Exhibit A

Tackling Climate Change: A Climate Change Adaptation and Carbon Dioxide Removal Landscape Analysis

Sierra Club, Feb. 2019

Tackling Climate Change:

Adapting to a changed world, while reversing global warming to protect communities & ecosystems and promote climate justice

A CLIMATE CHANGE ADAPTATION AND CARBON DIOXIDE REMOVAL LANDSCAPE ANALYSIS. | **FEBRUARY 2019**

SIERRA CLUB

Executive Summary

The latest climate science consensus informs us that in addition to accelerating the reduction of greenhouse gas emissions and moving rapidly to 100% clean energy we must simultaneously draw down large amounts of built up carbon dioxide from the atmosphere and deploy climate adaptation measures to protect the human and natural environment. To avoid intolerable climate impacts we must restrict global warming of 1.5°C average global temperature increase, and that requires major efforts to draw down carbon dioxide levels below 350 ppm. The Sierra Club can play a major role in both carbon dioxide removal and climate adaptation, and our chapters, groups and major national campaigns are already engaged in this work, but need added resources and expertise to make our engagement more effective. This work must be done in ways that follow the lead of the most vulnerable communities and promote climate justice. It is essential to start this work now, as delay makes risk higher and adaptation less effective and more expensive.

Tackling Climate Change:

Adapting to a changed world, while reversing global warming to protect communities & ecosystems and promote climate justice

Introduction

In April 2018 the Board of Directors authorized the establishment of a Climate Adaptation Task Force to conduct a landscape analysis for the Sierra Club and report recommendations back to the Board. For purposes of this study, "climate adaptation" and the scope of our investigation was defined to include measures needed to adapt to a climate-changed world (hereafter called adaptation); measures to remove carbon dioxide from the atmosphere (hereafter called carbon dioxide removal or CDR); and geoengineering measures such as blocking solar radiation that could potentially reduce global temperatures to reduce global warming (hereafter called geoengineering).

This report does not address reducing new greenhouse gas emissions (what is often called "mitigation") as the Sierra Club already has a robust program in this area.*

The impetus for this study comes from the growing scientific consensus that emission reductions on their own will be insufficient to prevent a climate change calamity and restore the climate to a state that will support life as we know it. Even if all greenhouse gas emissions were stopped today, the concentrations of accumulated long-lived greenhouse gases exceed the levels regarded to be safe by the scientific community. In 2018 atmospheric

*-*These terms and categories are confusing. Under the Paris Accord, some countries consider all CDR activities as mitigation to meet their targets. Some academics regard all CDR as geoengineering; others treat all approaches that do not involve emission reductions as adaptation, including CDR and geoengineering. For clarity we have separated these approaches out and treat them separately as emissions reduction, adaptation, CDR and geoengineering.*

concentrations of CO2 were are at about 425 parts per million (ppm), well above the 350 ppm threshold judged to be necessary to protect life on earth and avoid major climate disruption and even farther above the pre-industrial revolution maximum CO2 concentration of <300 ppm for the past 800,000 years.

The latest Intergovernmental Panel on Climate Change (IPCC) report on Global Warming of 1.5°C http://www.ipcc.ch/report/sr15/, which came out in October 2018, notes the scientific consensus that the 2°C average global temperature increase agreed to in the Paris Climate Accord is more dangerous than the original models projected and that a 1.5°C target is now a necessity. IPCC concludes that to avoid exceeding 1.5°C we must not only stop all green-house gas emissions but also urgently deploy programs and technologies to draw down the carbon dioxide already in the atmosphere.

The National Academies of Sciences, Engineering and Medicine report, released in October 2018, also states that technologies that suck CO2 out of the atmosphere will likely be crucial to meeting global climate goals, and will require more investment to reach scale. *Negative Emissions Technologies and Reliable Sequestration: A Research Agenda.*

Meanwhile, having a plan in place for adapting to climate change is becoming an accepted requirement for responsible government at all levels. In the United States, cities, regions, states, and land management agencies are all starting to pursue climate adaptation planning and implementation. Some are doing it in anticipation of projected climate impacts, and some are doing it in response to climate impacts that are already causing disruption and negative impacts in human communities and natural ecosystems. Climate adaptation planning was a major federal requirement during the Obama administration, but it has largely been ignored and undermined during the Trump administration. Meanwhile, billions of dollars of recovery funds are being expended in the wake of escalating climate-change-induced disasters such as hurricanes, flooding, drought, and wildfires. The result thus far is a system lacking both prevention and cure that is focused instead on application of small, temporary bandages and reconstructive surgery.

Preparedness for natural disasters and resilience in the face of consequences such as displacement are also major concerns and the subject of much international debate and negotiation. In its 2019 Global Risks Report, the World Economic Forum placed "extreme weather events" and "failure of climate change mitigation and adaptation" on par with "weapons of mass destruction" as the world's greatest threats. Countries and cultures that are already experiencing the impacts of climate change are pressuring richer countries to assist in adaptation efforts. Many wealthier, better-developed countries are accepting this responsibility; unfortunately, the United States — the largest historic contributor to global warming emissions — has been retreating from Obama-era commitments to meet our obligations. Equity-based programs designed to address loss and damage due to climate change are needed now more than ever to avoid mass starvation, climate migration, water wars, and inundation due to sea level rise of island nations and low-lying coastlines.

The Sierra Club, the national and global NGO community, the private sector, philanthropists, and governments are all in the early stages of seriously addressing adaptation, CO2 removal, and geoengineering. The Sierra Club needs to urgently explore these complex issues, update its positions and policies in order to adequately address them, and make some decisions about how it can be most effectively engaged at all levels of the organization to make a difference and help lead the effort to restore our climate and protect the human and natural environment from present and projected impacts of climate change.

The Sierra Club is also unifying its existing and evolving work on energy, justice, and equity into a cohesive and inspirational vision (CEFA). This process is designed to fundamentally transform not just how we power this country, but who ***holds*** power in this country. It is about replacing dirty energy with 100 percent clean energy to prevent runaway climate change while there is still time. It is about ensuring that the frontline communities currently suffering disproportionately from climate change and fossil fuel pollution benefit the most from the transition to a clean energy economy. Our work with communities impacted by climate change should be holistic It is about being part of a movement that builds power and harnesses our shared values to transform our economic, cultural, and political systems.

The Moral Hazard

Any consideration of taking action requires the Sierra Club and civil society to address the so-called "moral hazard" problem. This is the very valid concern that investments in adaptation, CDR, and geoengineering provide an excuse to avoid cutting greenhouse gas emissions. If we concede that we do not have the national and global will to stop emitting greenhouse gases, and we believe that we can counteract climate change through adaptation, CDR, and geoengineering, then we could ratchet down the urgency of reducing emissions. This could lead countries to slow or even cease efforts to get off dirty fuels and other major greenhouse gas emitters by no later than mid-century.

For that reason, any commitment by the Sierra Club and other parties to promote ramping up adaptation and CDR must be accompanied by a firm commitment to redouble and accelerate all emission reductions programs. These are not mutually exclusive approaches and activities; they are complementary and compulsory. CDR should be used to draw down the existing high level of accumulated emissions, not to allow the continuation of high levels of carbon emissions.

Al Gore once disparaged climate adaptation as "a kind of laziness" for not focusing solely on emission reductions. He now admits that he was "wrong in not immediately grasping the moral imperative of pursuing both policies simultaneously, in spite of the difficulty it poses."

We cannot wait until we have ceased all new emissions before we start deploying adaptation and CDR approaches to deal with existing accumulated, long-lived emissions that are already disrupting the human and natural environment. It would be morally hazardous to begin concentrating on adaptation and CDR but not simultaneously ease up on emission reduction efforts. There is also a huge danger if we refuse to engage in adaptation and CDR out of fear that it might reduce emission reduction momentum. Investments in adaptation, including preparedness, response, and recovery, need to happen now. Failure to do so will preclude adaptation and CDR options that might limit harm to human communities and natural systems but are only available *before* climate change progresses much further. Adaptation may be more effective and affordable when taken on proactively, and the right set of acceptable CDR programs requires research, development, and deployment starting immediately to get to scale and to start getting us back below 350 ppm. This task force believes that we must pursue emission reductions with renewed vigor and full commitment while simultaneously ramping up and bringing to scale appropriate climate adaptation and CDR efforts.

