UC Climate Stewards
Education and Service Program/
Community of Practice

STRATEGIC PLAN

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I.   INTRODUCTION/BACKGROUND

Why Climate Stewards?

The Climate Stewards for California Communities Initiative has been conceived through the UC California Naturalist Program with the goal of using its highly successful educational network to improve climate change literacy and civic engagement to foster community resilience to climate change. Specifically, the initiative has three objectives:

1) Increase access to up-to-date climate science locally relevant for California's bioregions to improve climate literacy through a Climate Stewards certification course and a module for California Naturalist courses;
2) Improve participants' self-efficacy and agency by fostering climate science communications skills development, civic engagement, and local conservation and community action on the ground; and
3) Establish an inclusive community of practice focused on climate stewardship as part of the larger UC California Naturalist program;

The State of California will benefit from a public education and service initiative on climate change. California residents will be offered the opportunity to gain knowledge on the science of climate change as a global challenge while acquiring specific local level knowledge and connections to engage on this issue in their communities. The UC Climate Stewards for California Communities initiative will be place-based, linking participants with climate-focused local organizations, and regional, state and federal initiatives where they live. Participants' volunteer contributions will support the increased capacity of local informal science and conservation organizations to enhance their climate change efforts.

The Climate Stewards for California Communities initiative can foster the connection of residents to the growing number of state and local government resilience and adaptation plans or other local government initiatives needing increased public involvement. Stewards, with an understanding of state climate efforts and their local application, will be better prepared and perhaps more motivated to participate in local climate planning processes and initiatives. Climate Steward graduates may become catalysts, early adopters, and local facilitators for public participation in climate change related initiatives. For example, Climate Stewards could support efforts of the Governor's Office of Planning and Research (OPR) in building awareness of Executive Order B-30-15 and the Safeguarding

> ### *Climate Literacy*
>
> *Climate change will affect every aspect of life, so to grasp the causes, consequences and scope of the subject, and to be able to communicate about it requires **climate literacy**.*
>
> *Being climate literate means **knowing that all life is shaped by climate, having the skills to communicate climate change science in a manner that is locally relevant, and being aware of ways to address the social and physical ramifications of a warming climate**.*

California Plan and also prompt use of the Adaptation Clearinghouse portal. See Appendix A for further details on these state efforts.

The Climate Stewards for California Communities initiative can also support state level educational needs. A climate education and service initiative could help state agency staff build their capacity to effectively implement both state and local climate policy requirements. For instance, the Climate Stewards initiative could support the state's agencies in implementing Executive Order B-30-15 asking for integration of climate considerations into planning and investment decisions.

In addition to the benefits at the statewide scale, the proposed Climate Stewards initiative will emphasize local engagement to build capacity and positively impact a multitude of local organizations. Many opportunities exist to do this. Perhaps the most important one is that organizations can use this initiative to educate their supporters, volunteers and the general public about what their organizations are doing on the ground to adapt to or mitigate climate change locally. It also provides an opportunity to engage people as active members (stewards) of their watersheds and to connect them to how local actions can have an impact on broader global issues. There may be other opportunities for working collaboratively with multiple organizations who are doing similar work, and to interface with regional, state and federal agencies on a larger scale. Finally, the initiative may increase the capacity for some local informal science and conservation organizations to expand their efforts in the climate science, education and project implementation space.

Purpose of the Strategic Plan

This Strategic Plan provides a framework for design, development and implementation of the Climate Stewards education and service initiative through UC California Naturalist Statewide Program. Developed by a selected group of committed and knowledgeable experts in relevant areas, the Plan includes the following elements:

- Vision, Mission and Guiding Principles
- Our Theory of Change
- Course Content, Delivery Methods, and Schedule
- Program Operations, including scope, audience, partners, and phasing
- Communications, Civic Engagement and Community of Practice
- Evaluation and Cumulative Impact

The Strategic Plan articulates the overall focus and approach to launching both the certification initiative and an ongoing community of practice to facilitate mutual support and learning. But as demonstrated in the planning process, the effort goes far beyond this planning document, the courses themselves and the extension into a community of practice: The Climate Stewards Initiative strives for change at a deep level, in the environment, among local communities, and within individuals.

The Landscape of Climate Education and Service Programming in California

Climate change has been investigated and documented for decades, with increasingly broad and intense attention. In the past two decades in particular, the topic has evoked a great deal of political debate and posturing; however, the exploration of causes, effects and mitigation and adaptation strategies has continued to advance against this backdrop.

In California, long known as a bellwether of cutting edge science and policy research, these investigations have led to a number of academic, non-profit and government programs. Many organizations have current programming for education and service opportunities, primarily with a focus on youth. This Climate Stewards Initiative will provide an opportunity to bring climate science, participatory research and community action into an adult-level certification course and community of practice that will help build community resilience. People working for organizations involved with climate action and education, many of whom we interviewed, expressed their enthusiasm for the adult education and service initiative developed here and believed it would build upon what currently exists (for a list see Appendix B). A graphic positioning of Climate Stewards within the existing California climate education initiative universe is provided in section IV.

Lessons Learned from Outreach

To help inform the design of the Climate Stewards initiative, the planning team undertook a series of interviews with key resource people involved in climate science, education, environmental justice and citizen engagement in order to solicit input on the scope and nature of the education challenge at hand. Interviewees came from the public and civic sectors, from organizations operating at the local, regional, state and national levels. Some of the key findings from these conversations are captured in this section. In addition, many of the resources these experts had to share are listed in Appendix D.

Barriers and Strategies

Stakeholders and experts working on climate science outreach shared what they thought would be some of the challenges to engaging participants in climate change education and community action. Interviewees mentioned the **scope and complexity of the issue**: people feel overwhelmed and that meaningful action is next to impossible; they don't feel that they can make a difference. Others don't feel the issue affects them personally – it's "invisible, colorless and odorless;" while still others believe that the science isn't conclusive, making it difficult to prescribe effective action.

Some interviewees mentioned that climate change has **become politicized**, and the issue has been swept into identity politics. Some people feel that their "faith" and the "facts" are in opposition. For some, the long timespan during which the earth will experience human caused climate change with the worse effects seemingly far off **in the future** can make motivating action now challenging. Others are conflicted that some of the things that run our economy ruin our

environment and changing economic paradigms can seem daunting.

To address and resolve some of the barriers to understanding and building agency, respondents suggested that communication needs to help break down the components of climate change and **make them more understandable, personal, action-oriented, and delivered with hopeful messaging**. Strategies should **focus on local community opportunities** and include **both short- and long-term, sustained actions**. Some indicated that **proxies for climate change** could be useful to motivate citizens to get engaged, such as soil conditions, water availability and weather. **Engaging influential voices**, both local and beyond (including celebrities), could help validate issues and spur action. Several mentioned existing resources as being useful in crafting and disseminating climate action messages.

More education is needed in local communities across the state so that informed climate action can happen more quickly. But it is expensive to provide educational opportunities, and individuals and organizations are not willing or positioned to pay for it. To provide this public good, an initiative that shares the cost across organizations would be important to consider. The Climate Stewards initiative builds on the successful social enterprise/social franchise program delivery model used in the California Naturalist program to address these conditions that limit the ability of the private sector and government to address the problem.

Issues and Trends

Interviewees were asked to identify the issues or trends related to climate change they think will impact communities in the next 5 to 10 years.

Many mentioned the **extreme weather** – storms, droughts, flooding, wildfires – and the frequency of these major events as a significant trend. In many areas, extreme heat will cause a number of related challenges. Coastal areas will experience flooding, king tides and overall sea level rise. There will be many challenges associated with **water management**, including heavier storms, limited snowpack, dam and reservoir management challenges, acidification, hypoxic zones, less fresh water resources. **Impacts on flora and fauna** include species loss/extinction, species migration. **Food production** will be stressed in the future due to limited areas for agricultural expansion or adaptation, declining fisheries, crop yield declines (especially fruit) and changes in what is considered productive land.

There will be incredible demands placed on our **physical infrastructure** of water storage and delivery, as well as our energy systems. We will continue to see combative elements in the policy arena as decision makers struggle to assert leadership. Some of the respondents call out impacts on settlement patterns, with climate change effects triggering mass migrations and economic, social and **political disruptions**; all of which would result in civil unrest. Most everyone said that connecting these environmental disruptions and climate change will be increasingly important,

and even more personally, that these are putting things people love at risk.

Suggested Course Content

Those interviewed had a number of ideas for what to cover in a Climate Stewards certification course. In general, most expressed the notion that the initiative could help **move people from understanding to action**. One suggestion was to include not just climate science, but **how to intelligently read and interpret data**, to be a good "consumer of information." There was some debate over learning about mitigation versus adaptation, but most saw **value in both**. Many cautioned about making the curriculum too science-heavy and suggested that **using examples of local challenges** (including the extreme events of hurricanes and wildfires) to illustrate scientific principles would be most effective.

With respect to communication about climate change, interviewees encouraged **avoiding arcane and jargon-filled language**, as well as "doomsday" messaging, saying these tend to shut people down. The advice was to stick to **simple messages, relatable stories, and positive and encouraging examples** of similar communities tackling similar problems.

People responded to the "fostering agency" part of the Climate Stewards initiative -- saying this is where the true impact can be felt -- so arming course participants with **case studies and tools for organizing community action** will be critical to making a difference. There are some who feel that **the policy arena** is a potential target for Climate Stewards'

efforts. California has among the world's most ambitious GHG reduction goals and a suite of policies and funding mechanisms, so sustaining the efforts with policymakers is seen as important.

Examples of programs, online courses, clearinghouses and video presentations abound and were shared by those we interviewed. One example, offered by the Post Carbon Institute, is a course called "Think Resilience," which is a series of 22 short videos with study guides. "Climate Interactive" is a resource that creates interactive, "scientifically rigorous" tools that "help people see connections, play out scenarios, and see what works to address the biggest challenges" faced by communities. Several people mentioned "Cal-Adapt," California's clearinghouse for tools, data and research which will serve as a key resource for instructors and participants alike. As a national model, many pointed to the work of the National Network for Ocean and Climate Change Interpretation (NNOCCI), which disseminates best practices in communications and provides a platform for sharing information and support across the country among climate change communicators. More of these resources are found in Appendix D.

II.   MISSION/VISION/GUIDING PRINCIPLES/ THEORY OF CHANGE

The Climate Stewards Initiative will be guided by the following strategic framework of Mission, Vision, Guiding Principles and Theory of Change model.

MISSION

The UC California Naturalist Program prepares Climate Stewards to communicate and engage in local efforts to advance community and ecosystem resilience.

VISION

Our vision is for California to have engaged communities and functioning ecosystems that are resilient in a changing climate.

To achieve transformational change at a community level, it takes vision, skills, knowledge and commitment, as well as motivation. The Climate Stewards Initiative can engender all of these within each course cohort and across the statewide community as a whole. Community level change is difficult for individuals to affect even when they are very driven and good at influencing others. Thus, the initiative will promote teamwork and foster a community of practice.

GUIDING PRINCIPLES
The Program will…

➢   … be grounded by interdisciplinary science.

➢   … address the "whole person" – mind, body, spirit, emotions – and will highlight and affirm humanity as embedded in the wider community of life.

➢   … provide opportunities to focus on the needs and conditions of the local community as a way of tackling a global environmental challenge.

➢   … be positive and motivating, inspiring wonder and awe.

➢   … be inclusive and founded on the interconnection of social and ecological justice.

➢   … encourage participation in community science and foster agency to advance community level action.

➢   … build and sustain a community of practice around climate resilience for California through partnership.

The place-based, community-level focus, as a key component of the theory of change (described below), is the concept that relevance comes from a strong sense of place. It is based on the notion that local solutions are more likely to be sustainable. Local solutions require people to focus on the place where they live, observe the natural and human systems they are a part of, and connect with others in the community. If individuals can identify and cultivate a sense of place, they

can find ways to live more sustainably, connect with community, and find increased purpose. This initiative can be a catalyst, prompting participants to reconnect to the natural world. Through reconnecting, they may be motivated to restore, replenish and develop a reciprocal relationship with the rest of the community of life.

Theory of Change

Climate change challenges our collective responsibility to prevent irreversible change to the Earth's systems so that we do not further harm other species and our own future generations. The Climate Stewards for California Communities initiative is a climate change education and service course that builds on the place-based program related to local ecosystems led by the UC California Naturalist program. Through an integrated approach, participants in this new initiative will come to understand the dynamics inherent to natural systems and what they can do to improve ecosystem and community resilience.

Experiencing humans' interdependence with earth's physical and biological processes and sharing these experiences in a social learning environment can motivate environmental stewardship for the benefit of the community of life. The hope is to empower participants by fostering their vision, skills, knowledge and commitment to engage effectively in community level work to ensure a resilient and flourishing future.

