and farmers support habitat conservation and protection of threatened species, including beaver reestablishment in every watershed
* No planting or release of Genetically Modified Organisms into the environment if there are safe alternatives, and only after improved, extensive safety testing and public debate about need
* Organic regenerative farms contribute half of the local food supply
* Public kitchens buy half organic food (learn from organic program in Denmark)
* Increased local and direct marketing of farm products and decreased exports

**2. Grazing Land**

**What does conservation of grazing land mean?**

* Herd management that minimizes disturbance of the native biodiversity that is intrinsic to (and which has evolved within) the area
* Phase-out or elimination of public land grazing in headwater areas that damages water supplies, stream flow and water quality
* Protection of water sources on grazing land
* Practices that mitigate the spread and/or continued dominance of exotic weeds
* Livestock herd size decreased substantially over time, and combined with the incorporation of more herd rotation and meaningful pasture rest (every other [or every third] year) to promote a robust restoration of the full complement of native species endemic to the area
* The proportion of lands that are not functioning at a healthy/high ecological level (using ecosystem health indicators to evaluate ecological status) decreased over time, and such lands brought to a healthy/high ecological function level over time
* Conservation standards for the restoration and/or maintenance of high ecosystem function on public lands are a higher priority than on private lands.
* Programs to support conservation on private lands supplement federal ecological conservation protections possibly through a good faith enforcement of the Endangered Species Act

**Examples of progress:**

* Site-specific federal legislation to permanently retire grazing land, (e.g. Mojave National Preserve where four of the five historical grazing allotments have been permanently retired and livestock permittees have been "bought out" via privately-financed funding)
* Stock-proof fencing to protect existing and replanted native plant/vegetation restoration areas
* TomKat Ranch and a few other integrated farms, where reduced livestock stocking rates (along with incorporation of rotation and meaningful pasture rest) have promoted improvement in ecosystem function
* Streams and riparian areas that are dominated by native plant species, (such as *Carex aquatilus* [water sedge]) that thrive when protected from livestock herbivory
* Composting or managing manure for farmland amendments

**What are the greatest challenges to conservation, nature-based solutions to climate change and environmental justice on grazing land?**

* Cattle-associated enteric methane emissions that contribute to further global warming
* Prevalent misconception that rotational grazing alone is a nature-based climate solution. (Rotational grazing needs to be integrated with animal stocking rate reductions and the incorporation of meaningful pasture rest from livestock herbivory)
* State investment in on-farm biogas projects that subsidize large factory farms to maintain herd size, support animal food production, and continue methane emissions
* Public lands livestock industry and "captured" federal regulatory agencies that oppose legislative proposals that would promote voluntary livestock grazing permit retirement concerning federal land livestock grazing allotments
* Prevalence of invasive and/or introduced plants that survive, withstand, and/or have adapted to livestock herbivory pressure (e.g. Kentucky bluegrass or Douglas sedge) and which have largely displaced other native plant species that have been unable to adapt to livestock herbivory over time
* Most cows and cattle not sold out-of-state spend their lives or, in the case of most pastured animals, a few months at the end of their lives in confined facilities implicated in the release of harmful air pollution from fine particulate matter (PM2.5) including PM2.5 formed in the atmosphere from precursors ammonia (NH3), nitrogen oxides (NOx), sulfur dioxide (SO2), and non methane volatile organic compounds (NMVOCs) (Domingo, N. G. G., *et al.,*  2021).
* The need for private landowners to make a profit while promoting native biodiversity
* Indigenous people with knowledge of land management are usually not involved
* Decreasing herd sizes may adversely affect much of the economy due to complex vertical integration of the California dairy industry—grazing, feedlots, fodder production, processing, packaging, export
* Lack of contract specifications that ensure attention to specific conservation requirements, (e.g. specified restrictive limitations in livestock grazing seasons to enable blue oak seedlings to grow above the browse line to facilitate blue oak regeneration)