> **"For my own part, I used to argue many years ago that resources and effort put into adaptation would divert attention from the all-out push that is necessary to mitigate global warming and quickly build the political will to sharply reduce emissions of global warming pollution. I was wrong — not wrong that deniers would propose adaptation as an alternative to mitigation, but wrong in not immediately grasping the moral imperative of pursuing both policies simultaneously, in spite of the difficulty that poses."**
>
> -Al Gore

Methodology

Once the Climate Adaptation Task Force was appointed and convened we identified a list of topics that we needed to research in order to make sound recommendations. We also conducted a survey of our chapters, groups, and staff to find out what adaptation and CDR issues they were already involved in and which programs, challenges, and opportunities they felt were most important for the Sierra Club to address. We also identified gaps in Sierra Club policy in this arena.

The topics that we explored include:

- Preparedness and resilience in both urban and rural environments. Community education/outreach and individual actions (behavioral changes related to adaptation).
- Public health
- Restoration and resilience in natural environments
- Extreme weather relief and recovery, relocation/displacement/climate refugees
- Forest carbon management, reforestation, and afforestation
- Agricultural lands, grasslands, soils, and animal management
- Freshwater and wetlands
- Oceans, coasts, and sea level rise
- Bioenergy conversion with carbon capture and sequestration (BECCS)
- Direct carbon capture and carbon sequestration (DACCS).
- Frontier Technologies (enhanced weathering, biochar)
- Geo-engineering
- Demographics, equity, and climate justice
- Mainstreaming climate adaptation into planning activities

Each subgroup was asked to address the following questions:

1. What are the major opportunities for adaptation in this area?
2. What is the potential for significant carbon drawdown, if any?
3. What kind of Sierra Club activity is already happening in this area?
4. What other groups are already working in this area? Are there opportunities for partnership or would Sierra Club efforts be redundant?
5. What governments, foundations and major donors are funding in this area?
6. Which political forums does this play out in? Local, state, regional, national, international?
7. Are there specific geographic locations for focus?
8. What are most important summary documents or experts we should be aware of?
9. Are there key justice and equity concerns we should be aware of? Are there environmental justice groups or individuals we should consult with on this topic?
10. Are there positive or negative environmental or ethical/stewardship concerns or choices we need to be aware of?
11. Is the action consistent with Sierra Club policy? Identify areas where we will need to update, clarify, or revise Sierra Club policy.
12. Any other key questions relevant to your area?
13. Ultimately we want to see what part of this might be particularly ripe for Sierra Club engagement and influence. Since we can't do everything, we will need to make recommendations of the most promising forums and issues to engage in, so deciding what *not* to do is also important. Your advice about the relative priority for Sierra Club engagement, pro and con, will be very valuable.
14. What are the implications for providing well-paid family-sustaining and/or union jobs and a just transition as part of deployment of this type of program?

Each subgroup prepared a lengthy report and assembled key reference documents. An Executive Summary of their findings and answers to these 14 questions can be found in the appendix. The longer reports are available upon request.

Near the end of our study we asked each subgroup that had studied an interest area to put forward up to two proposed priority campaigns that would make an impact, not be duplicative of other organizations, play to the Sierra Club's strengths, and meet other campaign criteria. Following this process, we then prioritized the suggestions and narrowed our recommendation to six campaigns.

Key Principles to Guide Us

All governments, particularly that of the United States, need to recommit to the Paris Agreement goal of limiting warming to 1.5°C as a matter of survival for all. As the Climate Action Network (CAN) states, "The science is clear: limiting warming to 1.5°C is not only a moral imperative, but technically feasible and economically beneficial. Stabilizing warming to 1.5°C by cutting emissions in the near term will help realise the Sustainable Development Goals (SDGs) and alleviate poverty and inequality." Limiting warming to 1.5°C should no longer just be an aspirational goal, but a mandatory and binding commitment.

The following set of CAN principles are particularly relevant to our report and are embraced by the Sierra Club as a participant in CAN:

- Full decarbonization of the energy sector by 2050 and replacing fossil fuels with renewable energy sources, supported by energy efficiency in all economic activities, is key to preventing dangerous climate change and avoiding negative externalities of industrial energy-related emissions that cause air, water, and soil pollution.
- Reducing greenhouse gas emissions to net zero, preferably by 2040 and by 2050 at the latest, is the only way to limit global warming to 1.5°C. This move to decarbonization must involve all stakeholders and follow the principles of equity and just transition, taking into account the impact on vulnerable communities and workers in the energy and industrial sectors.
- Delaying stronger and more ambitious action now and relying on future development of more powerful carbon removal technologies to compensate for a potential temperature overshoot between now and then is not an option. It is more likely to increase the risk of tipping points and runaway climate change.
- In addition to cutting carbon dioxide emissions, slashing potent gases and pollutants such as methane, hydrofluorocarbons, and black carbon must be prioritized and included in revised national climate targets.
- Developed countries must provide financial support to developing countries to help them meet the objectives of the Paris Agreement. This includes enhanced means for adaptation and mitigation as well as fostering equity-based schemes for loss and damage in developing countries already suffering the impacts of climate change.
- The most environmentally, socially, and economically cost-effective option to sequester carbon emissions is through Natural Climate Solutions, based on photosynthesis. Natural Climate Solutions should be focused on the complete halting of deforestation and degradation of lands in favor of ecological restoration and enhancement. Natural Climate Solutions also target sustainable low-carbon farming and forestry.
- Meeting the 1.5°C objective requires significant changes in the lifestyle of the growing middle class around the world. This includes a shift toward a low-carbon lifestyle.

We feel it is important to spell out these principles at the outset of this study in order to dispel any notion that we are advocating for adaptation or CDR as a substitute for the essential steps outlined above. This report is designed to fill in the blanks in some missing parts of a comprehensive Sierra Club approach to climate recovery.

Vital Role for the Sierra Club

As we conducted our study it became clear to us that climate adaptation and CDR were absolutely essential components of the campaign to head off climate catastrophe. It also became very clear that global governments — and specifically the United States government — are failing to adequately address adaptation and CDR. Furthermore, our review determined that the NGO community, both internationally and domestically, is similarly unprepared to adequately address these challenges.

In the appendix you will see a summation of NGO activity in this arena. Other groups have started this work long before us and have helpful programs largely composed of research and education. Some new groups are dedicated exclusively to adaptation and CDR. From our perspective, what's missing is a grassroots presence at the local, state, regional, and national levels in the U.S. to effectively advocate for adaptation and CDR and their full funding and implementation. These are things the Sierra Club is uniquely positioned to provide.

There is no other NGO group out there with a grassroots organizing and lobbying capacity, backed by smart communications, legal action, and digital tools, that can press for climate-smart policies all across the U.S. at the city, county, state, and federal levels.

Local organizations and activists have the opportunity to shape plans that spur the creation of climate-smart policies that include:

- Creating quality careers in renewable energy, energy efficiency, and climate adaptation for people in economically distressed communities;
- Protecting front-line communities from becoming "sacrifice zones" of carbon trading;
- Protecting coal-dependent working families and communities; and
- Substantially reducing carbon pollution.

In the absence of a national institutional framework for state and local coalitions to advocate for emission-reduction policies that create good jobs in the coming decades, intensive community engagement and grassroots leadership will be essential in order to create a clean energy economy rooted in racial and economic justice.

Just climate advocacy must include access to promulgation, implementation, and enforcement of all policies, initiatives, and actions. The people least responsible for the climate crisis bear the greatest burden. As these communities and advocates interact with policymakers, their voices must be incorporated and adhered to if they are to lead the climate movement. The Sierra Club, following the Jemez Principles, can help steer resources to these groups and join with them in a united movement for climate justice and equity. Again, few other NGOs are focused on the justice and equity component of adaptation and CDR campaigning. This is another important role for the Sierra Club to play, and it's something we are already doing in response to extreme weather events.