The Theory of Change (Figure 1) promotes an integrated, holistic approach to the consideration of climate change, exploring how human created systems affect and are embedded within natural systems. The Theory of Change (ToC) rests on the premise that human systems need to recognize that earth's systems are dynamic and have tolerance thresholds, or limits, beyond which irreversible and detrimental consequences for life on earth can result. It is critical that we restore our connection to nature in order to enable the flourishing of life. Ensuring human systems reflect the need to support functioning ecological systems is the only sustainable way forward.

The Guiding Principles are the foundation of the ToC. (See insert on page 6.) Instructors can integrate the Guiding Principles by:

- presenting the concepts of human interdependence and embeddedness within the community of life
- highlighting natural abundance and sufficiency and resilience thru diversity
- fostering wonder and a belief in humanity's ability to transition to new positive pathways forward
- illustrating the interconnections between our economic, social and environmental systems
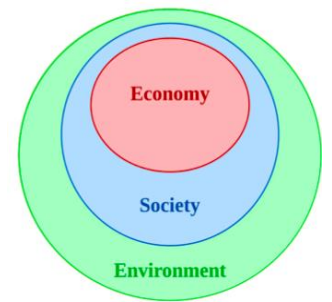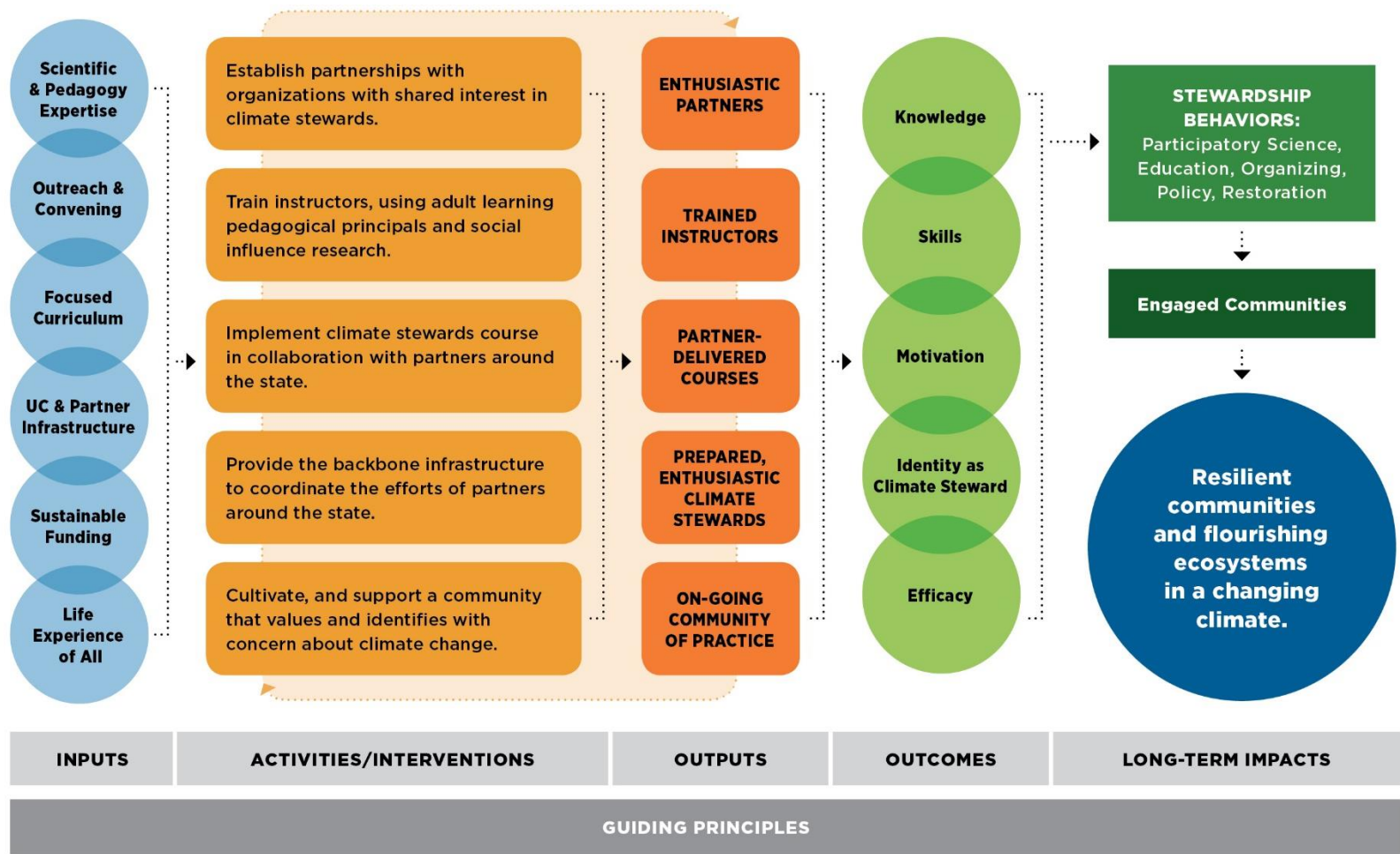

The concentric circles in the diagram above illustrate a mutually-enhancing relationship among our economies, society and the environment.

Through a culture of positivity and possibility participants will be prompted to re-imagine our collective future under climate change, develop agency, and feel confident in taking leadership within their communities.

Figure 1

THEORY OF CHANGE *for Climate Stewards Initiative*

THEORY: Through coursework, communication and communities of practice that promote learning and relationship building, Climate Stewards will enhance their motivation, confidence and capacity to participate in short-term and long-term stewardship behaviors that build their local communities' resilience in a changing climate.

INPUTS

- Scientific & Pedagogy Expertise
- Outreach & Convening
- Focused Curriculum
- UC & Partner Infrastructure
- Sustainable Funding
- Life Experience of All

ACTIVITIES/INTERVENTIONS

- Establish partnerships with organizations with shared interest in climate stewards.
- Train instructors, using adult learning pedagogical principals and social influence research.
- Implement climate stewards course in collaboration with partners around the state.
- Provide the backbone infrastructure to coordinate the efforts of partners around the state.
- Cultivate, and support a community that values and identifies with concern about climate change.

OUTPUTS

- ENTHUSIASTIC PARTNERS
- TRAINED INSTRUCTORS
- PARTNER-DELIVERED COURSES
- PREPARED, ENTHUSIASTIC CLIMATE STEWARDS
- ON-GOING COMMUNITY OF PRACTICE

OUTCOMES

- Knowledge
- Skills
- Motivation
- Identity as Climate Steward
- Efficacy

LONG-TERM IMPACTS

- STEWARDSHIP BEHAVIORS: Participatory Science, Education, Organizing, Policy, Restoration
- Engaged Communities
- Resilient communities and flourishing ecosystems in a changing climate.

GUIDING PRINCIPLES

Diversity, Equity and Inclusion

The success of climate stewards is intertwined with, and relies on, a commitment to ensuring access, inclusion, and empowerment for all California communities. California communities are diverse across views, vantage points, identities and geographies, all of which are needed as active participants in community and ecosystem resilience. Hence, **a central goal is to integrate diversity, equity, and inclusion into every level of the initiative.** Through this integration the initiative will recognize the link between social justice, ecological restoration, and climate change.

Achieving successful integration of diversity, equity, and inclusion requires ensuring meaningful representation in the UCANR staffing of the initiative and cultivating partnerships with diverse communities and local institutions who are trusted sources to potential Climate Stewards. To achieve this, specific objectives include: to identify, increase, and engage partners serving diverse audiences within and beyond the environmental education field; and to embody inclusivity in initiative outreach, delivery, and content. The intent is that the partnering organizations will find the initiative to be a welcoming and respectful place for collaboration where there will be a mutual valuing of each other's contributions and talents. In particular, the initiative will initially focus on improving access to young adults of color involved in workforce education opportunities.

To further develop **meaningful collaboration** with partners that serve diverse audiences, and a young workforce audience, the Climate Stewards will: engage state and local conservation corps to identify opportunities and barriers to becoming a partnering organization and assess needs specific to these organizations and where possible address them for implementation to become a reality. Climate Stewards staff will also participate and help build coalitions and networks that advance inclusive participation in science, education and stewardship (e.g., CA Outdoor Engagement Coalition, the North American Association for Environmental Education, the CA Association for Environmental and Outdoor Education, Alliance of Natural Resource Outreach and Service Programs, and the Diverse Outdoor Leaders Institute), including within the network of CalNat partners.

To enhance **inclusivity**, the Climate Stewards initiative will support innovative approaches to program delivery. An example is how the California Naturalist program is delivered by the Wishtoyo Chumash Foundation through in situ [traditional knowledge](#). This includes increased accessibility to additional course content and professional development opportunities. Activities and approaches can be co-developed with partnering organizations that would help participants explore what they can do to prevent climate impacts likely to preferentially impact water quality for low-income communities, for example. Environmental justice will be covered statewide but the exact context and solutions will be tailored depending on the location and partners involved in a specific course. It also may be helpful to provide some focus on incentives such as skills building, certification, and college credit that improve employment opportunities and on finding

funding for professional development and marketing initiatives.

Climate Stewards will also acknowledge and incorporate **environmental justice** into the curriculum, recognizing that climate change disproportionately has and will affect low-income people, communities of color and indigenous people. For this reason, many leading environmental organizations today are centering social justice in their climate work. To promote diversity, equity and inclusion, the Climate Stewards initiative will highlight the disproportionate impact of climate change resulting from structural and institutional inequities. The initiative also will be inclusive of the voices and experiences of frontline communities most affected by climate change. The sidebar lists some climate related goals being advocated by those working on climate justice.

Climate Justice Goals

❖ *Environmental, racial, and economic justice through the meaningful involvement of all people.*

❖ *A just transition to 100% renewable energy and sustainability more broadly in a way that protects workers and promotes family-sustaining jobs for all communities including indigenous peoples and especially frontline communities most affected by climate change.*

❖ *Just and equitable resiliency and recovery efforts led by the communities most impacted.*
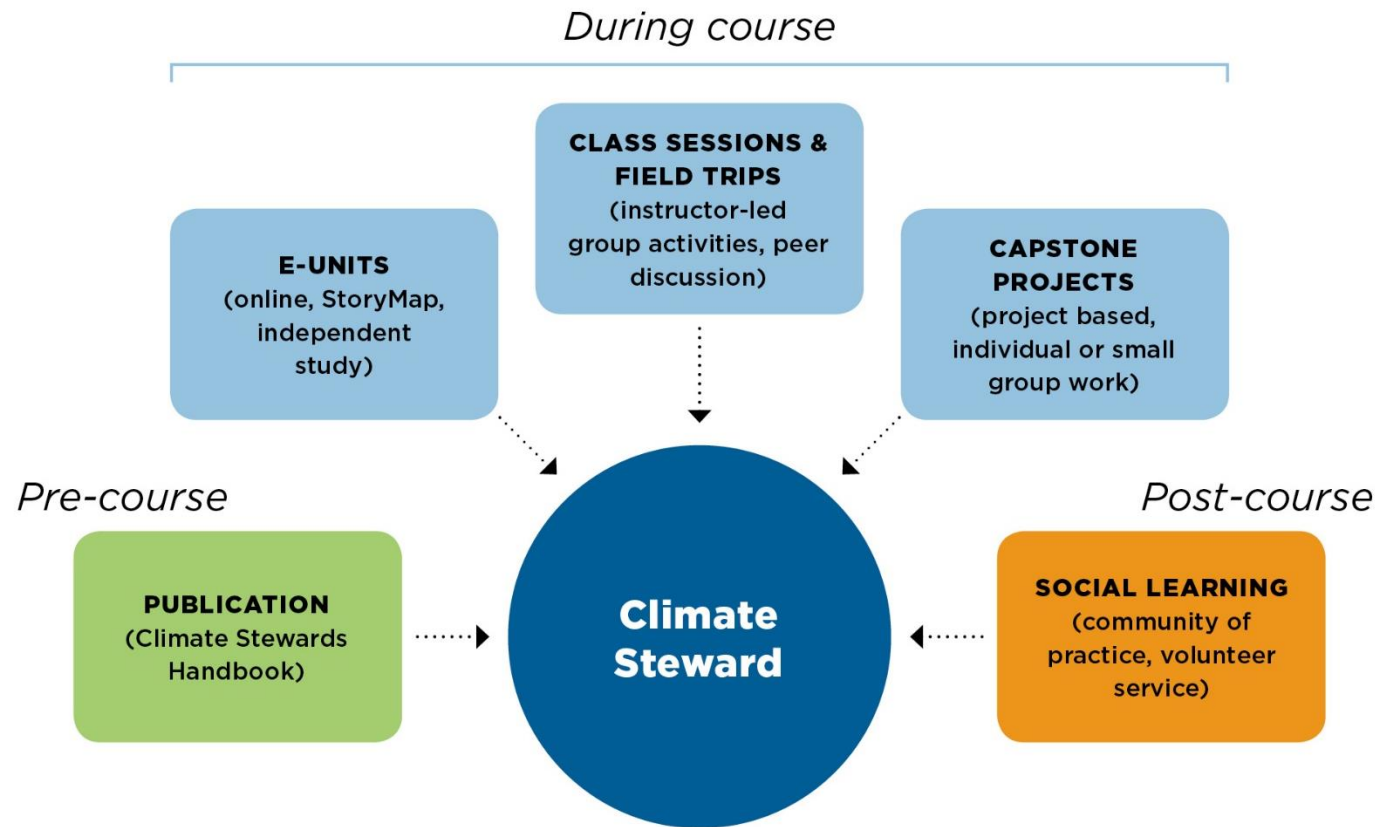
III.   COURSE CONTENT

Understanding climate science and climate solutions engages a wide range of disciplines, including natural and social sciences, evidence-based communications and arts and humanities. Distilling the most important knowledge and an appreciation for scientific and societal uncertainties is critically important and challenging, especially in a time-limited format. Given the global importance of the issues, numerous sources are available on both the basic science and regional impacts and solutions. In California, we have an especially rich trove of research from academic, government and NGO sources, including a series of four state-sponsored climate assessments that parallel the US National Assessments and the IPCC global reports. The Climate Stewards initiative plans to draw from these and many other sources to achieve the following course objectives.