**What does long-term success look like for nature based climate solutions on grazing land?**

* Herd size and amount of public land leased or allocated for livestock grazing steadily decline to meet necessary livestock-associated methane emission reduction and climate stabilization goals
* During herd size reduction, cattle and cows are managed so that enteric and manure-associated methane is not released to the atmosphere; alternatively, cattle-associated methane emissions are taxed at the social cost of methane emission (i.e. $4700 per ton, as per Shindell, 2015)
* Cattle and other ruminant animals are managed through use of rotational grazing practices that include incorporation of meaningful pasture rest to promote establishment of a robust native biodiversity over time
* Ranchers diversify to livestock species and varieties that emit less or no methane, such as llamas, horses, pigs, and poultry
* The Voluntary Grazing Permit Retirement Act is enacted by Congress to allow federal public lands ranchers to relinquish permits in exchange for privately-financed payouts. Associated livestock grazing allotments are then permanently retired from livestock grazing.
* Livestock are not allowed to pollute water sources, especially headwaters
* Subsidies for beef and cattle-associated dairy production are eliminated and re-applied to organic plant-based commodity production, where needed and appropriate
* Consumers consume decreasing amounts of beef and cattle-associated dairy products and increase consumption of plant-based proteins
* Trade agreements do not support export of beef and cattle-associated dairy products
* Vegetable powders replace all dairy caseinate ingredient powders in industrial food manufacturing
* Protection of, and accommodation with, native predators, combined with the preservation of keystone species in native food webs is vigorously promoted (e.g. promotion of wolf-and-cougar-and bear-accepting culture in areas traditionally hostile to native predators such as wolves, cougars, and bears, etc.)

**3. Marine aquaculture**

**What does conservation in marine aquaculture mean?**

* Strategic integration of conservation goals and improved protection of habitats and species (especially those that are environmentally sensitive) through human cultivation of a marine organism (Froehlich, Halley E., et. al., 2017)
* Adding complete ecosystem components to aquaculture, such as growing shellfish and seaweed together
* Growing marine species for harvest that will alleviate by replacement or supplementation the threats to wild and especially over-exploited populations
* Localizing marine aquaculture product markets for local food security
* Minimizing exports of marine aquaculture products to reduce ecological impacts from shipping and favor global sustainable aquaculture development
* Growing marine species that provide ecosystem services, such as improving water quality, reducing greenhouse gas emissions, and increasing biodiversity (Alleway, H.K. et. al., 2019).

**Examples of progress:**

* [Oyster Habitat Restoration: Monitoring and Assessment Handbook​](https://www.conservationgateway.org/ConservationPractices/Marine/Documents/Oyster%20Habitat%20Restoration%20Monitoring%20and%20Assessment%20Handbook.pdf) and Universal Metrics Worksheet
* Kelp restoration, e.g. Goleta Bay Kelp Study (Kiel, Robert and Greg Christman, 2019)
* The Native Conservancy in Eyak, Alaska, à cultivating kelp to bring life back to the Prince William Sound, the site of the Exxon Valdez oil spill <https://www.nativeconservancy.org/habitat-restoration/>
* Operation Crayweed [http://www.operationcrayweed.com](http://www.operationcrayweed.com/), based in Sydney, Australia. Habitat restoration through afforestation of *Phyllospora comosa*
* Billion Oyster Project in NY Harbor <https://www.billionoysterproject.org/>

**What are the greatest challenges to conservation and nature-based solutions to climate change in marine aquaculture?**

* Bureaucracy requiring years to acquire several permits (e.g. failure of Ventura Shellfish Enterprise to obtain permits and agreement among stakeholders)
* Not understanding the necessity of permitting complete ecosystem aquaculture, such as growing shellfish and seaweed together
* Polluted or disrupted waters especially in partly enclosed waterways (i.e. bays, estuaries, and harbors) preventing access for suitable low-tech aquaculture
* NIMBY or ‘Not in my backyard' attitudes toward aquaculture gear and vessels in the coastal and offshore environment. Current lack of social license due to association with previous unsustainable aquaculture practices
* Lack of priority for a new field that requires extensive collaboration between regulators, scientists, and NGOs

**What are the greatest challenges to equitable access to nature in marine aquaculture?**

* Undeveloped potential for agritourism and customers harvesting their own products
* Lack of outreach and community engagement on the myriad ecosystem services that can be provided by aquaculture
* Barriers to entry in learning aquaculture practices and exchanging knowledge with young prospective farmers. No appropriate aquaculture curriculum, certificate programs currently in CA