Climate adaptation and CDR work is not new for the Sierra Club. Much of what needs to be done to address adaptation and CDR has been part of Sierra Club campaigning for decades; we just never called it out as being climate adaptation or CDR work until now. The survey of what chapters, groups, and staff are doing in this area makes it clear that this work would not require adopting a totally new priority campaign, but would rather build on existing work, expertise, and past successes. The Sierra Club has been campaigning for wilderness and forest protection, wildlife habitat preservation, restoring wetlands, and preserving natural coastlines for nature's sake, without seeing these actions as vital to climate adaptation and CDR. Similarly, the Sierra Club has been promoting smart growth in urban areas by promoting infill while protecting and restoring open space, coastal and riparian buffer zones, greenways, and urban watersheds

as ways to promote livable cities, but without explicitly identifying them as climate adaptation and CDR per se. Our historic work on environmental justice is now being harnessed to promote climate justice. (See for example our climate justice work in Puerto Rico, Louisiana, and Texas, led respectively by staff organizers Adriana Gonzalez, Darryl Malek-Wiley, and Bryan Parras and Reggie James. www.sierraclub.org/texas/blog/2018/08/one-year-after-storm-peoples-tribunal-hurricane-harvey-recovery)

The Sierra Club has a well-deserved reputation as an effective campaigner to stop the burning of dirty fuels and move our country to 100 percent clean energy for all while respecting the tenets of justice and equity. Our reputation, movement relationships, campaign capacity, and trust can be built upon as we broaden our climate work to also address adaptation and CDR.

Domestic and International Adaptation and CDR work

If one looks at the problem and the solutions from a global perspective, the areas most vulnerable to climate-related disasters lie outside the U.S. Island nations and heavily populated low-lying areas face total inundation from sea level rise, but they lack the means to address the problem. Major droughts leading to widespread famine and mass migrations are already occurring in other countries, and the situation is only expected to get worse. Again, these countries are generally poor and lack the resources and the power to address the problem.

At the same time, the biggest potential for CDR is outside the U.S. While we must continue to do everything possible to protect and restore our forests, wetlands, and peatlands, the biggest carbon sinks that can easily become carbon sources are found in poorer countries. Consumer demand in wealthy countries for products such as palm oil, soybeans, and beef lead to the destruction of forests, mangroves, wetlands, and peatlands in the developing world and desertification worldwide, thereby destroying huge carbon sinks.

Historic global greenhouse gas emissions in the U.S. and our consumption of resources and energy have been the single largest contributor to climate change. Because of this history we have a responsibility to be a leader and primary funder of global adaptation and CDR programs, and not simply focus on America First.

The NAS calculates the upper limit for safe CO2 removal — given current technology and a price of carbon under $100/ton — as 9.13-10.83 gigatons CO2/year globally. Of that amount, only 1.02 gigatons CO2/year is achievable from the United States. This means we must have aggressive international *and* domestic CDR programs. If we don't have both, we will fail.

The Sierra Club is primarily a domestic environmental organization, and our strength lies mostly in our domestic chapters and groups. While we have had an effective international program for over 40 years, it is modest in scale, and its role has mainly been to influence global policies and spur U.S. funding of international programs, agreements, and treaties.

The task force met with Fred Heutte and John Coequyt of the Federal & International Climate Campaign to explore options for international engagement on adaptation and CDR. Their conclusion was that it is best for the Sierra Club to concentrate primarily on influencing domestic policy on adaptation and CDR. At the same time, the Sierra Club should seek the resources that will allow us to participate in a meaningful way in lobbying the U.S. government and the international community to make the necessary investments in international adaptation and CDR — and particularly in making sure that rich countries like the U.S. contribute their fair share to fund the most

vulnerable countries and populations through the Green Climate Fund and other programs. This includes enhanced means for adaptation and mitigation, as well as fostering equity-based schemes for loss and damage for populations in developing countries already suffering the impacts of climate change.

We will also continue our successful efforts to compel multilateral development banks to stop funding climate-destroying projects and instead fund adaptation and CDR projects. The Sierra Club can also use its power to make sure that the most vulnerable countries and peoples are represented and empowered to shape future adaptation and CDR plans so that they benefit everyone, not just the wealthy and powerful. Seeking ways to curtail the demand, trade, and import of products that are destroying native cultures and the natural areas that they depend on will also be important approaches for the Sierra Club to consider. We can lend our support and voice to other international climate-justice-oriented NGOs working on adaptation and CDR when we are invited to do so. There are also international initiatives with a clear and important domestic component. For example, the Sierra Club could join and promote 100 Resilient Cities, which is devoted to making cities more adaptable and sustainable worldwide. Another example is the 4 per 1000 initiative, an international effort to promote soil carbon sequestration.

A prominent sign of the rising profile of global climate change adaptation came with the launch last October of a Global Commission on Adaptation, followed by a December commitment of $200 billion in climate adaptation financing over five years by the World Bank and partners. The commission was initiated by then-U.N. Secretary General Ban Ki-moon, philanthropist and entrepreneur Bill Gates, and World Bank CEO Kristalina Georgieva. The Global Center on Adaptation, overseen by the World Bank, seeks to "advance bold actions to help societies across the world become more resilient to climate-related threats. We act as a solutions broker, bringing together governments, the private sector, civil society, intergovernmental bodies, and knowledge institutions that can address the obstacles slowing down adaptation action." The World Bank's investment will be evenly split between investments cutting emissions and those boosting resilience and adaptation.

The Case for Climate Change Adaptation

As noted earlier, documented human-caused climate change and its negative impacts are not things that pose a threat sometime in the indefinite future — we are already experiencing them, as past emissions commit us to a steady stream of increasingly frequent and severe negative impacts. Around the Earth and across the country, we are experiencing record deadly heat waves, rising seas, increased drought, more frequent, damaging, and deadly storms, ever-more massive wildfires occurring over longer wildfire seasons, polar ice sheet and tundra melting, and rapidly shifting and disappearing habitats for native species, leading to steep population declines, extirpations, or extinctions. Additionally, our increased emissions are acidifying and reducing the available oxygen in our oceans.

If we were to somehow instantly stop all additions to greenhouse gas concentrations, these unacceptable and alarming impacts would continue. Unfortunately, as 2018 illustrates, global and U.S. emissions are continuing to rise and increase the concentration of greenhouse gases in the atmosphere. As a result, global temperatures and the resulting negative impacts are projected to only get worse.

While this sobering situation could lead to hopelessness and inaction, it is also a rallying cry to take action to head off or reduce the negative impacts, thereby saving lives, preventing hardship, building more just and sustainable communities, and protecting the natural world. The dire predictions in scientific reports are not the inevitable future — we can control our destiny if we act now to apply climate-smart solutions to adapt to a climate-changed world.

While almost all countries agree that we need to take immediate action to reduce emissions and draw down carbon dioxide (CO2) concentrations from the atmosphere, even with a robust global response it will take decades to stabilize the climate by reducing atmospheric CO2 to safe levels. In the meantime it is essential that we take action to help human communities and ecosystems adapt to the negative impacts of climate change. Adaptation must proceed simultaneously along with emission reductions and carbon dioxide removal (CDR).

The Fourth National Climate Assessment makes a strong case for urgent action on climate adaptation, noting that, "Proactive adaptation initiatives — including changes to policies, business operations, capital investments, and other steps — yield benefits in excess of their costs in the near term, as well as over the long term."

Climate change adaptation must include a strong commitment to equity and justice. From a moral standpoint, we cannot allow wealthy individuals, neighborhoods, corporations, and countries to insulate and protect themselves from the worst impacts of climate change while ignoring the needs of the most vulnerable who lack the means to protect themselves. Wealthier individuals, corporations, and countries that have access to the technology and financial resources tend also to be the ones who created the lion's share of emissions.

Similarly, it is not enough to focus protection on the human environment. Human-induced climate change is radically and rapidly threatening native ecosystems from tropical coral reefs to the poles and everyplace in between. The next major biodiversity extinction crisis is inevitable and imminent if we allow climate change to continue unabated. Humans created this latest extinction crisis, and only humans can take action to prevent it from getting worse. We are part of nature, and failure to protect life on earth is certain to imperil our own ability to survive.

There is also a major potential for family-supporting or union job creation in climate adaptation work. Rebuilding communities or restoring ecosystems in a climate-smart way will be labor-intensive undertakings.

Climate change adaptation research and implementation programs are already underway domestically and internationally. With each new superstorm, drought, heat wave, and deadly wildfire the necessity and demand for action on climate change adaptation grows. Non-governmental organizations, scientific bodies, community groups, local governments, regions, land management agencies, tribal and federal governments, international agencies, and others are all starting to recognize the urgency of immediate action on adaptation. What to do, where to do it, how to pay for it, and who will pay for it are subjects of weekly discussions. As noted earlier, in October 2018 the Global Commission on Adaptation was launched and in December 2018 the World Bank committed $100 billion earmarked for climate change resilience and adaptation.