Course objectives include:

1. *Share experiences with climate, environment, and community, including extreme events.*
2. *Introduce stewards to the science of climate change, drawing attention to the latest research that has emerged on climate for California in recent years.*
3. *Practice evidenced-based communications methods and explore the social and emotional support needed to engage as a climate communicator.*
4. *Increase participants' understanding and connection to their local watershed/bioregion by examining social changes, mitigation strategies, adaptations that local communities are considering or actively taking, and by exploring other promising actions to consider as the climate continues to change in the coming years.*
5. *Make new connections to share and support participants' civic engagement.*

Figure 2

BLENDED LEARNING APPROACH

During course

CLASS SESSIONS &
FIELD TRIPS
(instructor-led
group activities, peer
discussion)

E-UNITS
(online, StoryMap,
independent
study)

CAPSTONE
PROJECTS
(project based,
individual or small
group work)

Pre-course

Post-course

PUBLICATION
(Climate Stewards
Handbook)

Climate
Steward

SOCIAL LEARNING
(community of
practice, volunteer
service)

Draft Syllabus

UNIT I.   **Experiencing Change**
- A. Relationship building among the participants through conversation, stories, and communication techniques.
- B. Who, what, where are part of these experiences and stories
  1. Understanding local community & environmental justice
  2. Exploring community of life & relationship to nature
  3. Working with trauma & depression
  4. Finding hope

UNIT II.   **Earth Systems Connections**
- A. Global earth systems
- B. California ecosystems
- C. People-nature relationship – addressing interdependence and rapid changes expected where we live and play

UNIT III.   **Water, Energy, and Agriculture**
- A. Case studies about changes in CA water, energy resources and agricultural practices
- B. Documented stories of hopeful directions for further evolution of current climate interventions

UNIT IV.   **Community Resilience**
- A. Extreme weather, fire, sea-level rise, floods, etc.
- B. Local adaptation plan review
- C. Local mitigation efforts
- D. Community resilience evaluation
- E. Citizen/community science group experience

UNIT V.   **Interpretation and Communication**
- A. Know your audience – "So what?" "Why should I care?" "WIIFM (what's in it for me)?" messaging
- B. Craft a message triangle to focus participants' educational efforts.
- C. Create a map of effective channels of communication for participant's community.
- D. Practice personal story, justification and desire for increased resilience.

E.   Develop communications tools for interpreting climate change to key audiences.

UNIT VI.   **Civic Engagement/Capstone/Graduation**
  A.   Participatory Science
  B.   Local Adaptation Planning
  C.   Education/Interpretation/Outreach

More details on content ideas for these units can be found in Appendix B.

Proposed Schedule

	Content	Hours
Meeting #1*	● Course logistics and requirements (including Community of Practice and contribution to initiative evaluation) ● Unit I (Experiencing Change)	2.5
At-Home	● Online learning focused on Unit II	~4
Meeting #2	Discuss Unit II (Earth Systems Connections) ● Introduce capstone proposal form ● Biodiversity-focused field trip	6.5
At-Home	● Online learning focused on Unit III ● Think about capstone ideas	~6
Meeting #3	● Discuss Unit III (Water, Energy, and Agriculture) ● Turn in capstone proposals ● Optional field trip with water/energy/agriculture focus	2.5 (6.5 with field trip)
At-Home	● Cal-Adapt exercise ● Sea level rise simulations ● www.Resilientca.org ● Exploration of local planning documents ● Work on capstone project	~6
Meeting #4	● Unit IV (Community Resilience)	2.5
At-Home	● Online interpretation/communication slides and exercises	~6
Meeting #5 **Meeting #6**	● Unit V (Interpretation and Communication) ● Unit VI (Civic Engagement) ● Connection to Community of Practice ● Present Capstone Project ● Graduation / Potluck	2.5 2.5

In sum, there will be a total of 15 classroom hours, with approximately 26 hours devoted to home-based, online work and the capstone project. There will be 4 hours for a field trip, with the option of an additional 4-hour trip after Meeting 3 (or as many as the instructor wants to lead). The overall total time commitment is approximately 45 hours, if capstone hours are included, but not reading time. This is comparable to the existing CalNat program; however, there is an advantage for working individuals in that the in-person time is 20-24 hours, whereas CalNat is 40+ hours. Video call platforms (such as Zoom or Skype) can enable the instructor to facilitate discussions about the readings and capstone work.

Another consideration for the course is the use of outside experts, which can enliven the course and activate partnerships as well as introduce local change agents/non-profit leaders. Participants in this type of initiative really enjoy engaging in conversations with scientists and local experts. One way to achieve this is to invite expert speakers and another is to have them help lead the field trips. Local field trips are great because they engage all of our senses, connect people to the place where they live, and tend to be the most experiential and stick with participants for a long time. In most cases, only 2-3 adjunct experts should be required to offer this course locally and so should present less of a scheduling burden for the instructors. The curriculum will emphasize the specific conditions and climate impacts within the local watershed and bioregion. For example, in the Sierra they may focus on fire ecology and management, while on the coast

instructors will cover local challenges like coastal erosion and salt water intrusion.

Capstone and future service opportunities
Participants will complete a volunteer service (capstone) project which is designed to provide a bridge from the class to service. Efforts led by the sponsoring organization or local institutions will be identified for each course and encouraged. Capstone projects and plans for future community work will be shared at the final class. See Appendix B for a list of types of capstone projects that build community resilience. Participants should be encouraged to plan future events with classmates following graduation. These could include book club meetings, stewardship days, or field trip exchanges with other naturalist course communities (e.g., field trips outside of the participants' home watershed). For example, coastal communities could visit project sites in Sierra or mountain communities and vice versa to appreciate how interconnected and diverse our state is. Capstones can be the bridge to future community activities and to linking to a community of practice, as described in Chapter V.

Publications

 "Climate Stewardship Handbook for California Communities," is a book in discussion with UC Press and Heyday Press that could provide a basic resource for the course. Alternatively, peer reviewed publications for each module may be a preferred method of making the curriculum widely accessible and far easier to update. There are also ongoing discussions

with KQED about making all four videos in the series "Clue into Climate" open source and available to instructors and participants (https://ww2.kqed.org/education/e-books/). More needs to be done to connect with Frameworks and NNOCCI program developers to determine the most efficient way to modify existing communication trainings for the purpose of this initiative.

Online tools

There are a raft of models and tools to aid instructors and participants in accessing information on climate science, climate communications and participatory science. A few of these are listed here, with a more complete set compiled in the Resources section of the Appendix B.

- Cal-Adapt (http://cal-adapt.org/) Interpretation/communication training NNOCCI style (Need to connect with Frameworks and have budget to revise for CA terrestrial topics)
- National Oceanic and Atmospheric Administration (https://toolkit.climate.gov/tools) U.S. Climate Resilience Toolkit
- California Landscape Conservation Cooperative (http://climate.calcommons.org/list/tools) Climate Commons – Tools for Assessing the impact on Climate Change
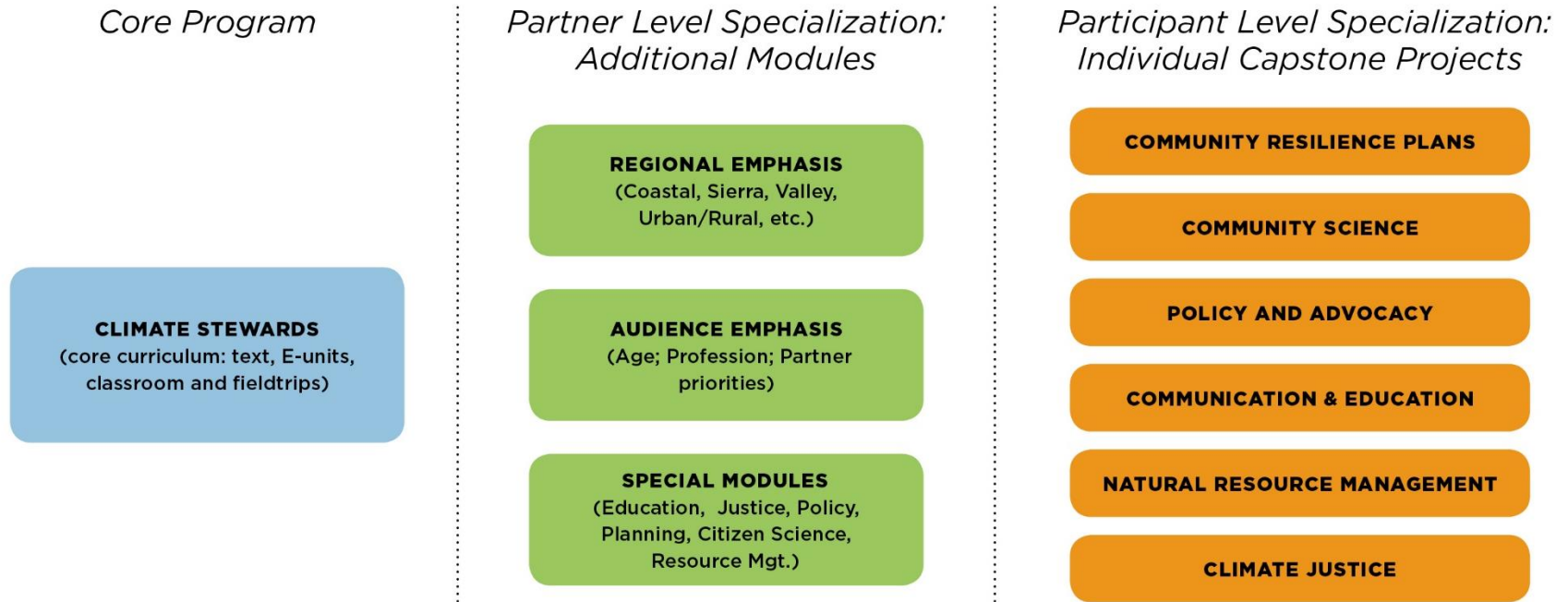- California Adaptation Clearinghouse (http://resilientca.org/)

Content Delivery

To meet the course objectives outlined above, the Climate Stewards Initiative will consider the following in delivering the content:

Relevance – the initiative will consider the specific needs and interests of the partner organizations and the participants themselves. This recognizes that there are regional variations within the state that have unique ecosystems and various types of development patterns and land uses. There are audience variations related to age, profession, and other characteristics of interest associated with partner organizations. There are opportunities to incorporate additional materials for formal/informal educators, those working on addressing justice issues, and specific resource management challenges and at the same time instructors can share these resources across locales. At the participant level, there are opportunities to tailor the capstone project to community needs. This concept of course variation is illustrated in Figure 3 on the following page.

Figure 3

OPPORTUNITIES FOR COURSE CONTENT VARIATION

Core Program	Partner Level Specialization: Additional Modules	Participant Level Specialization: Individual Capstone Projects

CLIMATE STEWARDS
(core curriculum: text, E-units, classroom and fieldtrips)

REGIONAL EMPHASIS
(Coastal, Sierra, Valley, Urban/Rural, etc.)

AUDIENCE EMPHASIS
(Age; Profession; Partner priorities)

SPECIAL MODULES
(Education, Justice, Policy, Planning, Citizen Science, Resource Mgt.)

COMMUNITY RESILIENCE PLANS

COMMUNITY SCIENCE

POLICY AND ADVOCACY

COMMUNICATION & EDUCATION

NATURAL RESOURCE MANAGEMENT

CLIMATE JUSTICE

Here are a couple of examples of tailoring the course to specific audiences:

- **_Educators/Support Staff who work with youth_** can access the Project WET climate training as a model for bringing curriculum into a youth learning environment. They also can learn about career opportunities or social media outlets that youth or students might be interested in, so participants can effect change by broadening others' interest. Connecting with science fairs, Scout troops and organizations such as the Sierra Club Student Coalition are other ways to engage youth that are already interested in climate change.