**What does long-term success look like for nature based climate solutions in marine aquaculture?**

* Collaboration between scientists and the owners and practitioners in this fast-growing industry to understand and implement effective sustainable conservation objectives ([MarineBio Conservation Society](https://www.marinebio.org/))
* Accelerated development of innovative policies, financing, and certification schemes with technical assistance and less red tape; incentivize active delivery of conservation, ecosystem, and food supply benefits at an increasing scale
* Seaweed farming and its restorative functions have provided an alternate and complementary source of income, new employment, recovery of local fisheries, and returned the colors of marine life as has happened at the Caribbean coast
* Place offshore wind turbines combined with biodiversity-increasing artificial reef foundations. Space the towers and reefs to prevent trawling
* Youth aspiring to be kelp farmers and a mobilized California State University and community college integrated aquaculture program. See CSU-wide Aquaculture Initiative<https://www2.calstate.edu/impact-of-the-csu/research/coast/coastal-resources/Pages/center-for-aquaculture.aspx>
* Active engagement, involvement, and entrustment of Indigenous peoples along the coast that often have storied history with and reliance on seaweeds, oysters, mussels, and other targeted aquaculture species.

**4. Landscape Management in Inhabited Areas - Gardens, Businesses, Parks and Green Streets**

**What does conservation in these areas mean?**

* Transition to majority diverse native and food producing plants
* Avoiding toxic inputs
* Water retention to reduce stormwater runoff and hydrate soil and vegetation
* Land use includes gardens and parks to access nature where people live/work
* A minimum standard of green space relative to housing density
* Positive ecosystem services in inhabited areas; including water and air quality
* Green Streets and greenways for connectivity and wildlife corridors
* Hardscape infrastructure for wildlife habitat, e.g. slots in bridges and other structures to accommodate bat and bird nesting and lizard harborage

**Examples of progress:**

* Replacing lawns with xeriscopic and native plant landscaping including contouring and curb cuts designed to harvest rather than channel away rainwater
* More ecological landscaping of homes, community space, commercial properties
* Urban planners and landscape architects designing village centers connected by parks and public squares, e.g. Christopher Stebbins with KTUA, San Diego
* Green Street community organizing and planning in Ojai, Santa Barbara, Atascadero, and probably other CA cities
* Community organizing to engage neighbors and children in gardening together
* Planting habitat for pollinators/Monarchs, e.g. NWF backyard habitat program
* Building codes that allows grey water from one fixture without a building permit

**What are the greatest challenges to conservation and nature-based solutions to climate change in gardens and landscapes?**

* Poor stormwater management to hold and sink water on the property
* Too much lawn and exotic plants that don’t support biodiversity
* Lack of community awareness towards ecology aesthetics
* Park authorities increasing development within existing larger parks rather than making them wilder and more biodiversity-friendly

**What are the greatest challenges to equitable access to nature in gardens?**

* People who rent (especially multi-unit buildings) lack access to garden space
* Lack of knowledge, time and resources for gardening
* Access to affordable water supply

**What does long-term success look like for nature based climate solutions in gardens?**

* Green Streets that manage stormwater runoff, support native plants, prioritize multimodal transportation (not cars), and connect high-density village centers
* Programs and incentives to residents to provide backyard habitats
* Half of green lawns managed by homeowners, property owners, land managers, farmers, etc. will plant more native plants and remove invasive plants as proposed in the Homegrown National Park campaign of Douglas Tallamy
* More larger, wilder parks supporting more native biodiversity
* School gardens supplying organic food for school food service
* Rehydrated cities without heat islands

**5. Urban Forests and Trails**

**What does conservation in urban forests and trails mean?**

* Managing increase in native biodiversity and protection of forest areas and trails
* Priority on conservation of native oak trees (Tallamy, D. W, 2021)
* Conserving cultural and historic sites important to Tribes/Indigenous communities
* Access to nature for activity-borne healing and preventive health
* Trails for transportation equity and greenhouse gas emissions reduction
* Economic development and tourism

**Examples of progress:**

* Established urban parks, long trails, and biological corridors
* Tree planting campaigns
* Public food forests and parks with more diverse native vegetation

**What are the greatest challenges to conservation and nature-based solutions to climate change in urban forests?**

* Development patterns that minimize space for reforestation and trails
* Lack of knowledge and understanding of stormwater management in urban areas
* Inadequate knowledge for successful long-term reforestation
* Too much impervious paving and surfaces, i.e. too much concrete
* Native biodiversity not included in landscaping road and utility easements

**What are the greatest challenges to equitable access to nature in urban forests?**

* Need for more green spaces in low-income areas
* Lack of support for unhoused people in riparian encampments
* Transportation infrastructure, especially freeways and railroads, that block access to nearby natural and urban forest areas.