Sierra Club groups, chapters, campaigns, and programs have all been engaged in climate adaptation for over a decade, but have been constrained by a lack of campaign resources. Our first major engagement was following Hurricane Katrina's devastating impacts on the Gulf Coast, and it continues today with national, chapter, and group response and recovery efforts to address recent storms such as Maria and Harvey, and wildfires such as the Tubbs Fire and the Camp Fire. Our state and federal lobby programs routinely address adaptation issues such as the impacts of climate change on the natural world. This work began in earnest with our Resilient Habitats program and it continues today through Our Wild America, as well as chapter and group land and wildlife protection efforts. Our chapter and group survey indicated that most local and state entities are actively engaged in some sort of climate adaptation planning or implementation.

While the scientific community, governments, professional planners, interested private parties, insurance companies, foundations, and a handful of environmental professionals have been deeply engaged in climate adaptation work, there is a major vacuum of grassroots community engagement in the field. The grassroots, particularly in vulnerable communities most affected by climate change, often lack the information and resources to effectively participate in decisions that will impact their lives, their communities, and the natural world. In most cases, there are climate-smart solutions that have been identified by climate planners and ecologists, but the Sierra Club and other environmental groups have not had the resources to share these solutions and campaign for their adoption

and funding. The Sierra Club is particularly well suited to help build a movement to participate in and shape climate change adaptation actions.

If the public is not involved in these decisions, we could very well see climate adaptation responses that continue to cater to the wealthy while giving short shrift to the urgent needs of those who are most vulnerable, as well as the natural world, which has no voice at the table.

One need only contrast the response to recovering wealthy communities in Texas and Florida with the wholly inadequate, tragic response to Hurricane Maria in Puerto Rico to grasp this injustice. Likewise, in the wake of climate catastrophes, environmental regulations are often waived to facilitate recovery efforts, doubling the damage to natural systems and decreasing their ability to regenerate. The Sierra Club can be a driving force to ensure that public engagement is real and powerful, and that we have just, equitable, and climate-smart adaptation solutions that fully protect the human and natural environments.

The task force has put forward draft Sierra Club policy suggestions on Climate Adaptation for consideration by the Conservation Policy Committee and the Board to give our volunteer leaders and staff policy guidance.

The task force set up subgroups to research in detail a number of important topics raised by climate change adaptation. Each subgroup prepared a long detailed report and an executive summary answering key questions. The executive summaries can be found in the appendix of this report. The longer detailed subgroup reports are available upon request. The topics related to Climate Change Adaptation are:

- Preparedness, resilience in urban and rural environments.
- Public health
- Ecosystem resilience
- Extreme weather relief and recovery, relocation/ displacement/climate refugees.
- Oceans, coasts and sea level rise
- Demographics, Equity and Climate Justice
- Mainstreaming climate adaptation into planning activities

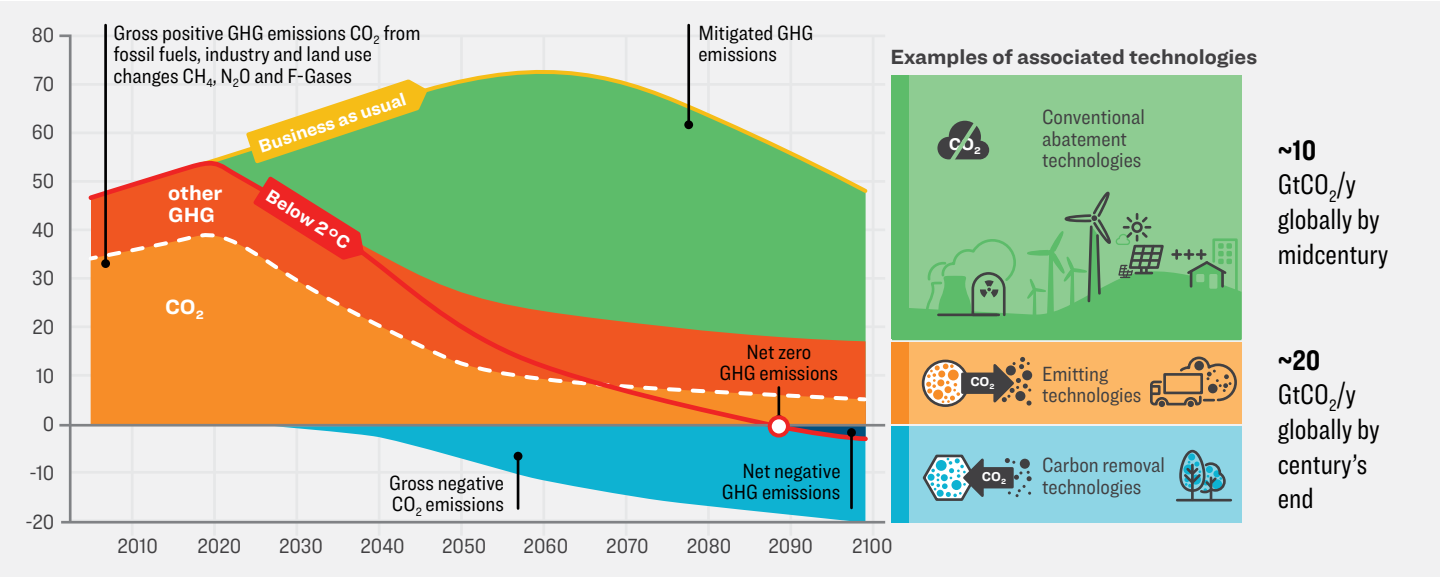
The Case for Carbon Dioxide Removal, and What Should be in a Portfolio

As noted above, the latest Intergovernmental Panel on Climate Change (IPCC) report on Global Warming of 1.5°C concludes that to avoid exceeding 1.5°C we must not only stop all greenhouse gas emissions but also urgently deploy programs and technologies to draw down the carbon dioxide already in the atmosphere.

The IPCC projects that tools to remove CO2 from the atmosphere, such as technological carbon capture and storage or reforestation, will be needed to suck out up to 1,000 gigatons this century, for a 1.5°C limit. If material consumption in developed countries was reduced and kept in check, it would reduce but not eliminate the need for carbon removal. Carbon removal measures could help return temperatures to 1.5°C above pre-industrial levels if the world overshoots the threshold, but they may have significant impacts on land, energy, water, and nutrients if used on a large scale. Governments will have to limit the trade-offs and make sure the CO2 is removed permanently.

Most models indicate that large amounts of carbon sequestration, or negative emissions, will be required, likely at very large scale, to head off the worst effects of climate change. Out of the 116 model scenarios consistent with keeping warming below 2C° used by the IPCC, 87 percent utilize negative emissions technologies. Note that most of these projections also assume that countries will implement aggressive emissions reduction strategies quickly. With further delayed action, the need for negative emissions will only increase.

How large is potential market for Negative Emissions Technologies(NETs) likely to be? Or equivalently, how much carbon uptake is needed to meet Paris Agreement goals?

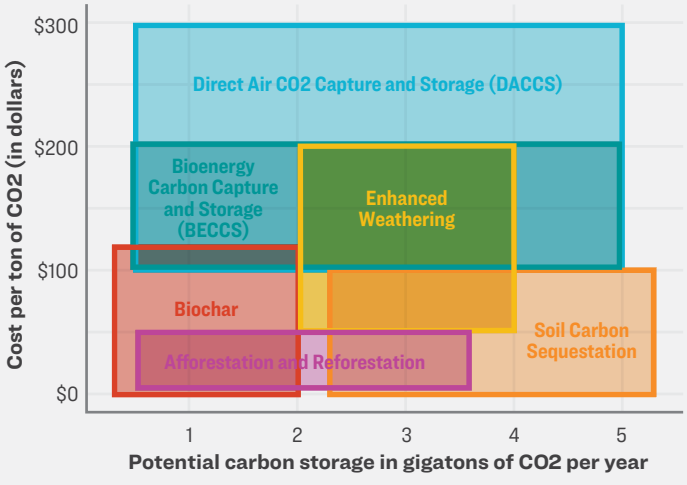


SOURCE: IPCC

The following chart summarizes the IPCC assessment of the potential of various CDR approaches, taking into account the cost of deployment. IPCC did not assume changes in consumption patterns and diets. The IPCC assumption is that all six approaches should be pursued, but that Bioenergy with Carbon Capture and Sequestration (BECCS), enhanced weathering, and direct air capture will only be competitive and available in the future and with a much higher price on carbon.

How do carbon storage techniques stack up?