- **_Connecting content to work_** for those who are either mandated to receive climate literacy training or simply want to make their workplaces more resilient are special opportunities. A vulnerability assessment checklist for the work (or home) environment is one way to bring the concept of resiliency home to participants.

- **_Relatability –_** incorporate personal stories, including opportunities for participants to tell their own climate stories. This reinforces the connection of people to place and to their environment; engages their emotions and spirit as well as their mind; and illustrates a valuable principle of communications, connecting with your audience. Storytelling can be conducted in a guided but casual setting. Specifically, in Unit V the class may focus on threats through a highly relevant lens depending on the particulars of

place, thereby increasing a sense of place, and decreasing the overwhelming feeling that can be crippling. An example may be salt-water intrusion for parts of the San Francisco Bay Delta or drought in central-coast California. The use of language and effective communication will also be carefully considered in developing the materials. Emphasis will be on fostering holistic understanding (systems thinking approach) and a beneficial conceptualization of our relationship with the rest of the community of life. Emphasis will be on "whole person" language which addresses not just the mind, but the body, emotions and spirit as well.

- **_Opportunities to take action_** – Since one of the course objectives is to promote change agency, it will be important to connect participants with opportunities to spur action either through the partnering organization offering the course or nearby collective efforts. For that reason, engaging a wide variety of local organizations in building a local course is not only encouraged, but will be supported through coursework templates to identify local change agents and mitigation efforts.

- **Interactivity and experiential learning– Engaging in hands on activities and peer-to-peer learning will be encouraged.** This could include activities in which participants share material with each other in the form of "skits" or "role playing" or "elevator pitches" in small groups. Ideas, materials and training will be

provided to support and encourage the use of interactive learning activities.
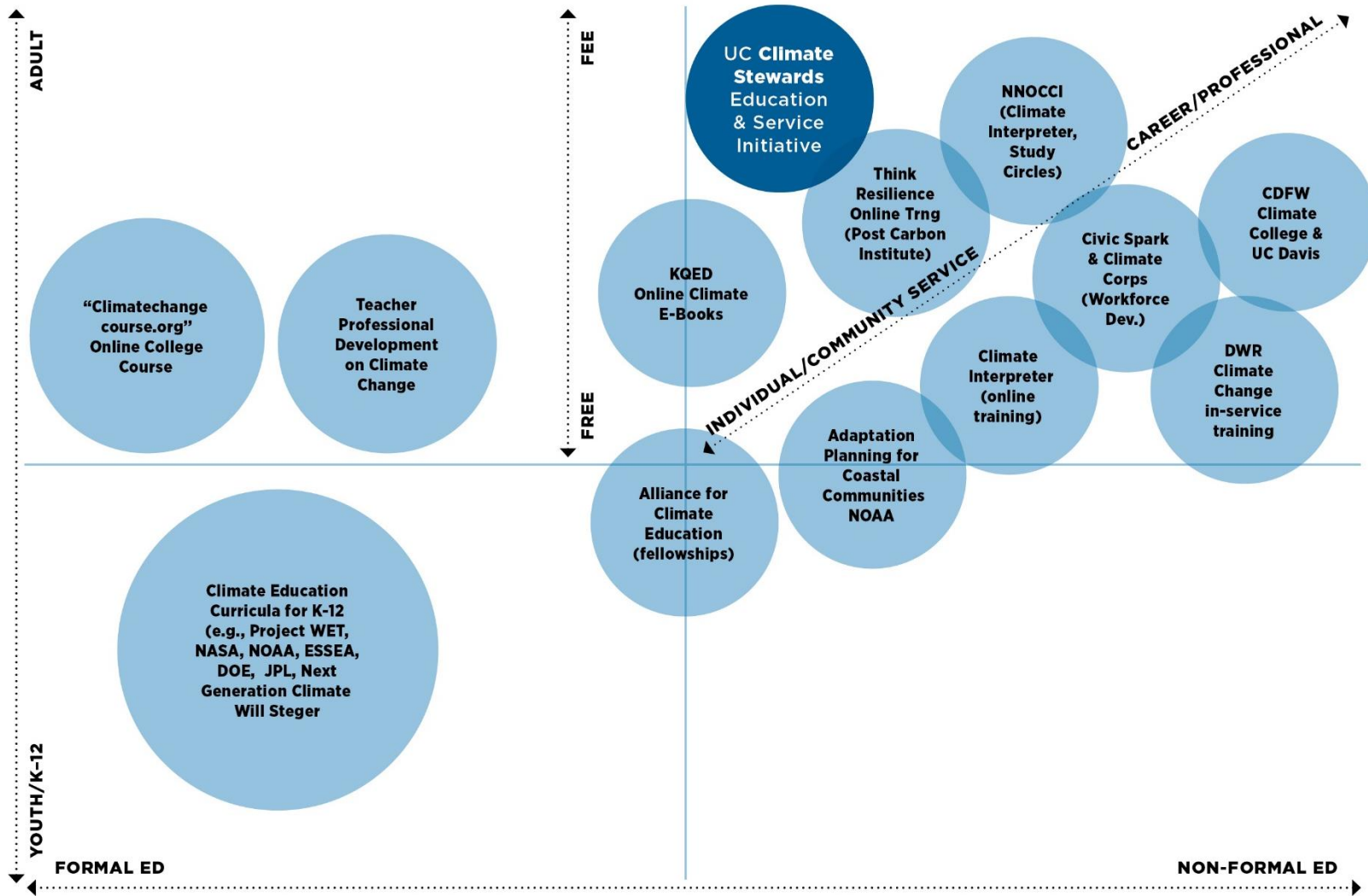
IV.   SCOPE AND OPERATIONS

The final name of the certification initiative will be determined in conjunction with UCANR leadership with a focus on climate, stewardship and California's community. The scope of the initiative can be defined by goals, geography, audience, initiative duration, delivery, administrative processes, rollout and cost. These elements help establish the specific niche of the Climate Stewards initiative in the context of other climate education efforts in California and nationally (see Figure 4). The following section outlines the broad parameters for each of these elements.

Purpose and Goals. As described in Section I., the Climate Stewards initiative emphasizes climate literacy (see definition of Climate Literacy in Introduction to this plan), climate communication, building an identity and capacity for civic engagement and stewardship, and establishing a culture in support of continued learning through social networks. While mitigation and adaptation are likely outcomes of the initiative, the overarching goals of the initiative are **increased engagement** and **community resilience**.

Figure 4

CLIMATE STEWARDS INITIATIVE NICHE

Geographic Coverage. The Climate Stewards initiative has a specific geographic focus on the state of California. It is designed to provide relevant content to California as a whole to build a shared understanding of Climate Change on a statewide level. However, the initiative will also be placed-based with each partner organization emphasizing localized/regional content based on the area or region of the local host partner. This balance of broadly relevant statewide content and context, together with locally specific examples, issues, and opportunities for action is a critical characteristic that defines the initiative. After successful implementation across California, the initiative plans to share its model and lessons learned with other states and possibly internationally.

Audience. This University initiative anticipates an audience of adult learners from broad spectrum of demographic backgrounds. This broad audience presents both opportunities and challenges. The opportunities revolve around the accessibility of the course to a wide range of individuals impacting a large number of communities. At the same time, a diverse audience with a wide range of prior knowledge, cultural and social backgrounds, and specific interests and purposes for taking the course, pose a challenge to instructors. The initiative seeks to minimize these challenges through the involvement of a wide range of partners reaching specific audiences, the promotion of best practices for differentiated instruction, and the application of individual and small group capstone projects. The overall level of initiative rigor may generally be aligned with that of a community college level course. The age range of potential course participants will likely be similar to that of the CA Naturalist program (i.e., ~17-70) with the majority of

participants being early retirees, the next largest group being from pre-career individuals, and then early to mid-career professionals. The initiative seeks to specifically reach out to a wider range of diverse, underserved communities through proactive partner selection (with community colleges, workforce development programs, indigenous groups and organizations reaching underserved populations), marketing, and scholarships.

Duration. The course is envisioned to approximately span 45 hours spread out over a six-week period to allow time for the class interaction, a field trip, and independent work. This course duration may also help build camaraderie and cohesiveness among each cohort. The initiative anticipates having approximately 15 hours of classroom time, about 26 hours of home reading, online-work, and work on capstone projects, and at least 4 hours of field trip time. Based on this model, each participant would be required to participate directly in about 20 hours of in-person time (class and field trip). A sample course schedule is provided in Section II above. However, we will not preclude alternative scheduling alternatives that are deemed more effective by partnering organizations interested in delivering the initiative as long as all the curriculum can be executed effectively.
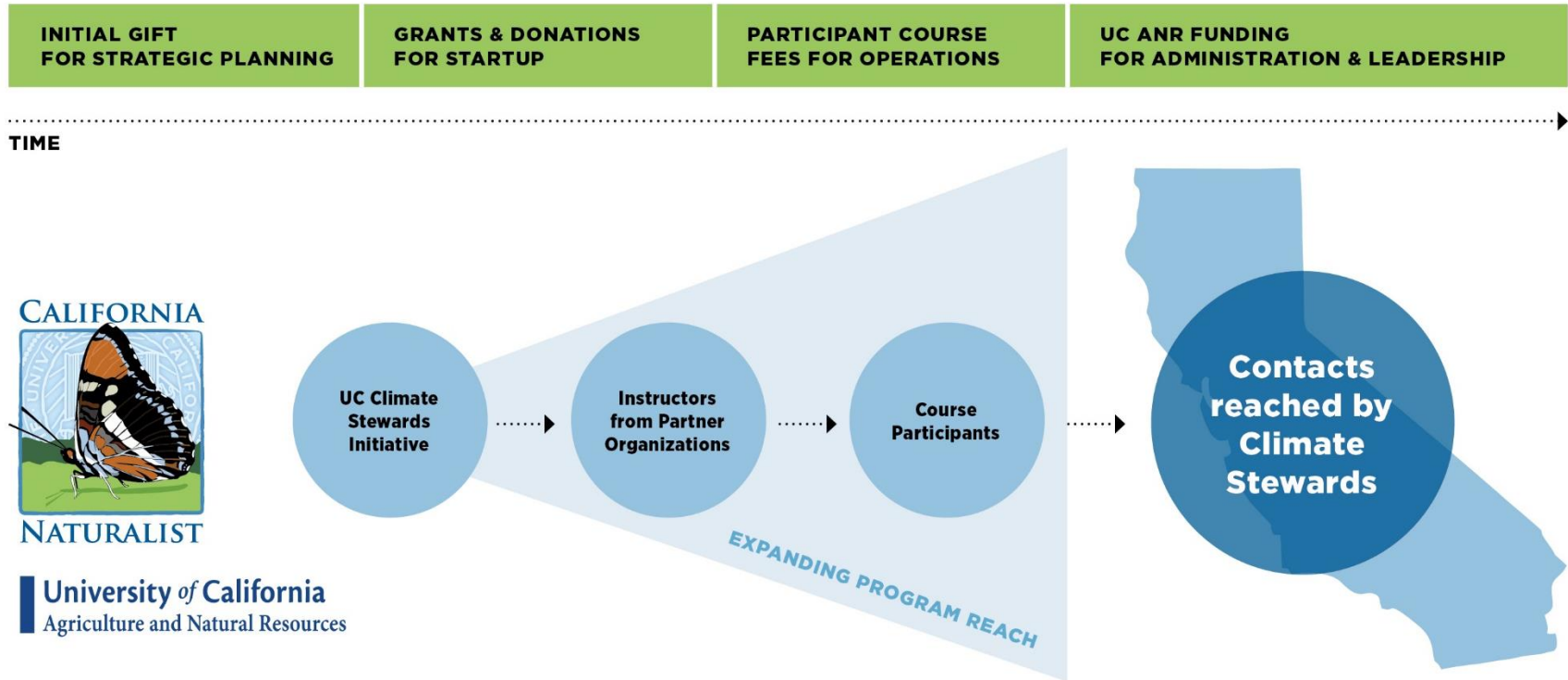
Delivery Model. The CA Climate Stewards is envisioned as a social enterprise - an initiative that addresses a social problem using - in part - entrepreneurial approaches. This approach builds on the successful model currently being used by the UC CA Naturalist Program: It integrates elements of a train-the-trainer approach, a collective impact framework, and a social franchise business model to deliver natural history training

statewide through over 40 partners. The train-the-trainer approach involves training instructors from selected partnering organizations around the state who elect to participate in the initiative by delivering the course themselves to their local clientele. The collective impact framework connects the efforts of the partnering organizations with the backbone institution (UC CA Naturalist) to bring about change on a scale larger than can be achieved individually. The glue that connects these partners is a set of shared goals (i.e., to prepare climate stewards, connect with them with opportunities for civic engagement and stewardship, build a social learning community, and strengthen community resilience) and the understanding that no single organization can accomplish them alone. Finally, the social franchise business model outlines the financial relationships between the partnering organizations (franchisees) and the UC California Naturalist Program (franchisor) and is designed primarily to ensure the financial sustainability of social enterprise. This concept is illustrated on the following page in Figure 5.