**What does long-term success look like for nature based climate solutions in urban forests?**

* Children playing in old-growth urban forests!
* Access to nature within a 10 minute walk of every home

**6. Fisheries**

**What does conservation in fisheries mean?**

* Protecting habitats, abundance of marine organisms, and species diversity
* Ensuring that the waters and marine organisms are unpolluted
* Restoring habitats, abundance of marine organisms, and species diversity
* Ensuring that all harvests are sustainable

**Examples of progress:**

* *Marine Protected Areas (MPAs)* or “no-take” areas or reserves increased in number and size to better protect habitats, endangered species, and restore the health of marine ecosystems in areas jeopardized by habitat and species loss, e.g. [NOAA National Marine Sanctuaries: USA](https://sanctuaries.noaa.gov/)
* Non-governmental organizations, sometimes with volunteers, sampling and testing water quality in their coastal community, photographing fouled areas, and reporting to local agencies for action
* Stronger zoning/ordinances for Environmentally Sensitive Habitat Areas (ESHA)
* Wetlands and estuarine restoration
* Enforcing science-based catch limits

**What are the greatest challenges to conservation and nature-based solutions to climate change in fisheries?**

* Global warming that affects ocean circulation patterns, the flow of surface currents and local areas of upwelling and downwelling, which can affect nutrient and oxygen delivery over large areas
* Arctic ice melts dilute Atlantic currents reducing seasonal heat circulation that increases climate instability on California’s coast, strengthening and increasing frequency of Central Pacific trade winds and cooling the sea surface in the Eastern Pacific (Kennel, C.F. and Elena Yulaeva, 2020)
* Sea level rise overtaking long-standing seal rookeries and bird nesting sites
* Ocean acidification that can harm reproduction of small organisms and inhibit secretion of calcium carbonate for skeletal structures and shells, thus disrupting the food web
* Extreme storms and flooding from unstable weather damaging fishing industry infrastructure on coastlines and estuaries
* Lack of a public sea ethic in part from marine organisms being less visible than terrestrial organisms
* Overfishing and overharvesting
* Bycatch, indiscriminate targeting of commercial species, and fishing methods that threaten non-target species and biodiversity
* Pollution from stormwater runoff and ‘forever’ chemicals in sewage effluent
* Pollution from commercial fishing equipment
* Sewage and chemicals dumped from ships
* Volatilization or atomization and consequent condensation of toxic chemicals
* Mining metal compounds, gravels, sands and gas hydrates that can devastate marine ecosystems
* Threats to NOAA designated sensitive species:  White Abalone, Central California Coast Coho Salmon, Sacramento River Winter-Run Chinook Salmon, Southern Resident Killer Whale, Pacific Leatherback Turtle

**What are the greatest challenges to equitable access to nature in fisheries?**

* Threats to traditional indigenous livelihood and culture from climate impacts and lack of legal protection
* Complexity and legal cost related to property rights of fishery resources -- organisms, ocean floor, and water -- determined by the life-cycle and biology of the organisms and the chemical and physical attributes of a location
* Cost and disruption to marine ecosystems from dredging in order to prevent beach erosion and mitigate sea level rise
* Boat anchors damage ocean floor ecosystems, e.g. hydrocoral sites
* Communities divided about restrictions on development and planned SLR retreat

**What does long-term success look like for nature based climate solutions in fisheries?**

* At least 30 percent of state waters in designated Marine Protected Areas
* Science-based understanding of the carrying capacity of fisheries, e.g. the current number of organisms in a fishery and agreement on limits on which type of fish to catch to make each fishery sustainable.
* Curriculum for schools and public education about marine ecosystems including a sea ethic to guide commercial and public behavior
* Organizations acting to monitor and protect waterways in every watershed via testing and reporting problems of pollution, flow rate, erosion, and riparian and estuarine habitat conservation, and volunteer ecosystem restoration projects
* Upland watershed ecosystem restoration to restore the small water cycles to hold stormwater for terrestrial use or groundwater recharge
* Innovative ecosystem restoration, such as adding octopus houses to kelp restoration (to keep kelp-eating crabs in check)
* Laws and enforcement to mitigate climate change and all pollution of the oceans
* Agreement in coastal communities about how fisheries resources--property rights and public rights--should be divided among people
* Permanent anchors for boats to reduce anchor drop damage to the ocean floor

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