To meet the goals of the Paris climate agreement and keep global warming under 1.5 degrees Celsius, the world will have to increase the amount of carbon dioxide pulled from the atmosphere, the IPCC reports. It compared the costs and storage potential of six key methods of carbon dioxide removal. Soil carbon sequestration is one of the cheapest with the most potential.



SOURCE: IPCC

IPCC notes that protecting and restoring forests and wetlands and soil carbon sequestration are available now, require the lowest carbon price to be affordable, have major co-benefits (wildlife habitat, watershed protection, recreation, water and air quality, etc.), but there are significant concerns about the permanence of carbon sequestration, as the carbon stored in forests, wetlands or soils could be lost if land management practices changed. In contrast, BECCS, enhanced weathering or direct air capture are more expensive, have fewer co-benefits, and aren't yet ready for commercial deployment, but the geologic sequestration is much more likely to be permanent. This is best summarized in this chart by Stanford researchers Field and Mach:

Rightsizing Carbon Dioxide Removal Expectations

A sampling of CDR technologies

Comparative features of three widely discussed, potentially large-scale strategies for carbon dioxide removal

	Level of engineering complexity	Environmental cobenefits	Land area required for large-scale deployment	Risk of later carbon dioxide release	Energy status
Forest and Soil Stewardship	Low	High	High	High	-Neutral
BECCS	Medium	Low	High	Low	Production
Direct Air Capture	High	Low	Low	Low	Consumption

The National Academies of Sciences, Engineering and Medicine report that came out in October 2018 states that technologies that suck carbon dioxide out of the air will likely be crucial to meeting global climate goals, and they'll need more investment to reach scale. Negative Emissions Technologies and Reliable Sequestration: A Research Agenda.

The report further states that in order to keep global warming below 2°C above pre-industrial levels, carbon removal techniques worldwide will likely have to remove and permanently store about 10 gigatons of CO2 per year by the middle of this century. It concludes that natural systems can probably only draw down carbon by 5 gigatons per year worldwide without severely impacting food production or causing significant equity issues.

Scale of Carbon Dioxide Removal Opportunities

Negative Emissions Technology	Estimated Cost ($/tCO$_2$) L = 0–20 M = 20–100 H = >100	Upper-bound* for safe** Potential Rate of CO$_2$ Removal Possible Given Current Technology and Understanding and at ≤ $100/tCO$_2$ (GtCO$_2$/y)	
		US	GLOBAL
Coastal blue carbon	L	0.02	0.13
Afforestation/ Reforestation	L	0.15	1
Forest management	L	0.1	1.5
Agricultural soils	L to M	0.25	3
BECCS	M	0.5	3.5–5.2
Direct air capture	H	0	0
Carbon mineralization	M to H	unknown	unknown
Total		1.02	9.13–10.83

SOURCE: NATIONAL ACADEMY OF SCIENCES

**Upper-bound assumes full adoption of agricultural soil conservation practices, forestry management practices, and carbon capture.*

***Safe means without large-scale land use change that could adversely affect food availability and biodiversity.*

The permanence of natural systems carbon sequestration (or lack thereof) is also a major concern. To reach the 10-gigatons-per-year target, the portfolio of carbon removal options we support will almost certainly need to include some technological approaches. By 2100, the target for CO2 removal rises upward toward 20 gigatons per year, and in the latter half of the century forests and soils may have absorbed all the carbon that they can, so other technological approaches will be needed beyond these natural systems.

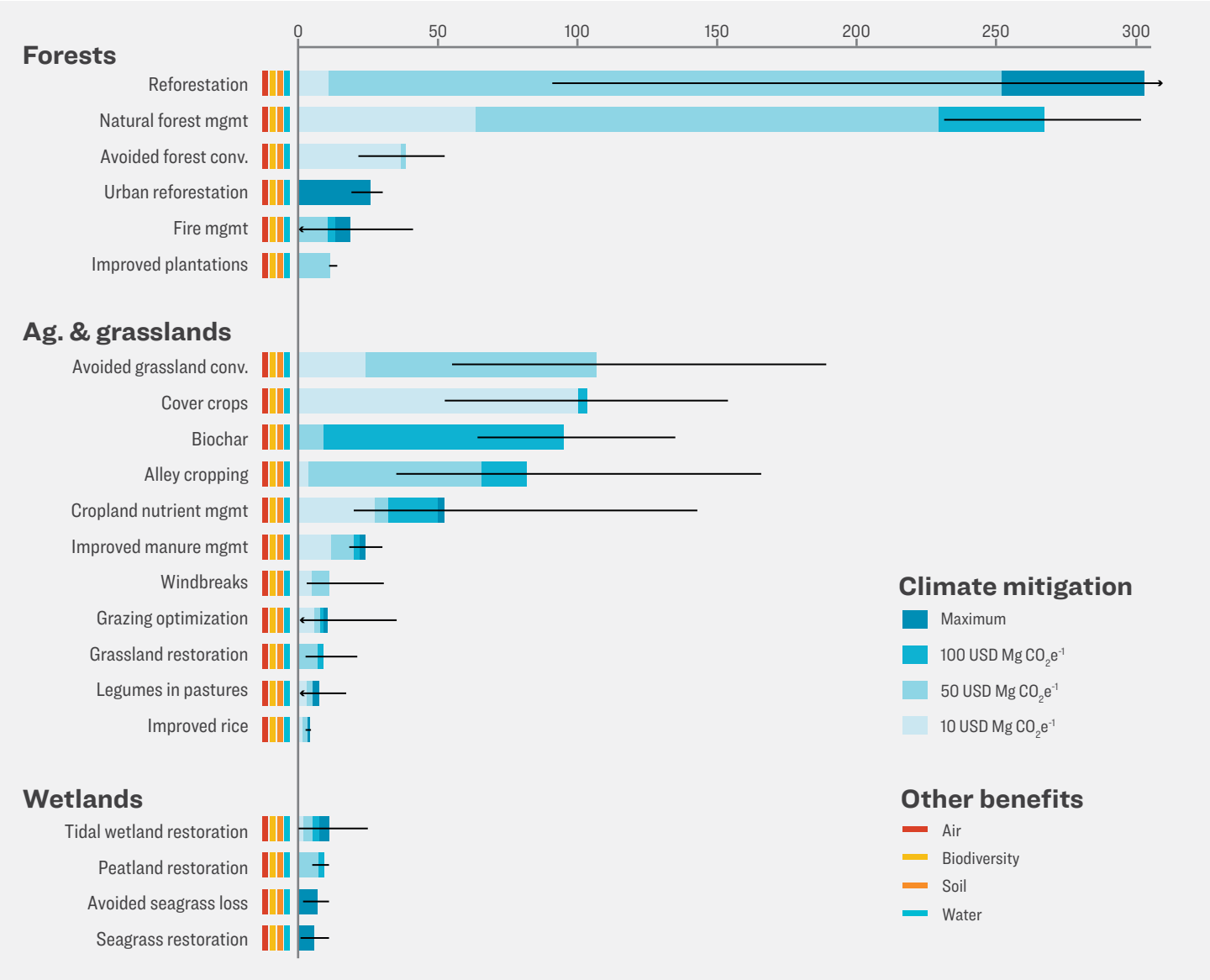
The US Mid-Century Strategy for Deep Decarbonization, released in 2016 by the Obama White House, suggests that U.S. forests and soils could sequester nearly one gigaton of CO2 annually by 2050, while also supporting nearly 1 billion tons of biomass production for another negative emissions technology: bioenergy plus carbon capture and storage (BECCS). This is a lot, but not enough to do the job.

A study done by The Nature Conservancy et al reports on natural systems' potential just in the U.S. All told, this could offset 21 percent of US total emissions, which is great, but insufficient. These volumes are assuming an acceptable level of deployment that does not compete with food and other vital land uses. Note that volume is dependent on price of carbon. Natural Climate Solutions for the United States, Farigione et al. 2018. Appearing in Science Advances.

There is some disagreement about how much land-based carbon dioxide removal can accomplish. Those opposed to technological CDR approaches project that massive deployment of land- based CDR systems and changes in high carbon consumptive lifestyles can fully meet the emissions reduction targets. The Climate and Land Ambition and Rights Alliance (CLARA) produced an optimistic report that shows how land-based systems and consumption reforms alone could do the job, https://www.climatelandambitionrightsalliance.org/report. The IPCC, NAS, and TNC reports all propose relatively minor changes to land management, including forests (e.g., the TNC report proposes a temporary reduction of only 10% in logging levels), and none of them include protecting forests from logging. A paper by Erb et al. (2018) indicates that natural climate solutions including reestablishing many forests where they were long ago converted to agriculture could pull considerably more gigatons of carbon out of the atmosphere than suggested elsewhere.