Figure 5

DIVERSIFIED FUNDING MODEL

INITIAL GIFT FOR STRATEGIC PLANNING	GRANTS & DONATIONS FOR STARTUP	PARTICIPANT COURSE FEES FOR OPERATIONS	UC ANR FUNDING FOR ADMINISTRATION & LEADERSHIP

TIME

CALIFORNIA NATURALIST

University *of* California
Agriculture and Natural Resources

UC Climate Stewards Initiative

Instructors from Partner Organizations

Course Participants

Contacts reached by Climate Stewards

EXPANDING PROGRAM REACH

Partnerships and Collaboration. The proposed initiative delivery model involves the UC Agriculture and Natural Resources division as a backbone organization working with a network of local partnering organizations. The backbone organization plays a crucial role in coordinating the participation of the various partners and providing the infrastructure necessary to ensure the success of the collaboration. Coordination involves regular communication with partners through various channels including listservs, social media, and in-person convenings. The infrastructure includes a shared data system for program monitoring and reporting. This includes data on partner organizations, instructors, instructor trainings and courses. Additional data on volunteer service and engagement by course participants would be collected through the UC Volunteer Management system. Local Partnering organizations may come initially from within the existing network of UC CA Naturalist program partners or organizations who are not currently involved in the CA Naturalist program.

Administration and Governance. The administration and governance of the initiative is outlined in two key documents: 1) the partnership agreement and 2) the Instructor Manual. The Partnership Agreement sets out the roles and responsibilities of the partnership between the UC ANR California Naturalist and the local partnering organization. The Instructor Manual provides the standardized policies, rules and operating procedures to ensure continuity, efficiency, and quality of the CA Climate Stewards Initiative across the network.

UCANR cross unit involvement. Members of the Climate Change Program Team will serve as initiative advisors and may help instruct the program for in-service training for UC UCANR academics and staff. The UC Water Institute plans to provide course material on water, help publicize the initiative, and play a leadership role in ANR to galvanize energy around the initiative.

Operational Systems. The primary operational systems for the initiative include the financial and administrative systems of the UC, the program data monitoring and reporting systems (e.g., the UC Volunteer Management System), course registration systems (conducted by the partner), course roster (submitted to UC), content sharing or learning management systems, evaluation instruments and systems for administering them (e.g., surveys on Qualtrics).

Recognition. The Climate Stewards initiative will be a certificate program. Participants who successfully complete the course requirements will be recognized with a one-time certificate and pin acknowledging them as a CA Climate Steward. The initiative does not currently anticipate having a recertification process. The initiative will pursue approval for UC Credits through UC Davis Extension. The number of credits will be aligned with the number of hours in the course based on a template syllabus.

Delivery. Course delivery is expected to integrate a wide range of instructional approaches for adult learners. Each course will include three main learning resources: 1) the primary course text, 2) classroom and field trip sessions, and 3) online content

for independent at-home study. The text will provide the overarching context for the course helping to build the shared understanding from a statewide perspective. Classroom and field activities led by the local course instructor will engage participants in a wide range of learning activities including case studies, role plays, lectures, experiential learning, small group work, games and simulations, and capstone projects. Online content will be designed to support self-study at home that will inform classroom activities and provide opportunities for learners to pursue areas in greater depth on their own. A statewide UC Climate Steward Academic Coordinator will be responsible for program management and delivery of instructor training.

Cost Structure. Grants and donations will play a significant role in covering the development and initial pilot testing costs of the initiative. While continued program management is the responsibility of UCANR and the local partnering organizations, the social franchise model provides a mechanism for cost recovery, required by UC for extension programming, through the sharing of a portion of revenue generated from course fees. That is, course participants pay a course fee to the partnering organization, and the partnering organization remits a portion of that fee (to be established) to the Climate Stewards initiative. This per participant "social franchise fee" helps cover the costs of continued curriculum development, instructional support, operating systems, evaluation and reporting. There is no cost for partners to enter the initiative. Therefore, the amount the partner pays is based on the number of course participants they have. Typically, a minimum of 10 participants is required for a course to push through. Each local partnering organization

establishes its own course fee in order to ensure that the course can be self-sustaining.

Personnel. As a major initiative of the UC California Naturalist program, the CA Climate Stewards initiative will exist organizationally within the California Naturalist Statewide Program Business Unit. This is managed by a leadership team including a Program Director, Associate Director and Program Coordinator. The Program Coordinator supervises three regional Community Education Specialists. The Climate Stewards initiative envisions bringing on a full-time Academic Coordinator to assist with the development, oversee testing, and manage implementation of the Climate Stewards initiative. Each partnering organization will need to identify a course instructor with the established minimum qualifications, typically a Master's Degree in a relevant field and three years of experience in training or education; and approved by UC CalNat leadership team.

New Partner Identification. Initially, UC CalNat will select two pilot programs from the existing network of CalNat partners. After the pilot phase, new partners will be solicited using a Partner Interest Form, which captures information on the organization's administrative capacity, training experience, expertise in climate change education, clientele, and rationale for seeking to become a partner. Prospective partnering organizations will be reviewed and vetted by CalNat leadership including discussions with nearby partners whose existing programs may be affected by a new partner. New partners will establish a timeline (ranging from 6 months to a year) for completing all program requirements including the Partnership Agreement, Instructor Application, Instructor

Training, and Course Syllabus prior to offering the Climate Stewards course. This process is illustrated in Figure 6 below.

Figure 6

BUSINESS PROCESS
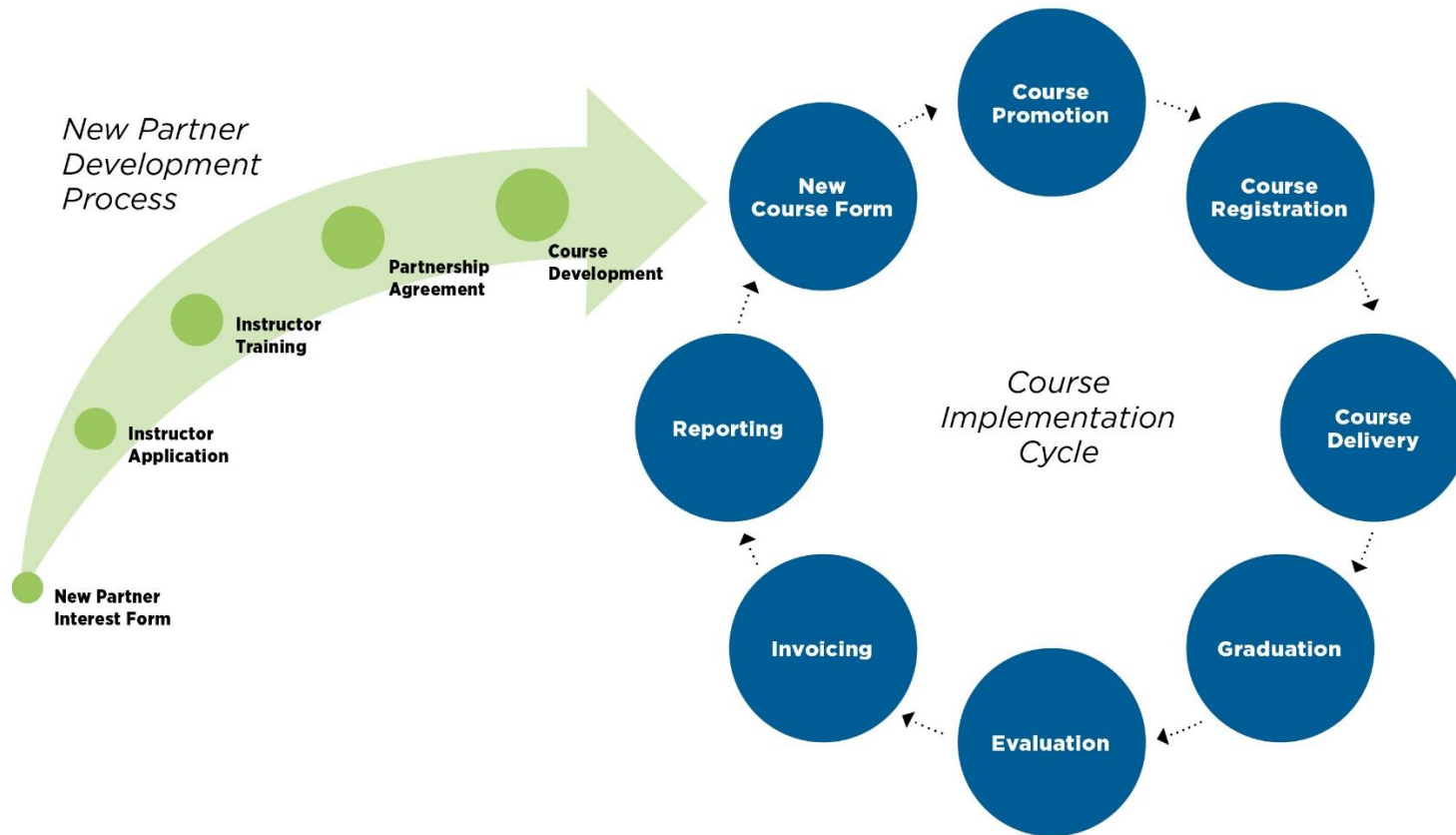
Instructor Training. The Initiative envisions conducting a multi-day instructor training, including in person and online study, on the specific Climate Stewards Curriculum, the administrative requirements of running the course, and the broader aspects of the Collective Impact model and Community of Practice. Initial instructor training will be conducted and co-developed with 1-2 pilot instructors. Future trainings may be conducted regionally. Instructor trainings will likely take place once every year until the initiative becomes large enough to sustain two instructor trainings per year.
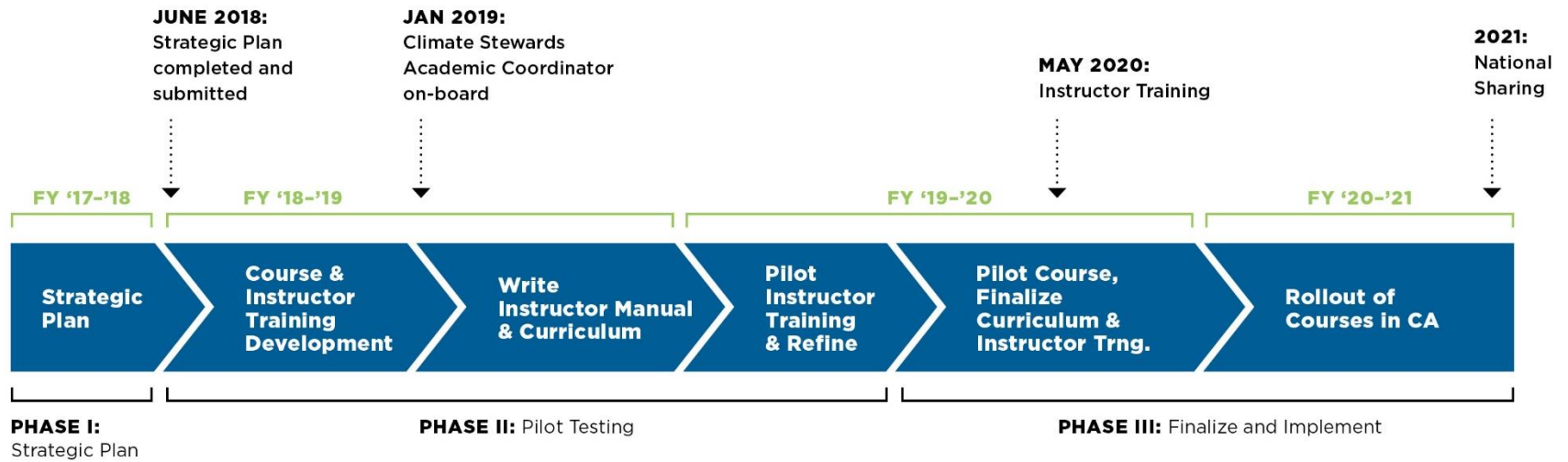
Marketing and Promotion. The Climate Stewards initiative will benefit from marketing at different levels. At the statewide level, the CA Naturalist Program will take the lead on course marketing and promotion, through its website, social media and earned media. At the local level, course partners will be provided tools and resources (generic/template materials) to market and promote their course offerings. Marketing will also occur through organization types such as state agencies, UC units, Environmental Education networks and regional adaptation collaboratives.

Initiative Rollout. The development of the Climate Stewards initiative can be divided into three phases (See Figure 7). Phase I is the development of the strategic plan which outlines the broad elements of the initiative and runs from November 2017 to Summer 2018. Phase II is the content development and pilot testing phase. During this phase (Fall 2018 to Spring 2020), the specific content for the course curriculum and instructor training will be developed, piloted, evaluated and refined. Phase III is the implementation of the finalized

initiative. This phase includes the onboarding and continued management of new partners and associated courses from within the CA Naturalist program as well as those not involved in the CA Naturalist program. The initiative anticipates a growth rate of an average of 3-6 new partners per year in the first three years after pilot implementation. Initially, the initiative will hold just one instructor training per year until program growth or demand requires additional trainings. After Phase III is well underway, the Climate Stewards Academic Coordinator will work with the Alliance of Natural Resource Outreach and Service Programs (ANROSP) to offer a workshop on Climate Stewards as a model for other state master naturalist like efforts. If funding is available, guidance and technical support for implementation of the initiative for other states will be provided.

Figure 7

TIMELINE

JUNE 2018:
Strategic Plan completed and submitted

JAN 2019:
Climate Stewards Academic Coordinator on-board

MAY 2020:
Instructor Training

2021:
National Sharing

FY '17–'18   FY '18–'19   FY '19–'20   FY '20–'21

Strategic Plan

Course & Instructor Training Development

Write Instructor Manual & Curriculum

Pilot Instructor Training & Refine

Pilot Course, Finalize Curriculum & Instructor Trng.

Rollout of Courses in CA

PHASE I: Strategic Plan

PHASE II: Pilot Testing

PHASE III: Finalize and Implement

Instructor Training Process. The train-the-trainer approach depends on a systematic and consistent method for preparing instructors/trainers to deliver the course. This process begins with vetting course instructors to identify those with the minimum requirements necessary to be successful with the amount of limited additional training provided by the initiative. Requirements generally revolve around a mix of academic background and work experience related to the delivery of adult education programs on the environment. With this foundation, the formal instructor training workshop adds capacity in three major realms: content knowledge, pedagogy and course administration. Content training will focus on understanding the core resources that will be used by the initiative and the ability to put these into the global as well as local context. Instructors will be expected to keep up on California related climate news which will be shared among the instructor community, from UCANR, and additional public resources such as Climate News Digest: https://www.water.ca.gov/Programs/All-Programs/Climate-Change-Program/Climate-News-Digest

The second realm focuses on the effective delivery of the content using a combination of instructional delivery methods some of which are specifically prescribed by the initiative and others at the discretion of the instructor. The third realm addresses the administrative responsibilities of delivering the course including completing all pre-course requirements (syllabus, etc.), completing all course requirements (capstones projects, completing roster, and adding participants to the Volunteer Management System (VMS), and conducting all

post-course steps (evaluation follow-ups, changing participant status in VMS). Instructor trainings will be led by the Climate Stewards Academic Coordinator with assistance from staff and experienced instructors. All instructors will be expected to be familiar with all of the course content. The training will likely involve studying the material independently and meeting as a group online as well as a two-day in-person training. A draft Instructor Training Workshop agenda is provided below.

Instructor Training Workshop Outline

Day	Topic	Materials
Pre	1. Introductory Webinar (synchronous) 2. Independent Study (asynchronous)	1. Initiative overview and review of Instructor Training Workshop schedule and requirements 2. Review core initiative content and resources: (Climate Stewards Text and StoryMap)
Day 1	1. Communicating Climate Change Exercises 2. Climate research update 3. Community Engagement	1. Relationship building, federal guidelines, NOCCI material, etc. 2. Recent literature relevant to California, http://resilientca.org 3. Local adaptation plans and strategies 4. Required steps for effective evaluation.
Day 2	1. Andragogy (adult learning) 2. Administration	1. Mitigation, Adaptation and Community Resilience 2. Relational Learning; Capstones; Field Trips; Online Content (StoryMaps); Inquiry-based Learning; 3. Registration; Instructional Team; Syllabus; Course Roster; VMS; CT; Evaluation; Certs and Pins; Community of Practice.
Post	1. Course Syllabus 2. New Course Form	1. Detailed description of the course for this specific partner 2. The New Course Form initiates the scheduling of a new course

Budget – see separate document.

V.   COMMUNICATION/COMMUNITY

Communication

Communication is one of the core elements of the Climate Stewards Initiative. Because graduates of the initiative will be providing a service role in their communities, helping to promote climate awareness and engaging people in community action projects, they will need effective communication skills and tools. Communication challenges around climate have to do with the complex scientific concepts, a sense of being overwhelmed in the face of daunting information and dire consequences, assumptions that others will come to understand things the way you did, as well as the politically charged nature of climate change in our society today. The Climate Stewards Initiative will address these challenges in the course, drawing from many existing resources.

The central objective of the initiative is for the participants to become trusted sources of climate information and local interventions to better support their communities moving toward climate conviction and helpful action. For this reason, it is critical that climate stewards develop effective climate communication skills. The evidence is clear that climate change communication can be challenging. At the same time, there are a growing number of resources to improve communication regarding climate change science and solutions. These approaches emphasize some of the following directions that will be central to the communication strategies fostered in this initiative.

A focus on communication that strengthens functional relationships and community among course participants and improves effective communication strategies used with Climate Steward's larger community, with the aim of building resilient communities. Therefore, effective communication strategies will be woven into the class meetings that provide methods and tools utilizable when stewards leave the classroom and work in their communities. Some detailed methods for the course can be found in the curriculum unit details (see Appendix B) and can be done in each step through 1) the material communicated, 2) the exercises, and 3) the examples used to demonstrate how inclusive, personalized, and skillful climate communication can foster healthy community and action. For example, by opening with an exercise that honors the need for relationship to self (self-reflection) and others (dyads and large group discussion) starting with their own close to home experience where nothing is "wrong" with interpretations of how climate change is impacting people, it starts the conversation off on the right foot and participants are learning tools (reflection, inquiry) by doing. For example, by opening with a Lego building task or survival on the moon group task, participants will quickly experience the benefits and losses that occur by communicating effectively with others, which includes being a skillful listener, attending to the limitations and gifts of any given situation, negotiating priorities, being aware of other people's skills and values, and crafting effective problem-solving approaches.

Important resources for instructors of the initiative and their participants will be, "Principles for effective communication

and public engagement on climate change: A Handbook for IPCC authors" and National Network for Ocean and Climate Change Interpretation (NNOCCI). During the development of the curriculum staff will explore working with Frameworks, Inc., who created the NNOCCI training materials and NNOCCI leadership to adapt these tools for our purposes.

Community

The community-level focus, as a key component of the theory of change explained above, is the concept of starting in place and building out. It is based on the notion that although climate change is global, its effects are local. By educating participants about their bioregion and the local climate change impacts they and vulnerable groups in their community face, they may come to appreciate how what they experience connects to the greater whole. This initiative is attempting to strengthen participants' sense of place by exploring local changes and make meaning of the course content and experiences in and with the place they live, hopefully ultimately increasing motivation to restore and replenish these places. By understanding the bioregion where one lives, and then focusing in on the local watershed with all its natural and human complexities, people can see themselves in relation to their surroundings and connect the decisions they make with the greater whole. They may also be motivated to strengthen community resilience by building and improving social connections among community members and support local organizations. The community aspect of Climate Stewards also has to do with understanding how local residents, businesses, civic leaders, vulnerable populations,

and policymakers perceive the threat of climate change, and what tools and activities can best engage them where they are. The same challenges mentioned above related to communication apply also to civic engagement, with the additional barriers of competing priorities and perceived lack of self-efficacy. Again, the course will seek to educate participants about these difficulties and offer strategies and tools to foster agency within communities.

Participatory research

In citizen and community science, people contribute to authentic science. This may involve a wide range of activities, such as data collection, data processing, shaping methods, or analyzing and reporting research findings. It can also take many different structural forms and may be led by communities who engage science as part of a broader effort or led by scientists who create opportunities for volunteers to play a role in a larger project.

Citizen and community science will play an important role in the Climate Stewards initiative. Depending on how it is implemented by initiative staff and instructors, there are several potential benefits to including citizen and community science as a formal component to the initiative, which align well with both the initiative goals, and the broader mission of ANR.

- **Participant benefits.** Hands-on experience with authentic science can deepen learning, promote

connection to place, motivate stewardship, and develop a sense of self-efficacy among participants. It can give them one entry point among many for continued engagement in climate-related issues that matter to them.

- **Useful results.** Projects may generate data and results that inform local communities, and statewide or even nationwide processes such as climate assessments, or climate actions to address mitigation and adaptation.
- **Advancing ANR's mission.** A network of actively engaged climate stewards presents an opportunity to strengthen relationships between communities and University of California researchers, creating new scientific opportunities, and helping scientists understand how their work can address real-world problems.

There are three ways in which we envision climate stewards participating in science as a result of their enrollment in the initiative:

- Activities led by an instructor, which involve the whole class in research in some form.
- Activities related to capstone projects undertaken by participants.
- Participation in citizen and community science as part of service hours that participants contribute after having completed the course.

For each of these, different kinds of citizen science projects may present opportunities.

There are several considerations to use in identifying or developing citizen and community science opportunities for Climate Stewards participants. The activity should be tractable and meaningful within the timeframe of the class, and relevant to the material covered. The initiative may also want to coordinate across multiple sites in order to generate data on larger scales, in coordination with a larger research initiative, or to serve the interests of an external partner such as the California Natural Resources Agency, the California Strategic Growth Council, or the US National Climate Assessment. On the other hand, a local instructor may want to target opportunities that serve the specific interests of a host organization, or inform a local community issue. The Climate Stewards initiative may also want to prioritize projects that promote engagement with UC researchers, and for which there is a good balance between the insights gathered in a single year of activity (i.e. during the timeframe of the course) and the value of activity over multiple years, as the initiative progresses. The first year of initiative implementation presents an opportunity to explore all of these factors, and develop a strategy, list of recommended projects, and partnerships based on that experience.

There are many existing citizen and community science projects, informing a wide range of climate-related issues. The Center for Community and Citizen Science, based at UC Davis, is currently undertaking a survey of existing projects that could be directly used, or that could provide a model for activities within the Climate Stewards initiative, and has offered to share its findings to aid in planning for the Climate Stewards initiative. Some initial examples are provided below.

- **Functioning of the Climate System.** Programs such as CoCoRaHS - Community Collaborative Rain, Hail & Snow Network and NASA Globe feed observations into global datasets that can improve understanding of the basic functioning of the climate system.

- **Ecosystem impacts of long-term change.** There are many projects focused on ecological change -- phenology, species range shifts, etc. -- some of which have fairly low barriers to entry in terms of the time, training, and other resources required for participation, and can be done anywhere. Some California Naturalist projects already participate in the California Phenology project that uses a national interface called Nature's Notebook.

- **Vulnerability and resilience of human systems.** Coastal vulnerability is one example, within this broad category, where broadly applicable projects have been developed. MyCoast and the King Tides Project each encourage documentation of nuisance flooding and other coastal impacts, which can inform scientific studies, and local decision making. There are many other community-based projects focused on vulnerability related to specific impacts such as air quality, heat waves and other extremes. Community-based projects may not be as transferable across contexts, but if a local host organization is part of a community science project related to human system vulnerability, that could provide exceptionally valuable opportunities for course participants wanting to do science that meets community needs. Broad-based

citizen science aimed at understanding vulnerability and human responses to impacts seems, at this point, to be a gap, presenting an opportunity for innovation within the Climate Stewards initiative, with the right partnerships.

- **Climate change mitigation.** There are likely citizen and community science projects (e.g., mycity.communityclimate.org) related to energy efficiency and consumption patterns, adoption and implications of technologies, and other topics related to climate change mitigation. These may be identified by the above-mentioned survey.

Community of Practice

A key identified goal of the Climate Stewards initiative is to develop an inclusive Community of Practice. A community of practice is a group of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly. A community of practice requires: (1) a shared domain, (2) a community, and (3) a practice. Climate Stewards intends to foster a Community of Practice with the shared domain being community climate resilience; the community consisting of all those associated with the Climate Stewards initiative and the practice centered on an inclusive Climate Stewards approach to climate literacy, climate communications and interpretation and building community resilience.

There are many reasons for fostering a Community of Practice within the Climate Stewards initiative, including:

- *Offers support and ongoing learning*
- *Motivates people to stay with the effort*
- *Instills and sustains an identity and cohesion as part of a network*
- *Reinforces relationship-building as an important objective of the course*
- *Helps monitor and address the impact on the physical and emotional well-being of people, such as trauma, uncertainty, anxiety, grief*

It is envisioned that after graduation, course participants will be connected to local organizations and work on community level climate resilience by doing service in the following possible categories: education/interpretation, participatory science, stewardship/restoration, mitigation, adaptation, or program support for the local organization. Working with the partnering organizations, graduates can form networks for joint service projects, collaborative civic action and mutual support.

Certified climate stewards may develop elements of communities of practice such as an understanding of a shared "domain" or focus on climate information, including mitigation and adaptation strategies, that participants share with others in the community. For many, the certification could be the first step toward **identifying** as a "climate steward" and participating in follow-up collective volunteer service and learning practices, as well as a shared identity as part of the organization. Convenings such as regional

conferences may help build community around a shared practice.