The Sierra Club should start by embracing maximization of natural ecosystems CDR and avoided emissions approaches. This maximization must take into account justice, equity, and ecological concerns, so we need to avoid competition with food production, indigenous peoples' rights, natural ecosystem protection, and other

Climate mitigation potential in 2025 (Tg CO_2e year)



SOURCE: NATURAL CLIMATE SOLUTIONS FOR THE UNITED STATES, FARIGIONE ET AL. 2018

vital concerns. The more we can squeeze out of deployment of natural ecosystems approaches and avoided emissions, the less we will need to rely on more expensive and impactful technological approaches.

That said, we almost certainly will need to deploy some level of technological CDR by mid-century, if not before. We would be wise to start now with the appropriate level of research, development, and limited deployment to improve the technology, drive down the cost, and develop the approaches with the fewest negative impacts—while ensuring that technological development is informed by consultation with community partners to address equity concerns. It may take several decades to get these technologies to a place where they are affordable, reliable, safe, permanent, and just. Having them fully researched and available in case reliance on natural ecosystems fails to do the complete job is the prudent course of action.

It should be pointed out that natural systems carbon sequestration poses the fewest risks, is the cheapest to deploy, and has numerous co-benefits, but it is also the least likely to provide new family-sustaining or union jobs, as it mainly involves land and wetland protection, forest stewardship, and changing agricultural land management practices. The technological CDR approaches tend to involve building and running plants and pipelines which have many family-supporting or union jobs associated with them.

Any effort to develop CDR technologies must in no way undermine the urgency of emissions reductions. In some cases, if such development would impact our ability to dramatically reduce emissions (e.g., CCS at Kemper), the Sierra Club may need to take a position opposing the use of resources to develop CDR technologies. It is also imperative that we keep the moral hazard in mind and not let CDR technology substitute for moving rapidly to 100 percent clean energy.

It should be noted that the Climate Justice Alliance has opposed all global warming interventions like geoengineering and carbon capture and sequestration, as they feel CCS does not address the root causes of global warming—emissions reductions.

In Paris, various justice groups came out strongly against REDD (Reducing Emissions from Deforestation and Degradation) because generally it lacked prior consultation and protections for indigenous communities. The Climate Justice Alliance has opposed market-based approaches to address climate change because they can disproportionately impact low-income communities and communities of color. climatejusticealliance.org/just-transition/ This grassroots network of Climate Justice groups initially expressed reservations about the Green New Deal (GND) because it was not designed with frontline community input. Following these objections, GND leaders and the Climate Justice Alliance met to address their concerns. Following these objections, GND leaders and the Climate Justice Alliance have been meeting to address their concerns. This is one more important reason to heed the Jemez Principles as we move into the CDR space. What may seem like a good solution needs to fully involve climate justice groups from the start.

The task force has put forward draft Sierra Club policy suggestions in each of these CDR areas for consideration by the Conservation Policy Committee and the Board.

The task force set up subgroups to research in detail a number of important topics raised by carbon dioxide removal. Each subgroup prepared a long detailed report and an executive summary answering key questions. The executive summaries can be found in the appendix of this report. The longer detailed subgroup reports are available upon request. The topics related to carbon dioxide removal are:

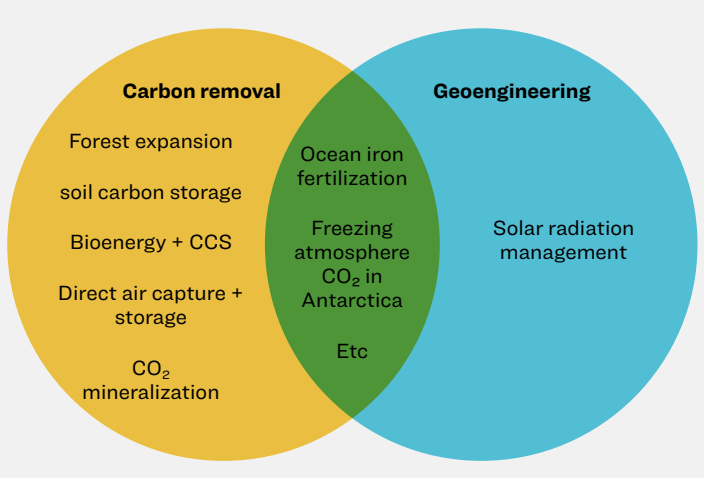
- Forests
- Wetlands/peatlands lakes
- Oceans (blue carbon)
- Soils and ag lands
- Biochar
- BECCS
- DAC
- Enhanced weathering
- SRM

Geoengineering

For purposes of this report we use a very narrow definition of geoengineering. Some people feel that all forms of carbon dioxide removal or solar radiation management is geoengineering, including enhancing natural systems carbon drawdown such as planting trees. For our report, we differentiate between carbon dioxide removal (CDR) at a very localized level, and large-scale cross-boundary climate modification schemes that would impact the global commons. The latter fall into what we define as geoengineering.

A few technologies such as ocean fertilization could be viewed as CDR and geoengineering. Since these pose major risks to the global commons if widely deployed, we chose to put them in the geoengineering category.

Relationship of CDR to Geoengineering



SOURCE: CARBON180

There are many proposed forms of geoengineering, but the most widely discussed are solar radiation modification (SRM) and ocean fertilization. Other geoengineering options include albedo modification (altering large swaths of the earth's surface in order to reflect more sunlight) and marine cloud brightening. We do not propose to study these geoengineering options or take positions on them. We remain highly skeptical of their value and concerned about their global environmental impacts.

Solar radiation modification (SRM) is particularly problematic, and our proposed policy recommends that the Sierra Club oppose it. SRM does not reduce carbon emissions; rather, it attempts to mask them by reflecting solar radiation back into space before it can heat the earth. It does this by continuously spreading sulfide particles and other materials into the stratosphere to reflect the sun's rays, or by deploying huge arrays of mirrors in the upper stratosphere. Given the earth's history of major global volcanic eruptions, solar radiation blockage can temporarily work to reduce global average temperatures. It can also alter regional and global weather patterns in unpredictable ways, leading to dramatic increases or decreases in temperatures and precipitation. For example, it could temporarily slow sea level rise but simultaneously stop South Asia's monsoons. And unless the solar blockage is continuous and carried out forever, it can lead to a huge spike in temperatures and climate shock if and when it is discontinued. Meanwhile, carbon dioxide levels remain unchanged or actually increase.

The IPCC concluded: "SRM technologies raise questions about costs, risks, governance, and ethical implications of development and deployment....Even if SRM would reduce human-made global temperature increase, it would imply spatial and temporal redistributions of risks. SRM thus introduces important questions of intragenerational and intergenerational justice.... The governance implications of SRM are particularly challenging, especially as unilateral action might lead to significant effects and costs for others."

The huge risk here is that some rich countries or private parties could attempt to circumvent the existing ban on SRM and unilaterally seek to deploy it in hopes of advantaging themselves, while ignoring the risks to other countries that would likely suffer the worst unintended consequences. For this reason it is absolutely vital that international governance be kept in place to ban unilateral deployment and give full voice and veto power to the most vulnerable and least powerful nations.

Our task force does not see a major role for the Sierra Club on SRM issues, except to monitor U.S. actions and research and take action to oppose any U.S. deployment and make sure that international governance matters allow full participation of all parties, particularly the least powerful and most impacted.

While ocean fertilization such as spreading iron filings into the ocean could be pitched as benign augmented natural photosynthesis, it also poses unacceptable risks to the global commons. The blooms of ocean plant life from this fertilization could possibly wreak havoc with the food chain and ocean ecosystems. The waters involved are largely international and so again it poses major governance issues where one country might wish to radically change the ecosystem while other countries might object. Ocean fertilization is presently banned and we believe it should continue to be banned, as there are many other CDR options that do not pose such huge risks to the global commons.

Again, our task force does not see a major role for the Sierra Club on ocean fertilization issues, except to monitor U.S. actions and research, take action opposing any U.S. deployment, and ensure that international governance matters allow full participation of all parties, particularly the least powerful and most impacted.

The updated policy that we will be proposing would also cover geoengineering and reflect the positions stated in this section of this report.

Recommended Priority Campaigns Around Adaptation and Carbon Dioxide Removal

After researching the landscape around climate adaptation and carbon dioxide removal we asked task force members to suggest possible Sierra Club major campaigns in each of the areas. The purpose of this request was to identify potential impactful grassroots campaigns that would be best suited to the Sierra Club. In some instances, it was determined that while the Sierra Club needed to update its policy and take a public position on a CDR technology, there was no grassroots campaign that was needed or made sense to pursue.

We asked those who suggested campaigns to measure them against some campaign criteria that we developed. A campaign did not need to rate high on every criteria to warrant consideration, but it needed to rate highly in a significant number of the criteria to move forward in the process.

The campaign criteria we selected and applied would:

- Be politically ripe and have a good chance of success
- Follow Jemez Principles, be culturally cross-cutting and respectful, and promote climate justice and equity
- Achieve large amounts of CO2 removal safely, equitably, and permanently
- Have the ability to make lasting big change and help build the broader climate movement
- Use cities and states as laboratories for change

- Address big climate issues of the day such as flooding or wildfires
- Benefit from added value brought by the Sierra Club
- Have a clear identifiable role for Sierra Club and be a logical priority for our national campaigns, chapters, and groups
- Benefit from the Sierra Club history and brand
- Be of interest to donors and foundations and could attract significant funding
- Fit with the Sierra Club's political goals for making change
- Build ties with rural America and other places where we have been less active
- Rely on multiple Sierra Club capacities and strengths
- Help mobilize the huge Sierra Club lands and wildlife constituency on climate change

Initially, 26 potential priority campaigns were identified. After applying the criteria, the task force settled on recommending six potential national campaigns around Climate adaptation and CDR:

1. Help communities and local, state, and national government agencies adopt, fund, and implement climate-smart, just, and equitable climate adaptation plans.
2. Engage in planning, preparedness, response, recovery, and relocation efforts in response to climate-change-related extreme-weather events.
3. Promote adoption of policies, practices, and programs to protect and restore carbon-rich soils through regenerative organic agricultural practices and improved public and private land management.
4. Protect and restore wetlands and peatlands to secure water resources, mitigate floods, and as natural adaptation/mitigation efforts to address climate change
5. Promote forest protection, restoration, reforestation, eco-forest management, afforestation, and urban forestry as a primary way to address climate change.
6. Protect and restore climate-resilient natural ecosystems by protecting large core natural habitats, establishing connecting corridors, and reducing non-climate stressors both in remote wild public lands and in close proximity to communities.

A short write-up of each of the six proposed priority campaigns can be found in the appendix. These are not campaign plans, but rather brief descriptions of what a campaign might cover and why. If the Board agrees these are directionally right, we would need to convene small groups of volunteers and staff with campaign experience to write up more detailed plans, theories of change, and ultimately grant proposals.

Funding for Climate Adaptation, Carbon Dioxide Removal and Geoengineering

This report is preliminary and will need far more research and follow-up by Advancement staff to verify, identify additional donors, and determine levels of interest in funding NGO advocacy work. In the Appendix you will find a list of potential donors who are funding various ongoing work in these areas. Most are not presently funding the type of grassroots-based work we would propose to conduct. But we do believe there is a vacuum and a high potential to move donor support to groups like the Sierra Club.

This year there was an uptick in donor interest in these areas, with donors funding white papers, conferences, and research. With the IPCC and NAS both calling for urgent action on climate adaptation and carbon dioxide removal (CDR), foundations that have typically restricted climate funding to emissions reductions campaigns are now exploring what to do in the Adaptation and CDR space.

A seminal report by the Kresge Foundation, "Rising to the Challenge Together" (Dec 2017), kresge.org/content/rising-challenge-together found that climate funders were falling short on the key challenge. It found the field lacked a shared vision, does not have steady and coordinated funding, and is only shallowly focused on equity and justice. It's summary judgement was that the funding was "utterly inadequate".

Kresge and Rockefeller are the two most notable foundation players on domestic adaptation. "Rising to the Challenge Together" noted there is growing community action and leadership, but it is very poorly supported and

connected, and support from the federal government has been dramatically scaled back by the Trump administration. There is a growing network of knowledge and tools for adaptation work being developed, but it is not being widely shared and adopted. Attention and resources are being provided to vulnerable large urban areas, with scant attention given to rural areas, vulnerable poor urban communities, and the resilience of natural ecosystems. Root problems such as institutional racism, extractive economies, and wealth inequality are not being addressed.

The Kresge report cites other common failings in philanthropy, such as its tendencies to follow trends and avoid risks. In a field with such profound implications, foundations need to think bigger and for the long term.

A parallel study by the National Committee For Responsive Philanthropy (NCRP) and Grantmakers for Southern Progress, "As the South Grows, Weathering the Storm" (2017), www.ncrp.org/wp-content/uploads/2017/11/As-the-South-Grows-Weathering-the-Storm.pdf found that despite tremendous need and potential, grassroots and community groups are not invited to the table. This report describes the deep divides between larger environmental NGOs and grassroots groups and communities of color. It points out disproportionately low per-person funding in the Southern rural regions over a five-year period ($31 and $67, respectively, compared to $451 nationally) and only a small percentage of that funding going to strategies like community organizing and policy change.

Our own survey and research revealed that there are dozens of foundations that are funding work on Adaptation and CDR. Some focus domestically, some internationally, and some do both. Most up-to-date are funding white papers and conferences, but that is also what the NGO community to date has been pitching to them. Domestic grassroots advocacy groups such as the Sierra Club and our environmental justice partners have not come up with comprehensive and strategic multi-year proposals for advocacy and implementation, so we have yet to gauge donor sentiment.

It appears that the donor community may be ready to make the shift from meetings and further study to action. We do not know if donors and foundations are willing to put large six- and seven-figure gifts into grassroots campaigning around climate change adaptation and CDR.

Developing strategic campaign proposals and then testing them with donors and foundations is a next logical step. In conversations we have had with a few key foundations they are open to talking to the Sierra Club about our vision and plans.

Sierra Club Organizational Landscape

Work on climate adaptation and carbon dioxide removal is nothing new for the Sierra Club, but it has not yet been prioritized, staffed, funded, and developed into a strategic campaign in any way so as to have a major influence on policy or real world outcomes. We have also failed to look at this broad array of issues in a comprehensive way and we have lacked clear cohesive policy and guidance.

The Sierra Club, the NGO community, and the international community have legitimately focused primarily on curtailing greenhouse gas emissions (mitigation) while decrying the past, present, and future impacts of climate change. Only recently has attention shifted to the desperate necessity to simultaneously address climate adaptation and carbon dioxide removal in a significant and coordinated way.

This section of our report is a summary of Sierra Club activities and capacities that are already doing some work on climate adaptation and CDR and could readily be engaged in a stepped-up effort for a major campaign if we had the direction, commitment, and resources to do so.

We start with a major shout-out to to our chapters and groups, who have been heavily engaged in on-the-ground, frontline climate adaptation. As the chapter and group survey clearly shows (see more detailed summary of the survey in the appendix), the Sierra Club grassroots is already a very significant player on adaptation and carbon drawdown. They have already prioritized this work, and now they eagerly seek more help and resources from the national organization so they can be even more effective and engaged. Our chapter directors and lobbyists are

already working on climate adaptation policy measures at the state level, so this would not be imposing new work on the chapters and groups; it would be assisting them and building on their existing work.

The Environmental Justice Campaign and Justice Cluster, Federal and International Climate Campaign, Federal Policy Program, Dirty Fuels, and Resist Campaigns have worked with chapters, organizing staff, Advancement, the rapid response team, communications, and others to address extreme weather and wildfire impacts, provide relief, and seek funding and reforms for recovery and preparedness. For example, through partnership with state chapters and the Justice Cluster, our Climate Policy Director, Liz Perera, coordinated lobbying on the three Supplemental Disaster packages that passed Congress in the wake of extreme weather events this past year. Most of the Climate Adaptation and CDR approaches that the Sierra Club will want to support also have significant potential to provide family-supporting or union jobs in their implementation. Some of the most promising approaches that also provide good green jobs are being considered for inclusion in the New Green Deal package.

SOURCE: FEMA

The Dirty Fuels Campaign did hire a full time organizer in Houston, Bryan Parras, whose work has focused primarily on hurricane response — shining a light on the fact that all too often,communities on the frontlines of the climate crisis also bear a disproportionate burden of pollution from the fossil fuel industry. Houston, Port Arthur, New Orleans, and other Gulf Coast cities that are rife with fossil fuel infrastructure bear the brunt of climate-related disasters on a near-annual basis. However, most climate-disaster response work has been done on a case-by-case basis with no dedicated funding or staff. We have proven we can do this vital work, but we need more dedicated resources to do it even better and be more responsive and effective.