There are many possibilities for how the initiative can foster its Community of Practice. People stay in communities that nurture their spirit, so activities like potlucks, fun and interactive class sessions, Zoom video conferences, and an array of other creative ideas are ways to foster connection. Promoting group activities and group capstones throughout the course helps foster relationships among class participants. The initiative can also promote collective participatory science projects to build strong relationships and mutual learning, remove "barriers to entry" and make it easy for participants to engage in climate activities on an on-going basis. Developing affinity groups (e.g., "The Coastal Crusaders," "The Fire Stompers," "The Drought Dodgers) could link current and graduate participants to each other by topical interests and/or geographic location. A Climate Steward "talent show", class t-shirts, certification pins, years-of-service pins and commemorations all build connection and promote participants' identification as Climate Stewards.

There can be cohort or place-based Facebook pages for participants to interact and continue their learning and engagement. The initiative can identify, even perhaps through a class exercise, local climate organizations, have invited speakers and maybe even site visits to connect with existing local climate efforts. By tracking volunteer hours and actions, participants can be recognized at regional/state conferences; as individuals (Climate Steward of the Year), groups (Cohort of the Year), locations (Southern California vs

Northern California, counties or regions ranked by volunteer hours) to promote motivation and friendly competition, while also celebrating the volunteer contributions as a whole.

Recognitions, such as "Volunteer of the Month," can also be put on Facebook pages and the initiative's website. Annual graduates' and current participants' outings and celebrations also build connection. Creating means and methods of alumni connection can increase the long-term impact of Climate Stewards."

The format for the Climate Stewards community of practice will ultimately be multi-faceted with much of the ongoing learning, connection to resources, and tracking of service hours, etc., potentially hosted through an online volunteer portal currently used by California Naturalists. Through the effort, creativity and commitment of staff, partners, participants and alumni the Climate Steward's Community of Practice will evolve its own unique identity over time.

VI.   EVALUATION/COMMUNITY IMPACT

The evaluation and community impact components of the Climate Stewards initiative are based on the desired outcomes as expressed in the Theory of Change mentioned earlier. In that framework, the long-term outcome impact – *California has engaged communities and functioning ecosystems that are resilient in a changing climate* – is achieved through enhanced knowledge, skills, motivation and self-efficacy of participating Climate Stewards, as demonstrated in actions and behaviors of the stewards in their local communities.

The purpose of the evaluation process for the Climate Stewards initiative is two-fold: (1) formative evaluation to collect feedback in the early years of the initiative to improve initiative implementation throughout the state, and (2) evaluation of outcomes as they relate to both the influence of initiative participation on Climate Stewards as well as documentation of community resilience as the longer-term outcome.

The primary audiences for the evaluation process are the UC California Naturalist unit and Climate Steward instructors who will utilize participant feedback and outcomes to adjust and improve the initiative. Also, administrators of UCANR and partnering organizations may find this feedback useful for internal reviews or to report to outside interests such as funders and other stakeholders.

The evaluation process aims to address the following questions:

- *Formative Evaluation*:
  - What has worked well in the design and implementation of the Climate Stewards initiative?
  - What needs to be changed in the initiative to improve the experience and preparation of Climate Stewards?
  - What needs to be changed in the initiative to improve the experience of the initiative's community partners?
  - What needs to change to support Climate Stewards in more effectively promoting community resilience?

- *Outcome Evaluation*:
  - What is the influence of initiative participation on Climate Stewards?
  - What do they need to be effective as community change agents?
  - What types of activities/actions do Climate Stewards engage in within their local communities and/or at the state level?
  - In what ways, if any, do Climate Stewards influence community resilience?

Given the complex nature of the Climate Stewards initiative, a focus on formative evaluation will be critical in its early years of initiative implementation to learn from early adopters and to share lessons for initiative improvement. For example, systematically collecting feedback from Climate Stewards about their experience in the courses will assist in making

adjustments to improve the courses. Potential strategies and specific justification for this formative period include:

- regularly checking in with partner organizations about what is working and not working for them will assist in improving the relationships between the partner organizations and the statewide office
- consistently asking Climate Stewards to document their volunteer work through an easy-to-manage interface (e.g., the Volunteer Portal/UCANR Volunteer Management System) will help inform others about what is possible
- interviewing an intentional sample of Climate Stewards at the end of the first year of initiative implementation will help initiative designers make adjustments to the initiative moving forward

The outcome evaluation of the influence of the initiative on participants will be implemented concurrent to the formative evaluation mostly through the use of course evaluations. The intention here is to document the potential growth of knowledge, skills, motivation and self-efficacy of the Climate Stewards as a result of their participation in the initiative and over time. Strategies for this could include the following:

- pre-post initiative surveys completed by Climate Stewards
- interviews of Climate Stewards and partner organizations
- documentation of Climate Stewards' activities once they return to their local communities

- longitudinal surveys based on ongoing interviews

Finally, outcome evaluation will focus on actions related to building community and ecosystem resilience that will be recorded by Climate Stewards over time in the volunteer portal. Data about the service hours conducted will include:
- the organization benefiting
- the activity conducted
- the number and demographics of people contacted
- the area covered by the activity (such as miles of stream restored)
- the location of the activity
- annual completion of a "community resilience" audit or rubric (to be defined) to track indicators of a community's resilience with baseline and annual progress checks over time

Ideally, we want to create data collection tools to be used on an ongoing basis that rely on processes that make sense for the individuals using them and that organizations find meaningful for use in the local communities. We envision changes and improvements to data collection instruments and processes based on user feedback.

Draft Evaluation Framework

Outcome Term / Realm	Expected Outcomes	Monitoring Instruments

Formative Evaluation for Initiative Design and Improvement	▪ Identification of what works about the initiative and what can be improved in initiative design and implementation
	
	  --Participant feedback on initiative experience (course content, pedagogy, etc.)
	
	  --Partner feedback on initiative design and implementation
	
	▪ What specific activities/elements have been particularly effective in foster the Community of Practice?
		▪ End of course participant surveys
		
		▪ Partner organization check-ins through surveys/phone interviews (site visits/audits)
		
		▪ Documentation of Climate Steward activities
		
		▪ 12-month follow up participant surveys
		
		▪ Story interviews with participants, partners and community representatives

Influence of Initiative Participation on Climate Stewards as Participants	▪ Knowledge (e.g., climate science) ▪ Skills (e.g., messaging, citizen science, advocacy) ▪ Motivation ▪ Identity as climate stewards ▪ Sense of efficacy	▪ Pre and end of course participant surveys ▪ Annual participant surveys ▪ Story interviews with participants, partners and community representatives
Changes in Community Resilience	▪ Community capacity to face stresses imposed by climate change ▪ Ecosystems ability to adapt and evolve to maintain biodiversity, natural processes, and function ▪ Implement mitigation and adaptation that improves sustainability of coupled human and natural systems	▪ Documentation of Climate Steward activities (volunteer hours reporting -- education/interpretation, citizen science, stewardship/restoration, mitigation, adaptation) ▪ Annual progress "report"/digital portfolio including documentation from Climate Stewards, community partners and community representatives about positive progress towards resilience in the community (including new guidelines, General Plan policies, etc.)

		▪ Local audit and comparison with existing metrics on community resiliency from baseline to change over time

The Climate Stewards initiative defines community resilience as follows: Resilience is the ability of a system or community to survive disruption and to anticipate, adapt, and flourish in the face of change. The Climate Steward initiative will evaluate existing resilience assessment tools and tailor them to go beyond disaster preparedness and delve more thoroughly into increasing community resilience. The following are some examples of assessment tools:

1. Second Nature Climate Resilience: http://secondnature.org/climate-guidance/sustainability-planning-and-climate-action-guide/building-blocks-for-sustainability-planning-and-climate-action/climate-resilience/
2. MS & AL Sea Grant "A Community Self-Assessment: http://masgc.org/assets/uploads/publications/662/coastal_community_resilience_index.pdf
3. NOAA Coastal Community Resilience Indicators and Rating Systems: https://coast.noaa.gov/data/digitalcoast/pdf/resilience-indicators.pdf
4. ITRC Community Resilient Self-Assessment tools

A resilient community is one that isn't just capable of absorbing impacts and change, but using those changes to develop more positive and regenerative capacity. Resilience is also about facilitating positive change to enhance the overall well-being, engagement, and prosperity of a community (making it stronger overall), and reducing the community's impact on the surrounding environment while conserving natural resources (making it sustainable in the long-term). While the disaster component is critical in resilience (minimizing impact and maximizing recovery), the overall goals go far beyond managing acute or catastrophic impacts. Resilience also focuses on eliminating chronic stresses, and maximizing the dynamic potential of community members and economic and natural resources. The above sample assessment tools and others will be used to create a "community resilience" audit or rubric for Climate Stewards to help their local communities track progress in addressing climate change.

APPENDICES

APPENDIX A: RELEVANT STATE PROGRAMS AND GUIDELINES

The following illustrates additional details related to the leadership that the State is providing to increase resilience to climate change that calls out for increased public engagement.

1. The Governor's Office of Planning and Research developed guidance for state agencies to implement Executive Order B-30-15, which requires state agencies to incorporate climate considerations into all planning and investment decisions. This guidance outlines a multi-step process for agencies to follow, a process that can be scaled and accommodated by agencies at very different stages of awareness and readiness. Climate Stewards could help extend this approach to other institutions looking to incorporate climate considerations into decision-making. In general, increased public awareness of this executive order will help set an expectation among communities for increased compliance.

2. The Governor's Office of Planning and Research is developing the Adaptation Clearinghouse, a centralized source of information and resources to assist decision-makers at the state, tribal, regional, and local levels when planning for and implementing climate adaptation and resiliency efforts across California. The Adaptation Clearinghouse aims to support a community of practice across the state through knowledge exchange between communities, businesses, and across levels of government. The Adaptation Clearinghouse harbors a tremendous amount of relevant resources and guidance related to climate change adaptation in California and allows one to navigate a searchable database of resources that have been organized by climate impact, topic, and region. Importantly, the Adaptation Clearinghouse also provides a platform for Californians to share and access case studies and stories about how and why their communities, businesses, and organizations are responding to climate change impacts. The Clearinghouse is only as good as the rate of its use so training community leaders as super users is one way to improve the extension of the information on the site.

3. The California Natural Resources Agency leads the development of The Safeguarding California Plan, and recently released the 2018 Update. Safeguarding is the State's roadmap for everything state agencies are doing and will do to protect communities, infrastructure, services, and the natural environment from climate change impacts. This holistic strategy

primarily covers state agencies' programmatic and policy responses across different policy areas, but it also discusses the ongoing related work to with coordinated local and regional adaptation action and developments in climate impact science.

APPENDIX B: COURSE CONTENT

This appendix covers some additional ideas for content across the course units including participant capstone projects that came forward in the planning process. Over the next year we will be more fully developing the curriculum and associated materials for use by course instructors. We also provide a cross walk between what is being covered in 55 college courses in climate change analyzed by Olivia Cooper, Smith College at the end of this appendix. This provides a way to ensure that part of becoming a Climate Steward is becoming climate literate and our belief that, while not sufficient on its own, increased climate literacy is essential to effective communication on the topic and working with others to develop and implement solutions.

UNIT I.   Experiencing Change

    A. Relationship building (among the participants through conversation, stories, and communication techniques)
    B. Who, what, where are part of these experiences and stories
        a. Community & Environmental Justice
        b. Community of Life[1] and Relationship to Nature
        c. Sitting with trauma & depression
        d. Finding hope

    <u>1.</u> Homework after this session could include a personal carbon calculator https://coolclimate.berkeley.edu/calculator

    <u>2.</u> A mini project the participants do as "homework" is complete a vulnerability assessment for their work. In fact, each person, even not working, could do one for their home or family or pets. Making a short presentation on their vulnerabilities early in the class really starts folks thinking and getting to know one another. And they would be mimicking the first step of ANY town or company; assess your vulnerability. Learning this step also makes them more effective change agents! The curriculum development team could craft a basic VA checklist.

    <u>3.</u> It is important that participants understand the impact of these issues on people, community, agriculture, disease, and nature. These impacts are not distributed evenly.

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[1] Community of Life refers to the variety of life in all its forms and interactions from genes, to individual species, communities, entire ecosystems. Community of Life includes the diversity, interactions and interdependencies of life within species, between species, within ecosystems, between ecosystems and the interplay of life forms with the physical environment.

4. <u>Introductions</u>: ask people to pair up to learn about each other, then introduce their conversation partner to the whole group

5. Begin with facilitated discussion about what kinds of <u>changes people are seeing locally</u>. Start this session with 1) a 10 minute guided self-reflection to allow people to think on their own (great for introverts and others that need a moment to think), 2) progress to a 10 minute discussion (5 minutes per person) in pairs (different than the person they paired up with to begin with) to talk about the material participants came up with during their reflection period (great to do in pairs so that people feel heard; ring bell and walk through room to ensure that people are switching speaking/listening roles), 3) open it up to a 15 minute group discussion. Let people move around, go outside, explore during their self-reflections and pairs. Once people have a chance to become more comfortable, move into a scientific overview. Here are possible questions for the guided self-reflection. (Facilitator provides question prompts first for partner A to ask partner B and then vice versa.) 1. When I think of what climate change is doing and will do what really breaks my heart is? 2. When I imagine the world we will leave to those coming after us it looks like? 3. Ways I am going to empower myself regarding climate change are? 4. If I knew I could not fail what wild thing would I do in service to life on earth? 5. What inner strengths do I draw on to face climate change?