The Federal Policy Program and the Federal and International Climate Program have been represented by Liz Perera in hill advocacy around supplemental disaster assistance packages after this past year's major hurricanes and wildfires. This hill advocacy has allowed chapters working with communities to have a voice in Washington when the money for their recovery is being negotiated, and it was particularly useful in the aftermath of Hurricane Maria in Puerto Rico. There are numerous federal-level coalitions still working in Puerto Rico, where the Sierra Club has been coordinating efforts with Power4Puerto Rico. The Club has also been working with the Disaster Housing coalition, which has responded to all the major hurricanes of the past few years by advocating for robust recovery programs, particularly for people living in public housing. A strong adaptation coalition through the U.S. Climate Action Network (USCAN) called the Sustainable and Just Adaptation and Mitigation (SEJAM) coalition. This USCAN/SEJAM coalition is led by the New Jersey Organizing Project, the Union of Concerned Scientists, and Wisconsin Green Muslims, with participation from Anthropocene Alliance, EFC West, Public Citizen, FloodUSA, and Amnesty International. The membership of this coalition is growing daily and we expect further expansion. (See Sierra Club Resilience and Adaptation Federal Policy work in appendix)

The Environmental Law Program has been a key Sierra Club capacity in all of our conservation campaigns, including our work on emissions reductions; combatting dirty fuels leasing, development and transportation; and protecting forests, wetlands, and wildlife habitats. Our attorneys have already begun legal advocacy on adaptation issues: some examples include challenging the approvals of facilities in floodplains, arguing for the expanded habitat needs of wildlife in a climate-disrupted world, and explaining how conventional pollutants like smog will be greatly exacerbated by climate change.

Communications, Advancement, and Digital Strategies have also been highlighting this work and this issue. During and after each extreme weather episode or wildfire we are carefully messaging the fine line between compassion for

victims and the need to learn lessons so we can both recover and be better prepared for future disasters. The January-February special issue of Sierra magazine is dedicated to covering climate adaptation from multiple angles.

Our International and Federal Climate Change Campaign is already engaged in influencing major international governance bodies involved in climate change, including the Conference of the Parties, the United Nations, the Intergovernmental Panel on Climate Change, and federal agency and federal government policy makers. As these various bodies take up climate adaptation, CDR, and geoengineering governance, we are well-positioned to assert Sierra Club influence along with our allies. Given the modest size of our program and our lack of an international grassroots presence, our role and influence may be limited, but they will be vital and valuable.

The Our Wild America Campaign (OWA) has always had a component related to forest protection, but in this specific area of work, the campaign is underfunded and relies primarily on partial time of a handful of national organizers and chapter volunteers, along with some federal policy advocacy by the Lands Team in Washington, D.C. Similarly, the Resilient Habitats Campaign, which was the predecessor of OWA, was folded into OWA objectives, and the specific body of work focusing on connected landscapes remains largely underfunded and unstaffed. That work could be resurrected and the federal land management climate adaptation plans developed during the Obama administration could be revived. The work that OWA carries out on protecting wild lands, addressing wildfires, and stopping dirty fuels is all part of a bigger effort to establish resiliency so that natural areas and wildlife can adapt to climate change and store large quantities of carbon in forests, wetlands, and soils. If we succeed in the OWA 2030 goal of protecting 30 percent of our U.S. land base, that will do wonders to promote climate adaptation and carbon sequestration. But it would be smart to keep adaptation and carbon sequestration goals in mind as we work toward saving that 30 percent so that we make sure to include key carbon sinks and wildlife corridors as we promote and protect our waters — themes that the OWA teams are eager to take up as part of this work.

Our Clean Energy for All Campaign has started to knit together our work on stopping dirty fuels development and energy conversion and adopting 100 percent clean energy at the community, state, and federal levels. But as we have learned, it is not enough to just stop the addition of harmful emissions. We must simultaneously help communities and states adapt to climate change and help adopt plans and policies that will make them safer, more resilient, and help draw down carbon to safe levels. Every community needs to be committed to 100 percent clean energy and have a climate-smart climate adaptation plan.

Next Steps as Determined by Board of Directors

The Board thanks the Climate Adaptation Task Force for its excellent work in developing a landscape analysis for consideration. As a next step the Board requests that any specific recommendations for change brought up at this Board meeting are reflected in the final report and then it is then circulated to Chapters, Groups and other key stakeholders for review.

The Board directs the staff to convene small groups of Sierra Club experts, leaders and fundraisers to flesh out the six recommended campaigns and to develop more detailed campaign goals, strategies, theories of change and plans around each as well as testing the fundability of each one with likely donors and foundations. This work should be completed so that a report on the feasibility and fundability of each of them is brought back to the Board for its September 2019 meeting. Those six are: Climate Adaptation Planning and Implementation; Extreme Weather Preparedness and Recovery; Forest Protection and Restoration; Wetlands and Peatlands Protection and Restoration; Healthy Carbon-rich Soils; and Protect and Restore Climate Resilient Ecosystems.

The Board directs the Conservation Policy Committee to recommend and the Board Executive Committee to appoint a new task force to develop a comprehensive policy on climate change adaptation, carbon dioxide removal, and geoengineering. This draft policy should be widely circulated and a final recommended policy brought back to the Board by the CPC by September 2019.

The Board urges the volunteers who have been involved in the Climate Adaptation Landscape Analysis and its information sharing network to establish a team within the Grassroots Network to carry this volunteer leadership forward.

Adopted March 2, 2019

Conclusion and Acknowledgements

Conclusion

We hope we have made a compelling case that action on climate adaptation and carbon dioxide removal must be undertaken immediately to address already-existing impacts of climate change, and bold action is essential if we hope to protect and restore our human communities and the natural environment in the future. This work cannot wait for five or ten years, and delay will only make necessary changes harder, less effective, and more expensive.

We also hope we have identified the places where the Sierra Club can make the biggest difference, and elucidate how this work will complement and add to our existing efforts rather than compete with them. The alarm has been sounded by the scientific community, and residents of frontline communities worldwide who are bearing the brunt of hardship caused by climate change are calling out for support and resources to help them survive. Extreme weather and other climate-induced catastrophes remind us weekly of our vulnerability; now more than ever we must prod and rally the philanthropic community and government institutions to step up before it is too late.

A big unknown is whether or not we can raise the necessary funds to carry out the work that we have identified as most important. At the same time, there is tremendous opportunity in this work to undo past damage, restore natural landscapes, help rebuild communities and make them safer and more livable, and build a movement and unite communities in the process. Instead of just heading off climate catastrophe, we can actually help build a better, more just, and more equitable world for present and future generations.

Acknowledgements

We would like to thank the Board of Directors and Executive Director Michael Brune for initiating this project and recognizing the importance and urgency of this study and this work. The two co-chairs, Steve Crowley and Bruce Hamilton, would like to extend our admiration and thanks to the tireless work of the task force members who met weekly for over six months and devoted hundreds of hours to research and writing. Each brought vital background, experience, talents, and compassion to the task. Task Force members are Chance Cutrano, Colleen Kaelin, Warren Lavey, Janice Meier, Robert Murphy, Tom Olivier, Elna Otter, Liz Perera, Dave Raney, Al Tilley, Thomas Wassmer, and James Woodley. (Contact information for this roster is in the appendix.)

In addition, we were assisted by a number of top internal volunteer consultants, notably Chad Hanson and Dominick DellaSala on forest carbon issues, Arthur Feinstein on sea level rise and wetlands issues, and Fred Heutte on international climate and energy issues. Our report also benefited from advice, tutoring, and technical reviews by the staff of EcoAdapt and Carbon180. Grace McRae was instrumental in helping to prepare and compile the chapter and group survey. We are also indebted to the many professional colleagues inside and outside the Sierra Club who have been working on these issues for years who were so generous with their time to help educate and advise us. Tom Valtin, Peter Walbridge, and Libby Lee-Egan provided vital editing and design skills that helped make this report readable and attractive. Last, and most important, we were inspired by the many Sierra Club chapter and group leaders and staff who have been carrying out vital work on climate change adaptation, extreme weather response and recovery, and carbon dioxide removal; they've been waiting for us to catch up and lend them a hand.