6. Trauma – See Faith Kearns's interview with Maryam Kia-Keating, a clinical psychologist at UCSB, about this topic for our blog (http://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=27000). She points to things like the Vicarious Trauma Toolkit and some other tools. I think at this point it is important to give space to people to discuss, but I'd probably want to get advice from somebody like Maryam about how to do in this specific context as there are lots of different things that could happen based on proximity to disaster – direct experience, friends/family/neighbors, air quality impacts but no direct fire, etc. Can see experiences colliding so would want to think carefully about how to address.

UNIT II. Earth Systems Connections

A. Global Earth Systems
B. California Ecosystems
C. People-Nature Relationship – Where we live and play; interdependence and the rapid changes to come
   a. "<u>Open space</u>": once people have had material presented, met each other, tried some things, give them the opportunity to self-organize and see what emerges – this has been really effective in recent years to give people space to talk about what comes to them as they go through the course. Again, there are models of many different communication concepts including the emergent properties of relational work.

1. <u>Climate change overview</u> that touches on the major scientific and technical issues in California (could also see using the 4 topic areas as laid out in the [KQED materials](#)): The goal is to give people enough of a grounding in climate science so they feel comfortable with the topic and then those that want to learn get what they need and those that don't aren't bored or tune out. These topics will be covered across Units II-IV using effective communication techniques as a model for how participants will interpret what they learn for others.
   a. Mechanisms of climate change
   b. Water/snow, wildfire, ecosystems
   c. Food systems and agriculture
   d. Public health
   e. Energy systems
   f. Adaptation and mitigation approaches that address root causes not just symptoms
   g. Policy & decision-making overview: discussion of federal/state/local responsibilities/issues
   h. Tools/resources: Cal-Adapt, California Climate Assessment, state level data (DWR, etc.)

2. Learning outcomes from this unit should include
   i. Clear thinking on carbon sequestration in our state policy

   ii. Investigate shifts in the distribution of plant and animal species due to climate change, and the effects of increased carbon dioxide emissions on the ocean.

   iii. Understand that ecosystems are part of sense of place.

   iv. Understand to embrace change and think of ways to improve the outcomes for all.

   v. Incorporate other ways of knowing (Example, traditional ecological knowledge)

3. Methods of delivery could include:

   a. case studies

   b. tours (e.g., in burned areas)

   c. field trips

   d. social media

  e. share-able, clickable content

  f. games

  g. interactive exercises

  h. phenology project, participatory science

  i. theater/improv

  j. map exercises

  k. Exercises using CalAdapt.
  l. Participatory science.
  m. Some suggestions available from CA-DWR for games to include during in person sessions are:
    i. Mitigation BINGO
    ii. Climate JEOPARDY
    iii. Climate CASINO
    iv. Music and Art approaches

UNIT III. Water, Energy, and Agriculture

  A. Stories about changes in CA water, energy and agricultural use; past and future and stories of hopeful new directions
  B. Subtopics may include
    a. Oceans
    b. polar ice melt
    c. sea level rise
    d. freshwater
    e. drought
    f. dams/storage

1. This unit might benefit from local community leader and expert guest participation. One method is to bring in local community leaders as guests for a "mini-listening-session" and have the participants speak to an important topic and what they'd like done and are currently doing.
2. Learning outcomes such as, "Learn about how climate change influences precipitation patterns and how it impacts our frozen landscape."

3. Discuss one thing that your community is doing about water (in the CAP). Could that deepen our understanding of why the water got salty? What is inspiring about the set of solutions you are presenting?
4. Fold in option for Project WET/climate training for educators or support staff who are becoming Climate Steward

UNIT IV.   Community Resilience

A. Extreme weather, fire, sea-level rise, floods, etc.
B. Local adaptation plan review
C. Local mitigation efforts
D. Community resilience evaluation
E. Citizen/community science group experience

1. In thinking about impacts focus on how to find out what the impacts are, how to find the solutions, and how to best create a community of action, and how to best communicate with this community and beyond.

2. Review existing climate action plans and models of good plans.

3. How do we find allies and move away from ineffective individualistic approaches that have failed? How can we normalize community efforts that employ system thinking? Not just what do they need to know. We need to help them how to do it for themselves.

4. Focus on community action.

5. If Stewards can actually provide a mini-listening session with local leaders (councilmembers, mayor, etc.), what a terrific service that would be.

6. <u>Disasters</u>/extreme weather session: because so much in California will be filtered through the lens of disaster, it is an important topic to discuss. Start with 1) stories of disasters; 2) major disasters in California (drought, flood, fire); 3) disaster resources, 4) trauma-informed disaster response and emotional resilience material, and 5) a "heart and hands" exercise.

7. <u>Develop climate actions</u>; support climate action plans

    a. Review local climate action plans, if they exist; are they adequate? What is missing in the approach? Are they directed at "tailpipe" or "well head"? What are the benchmarks for success?

8. <u>Learning outcome for this unit</u>: feel comfortable interpreting what you know about water; and feel comfortable communicating this to others and working together to improve outcomes on the ground and into the future.

9. <u>A focus on habitat connectivity</u> can be a great way to improve outcomes for ecosystems and the associated goods and services.

    a. Connectivity is positive story and is something that can be improved at the community level.

UNIT V.   Interpretation and Communication

    A. Some audiences need help understanding what are the aspects of climate change that may impact them and their local communities for the topic to resonate so keeping the impacts and hopeful solutions local will be emphasized.
    B. Know your audience; Know how your information is relevant to them
    C. Craft a message triangle to focus your educational efforts
    D. Identify effective channels of communication in your community
    E. Practice your personal story, justification and desire for increased resilience.

1. <u>Communicating climate change</u> session: focus on exercises to help people develop a style that they feel most comfortable with. Pull in video from prominent climate communicators to demonstrate different styles and show that there is no one way and that it's more important to find what works for you. Examples: Katherine Hayhoe, Sarah Myhre, Renee Lertzman, Marshall Shepherd (among others). In addition, George Marshall's book and teachings will be a foundational resource in developing Climate Stewards understanding and approach to climate communications.

    a. Topics to address: evolution of climate communication so that people are aware of how they are placing their own communication (I often find people have no framework for what they believe about how to communicate about

climate), climate as an intersectional issue and alignment with social justice issues, basic addressing of denial/skepticism (point people to resources like Skeptical Science if they are concerned; otherwise don't dwell on this), emotional content – e.g., hope vs. despair

2. Exercises: active listening, working with conflict, motivational interviewing techniques, contemplation & compassion, comfort with messy relational work, language for a changing world, graphic/comic climate communication

3. Five potential elements that could be incorporated: 1. Culture Change 2. Reconnection 3. Building community 4. Imagining and Creating Alternatives 5. Transforming Structure and Systems. For each of these, crossing cutting approaches, experiences, and exercises could embrace: 1. Mind 2. Body 3. Emotions 4. Spirit, such as to include, for instance: song, dance, drawings, listening, tasting, touching, feeling, seeing, art and music.

4. From National Academies Report to Congress for IPCC co-authors on communicating climate change:
   a. Know your audience: Learn what people (mis)understand and their information needs.
   b. Understand social identities and affiliations: Effective communicators often share an identity and values with the audience.
   c. Get the audience's attention: Use appropriate framing to make information relevant to different groups.
   d. Use the best available, peer-reviewed science: Use recent and locally relevant research.
   e. Translate scientific understanding and data into concrete experience: Use imagery, analogies, and personal experiences.
   f. Address scientific and climate uncertainties: Specify what is known with high confidence and what is less certain.

UNIT VI.   Civic Engagement/Capstone/Graduation/Community of Practice

A. Participatory Science
B. Local Adaptation Planning
C. Education/Interpretation/Outreach

Instructors will have a list of possible capstone projects intended to provide a bridge from the course to taking action through service that individuals or groups may want to choose from. For example, American Rivers Conservancy has habitat restoration projects that emphasize "re-watering" and groundwater-surface water connectivity exist within their organization: meadow and floodplain restoration, water quality monitoring, landowner outreach and education for responsible land stewardship. They also work on fuel reduction projects in the headwaters that are designed to promote fire resiliency and work with multiple agencies

(water agencies, USFS, non-profits) to manage conifer forests in headwater reaches to minimize the risk of catastrophic wildfire and study forest management effects on water quality, water quantity and infiltration. The latter provides a perfect outdoor classroom so that Climate Stewards could observe firsthand what these types of projects look like on the ground.

Capstone projects could focus on agroecology, working range and forest lands, soil quality, water quality, water reuse, mitigation of greenhouse gas emissions, clean energy, community recycling and composting, open space conservation, habitat connectivity and other areas. Some great stories about what regular folks are doing to help with resilience can be found at resilienceca.org

Here are some themes and project types that may help instructors to develop their own locally relevant list.

1. Water: recycling water, composting toilets and other innovative waste treatment options, roof rainwater capture systems

2. Community capacity (activities that connect folks): Creating neighborhood preparedness teams, block parties, neighborhood on-line portals/Facebook pages, green schools, social events, senior/shut-in outreach, becoming a transition town, co-working spaces, movie nights and book clubs on topic, plan a climate film night, organize an evening of climate conversation, educate youth about solid waste reduction, organize green building workshop, art mural with a vision for resilient local landscapes, organize art till you drop event on climate change.

3. Energy: Community solar, solar purchasing cooperatives, sustainable energy utilities, revolving loan funds, renewable portfolio standards, on-bill financing, energy investment districts, energy efficient subsidies, net metering, low income energy subsidies, participatory planning, virtual net metering, municipalization, community choice aggregation, public green power purchasing, cap and dividend, democratized grid management, smart grids, microgrids, greening of community facilities (libraries, fire stations, police, schools, churches, etc.), free energy audits and incentives to implement recommended changes (fee baits, rebates, discounts, free showerheads, etc.)

4. Policies: Zero waste ordinances, bans on single use, bans on straws, Styrofoam bans, plastic bags bans, curbside recycling, yard waste, food scraps, reuse/resale of unwanted items (like Urban Ore, Restore of Habitat for humanity), green building ordinances, solar tax credit, land use planning, zoning, protecting ag land, protected area management, wetlands, parks, conservation easements.

5. Transportation: increase local walkability, public transport, rideshare, carshares, bike paths, bike lanes

6. Development: Building codes, ordinances, Demolition Recycling, Reuse (refuse refuse), Building Energy Saving Ordinances, LEAD, Living Buildings, Living Communities, Energy retrofits and upgrades, insulation, roof top solar, electric heat pumps, cohousing, etc.

7. Art, Music, Murals, Communications, Social Media that communicate positive narratives about what can be done collectively, while also addressing psychology of climate change and its impact on local people.

8. Other: remove barriers to animal movement such as barb wire fencing no longer needed

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Here are the various science topics cross-referenced to the unit where it will be covered. Over the next year we will be working to articulate the **method of delivery** as well as **essential resources** for these subtopics.

Unit Number	Category	Climate literacy sub-topics
4	Biogeophysical science	Tools/observation/method
2	Biogeophysical science	Forcing
2	Biogeophysical science	Feedbacks (e.g. water vapor, land cover, pollution, nitrogen cycle)
2	Biogeophysical science	Sun/Radiation
3	Biogeophysical science	Oceans, thermohyline circulation, acidification
2	Biogeophysical science	Atmosphere
3	Biogeophysical science	Energy cycle
2	Biogeophysical science	Carbon cycle
2	Biogeophysical science	Ecosystem/natural communities
2	Biogeophysical science	Greenhouse gas sources
2	Biogeophysical science	Methane/CO_2/N_2O/oxide/gas names and relative concentrations/forcing
1	Biogeophysical science	Difference between climate and weather

1	Biogeophysical science	Climate History: how/why this climate change is different than past
1	Biogeophysical science	Precipitation patterns changing
1	Biogeophysical science	Temperature rising over time
2	Biogeophysical science	Climate models (global)
2	Biogeophysical science	Climate models downscaled for CA
3	Biogeophysical science	Water cycle
4	Social science	Systems Thinking, Complexity theories, Leverage Points (where to intervene in a system)
4	Social science	Economics - structural impact on society, ecological economics, doughnut economics, relocalizing, abundance
4	Social science	Technology - benefits and limits, impacts
2	Social science	Impact of worldview - human embeddedness in the community of life
4	Social science	Politics
4	Social science	Society - social unrest
1	Social science	Emotional Elements: Trauma, Grief, Anxiety, Hopelessness --> empowerment, agency, ability, creativity, purpose
4	Social science	Global/International - strengths and limitations of global agreements
4	Social science	Policy - global and California policies
1,4	Social science	Health - emotional, disease vectors, hunger, heat stroke, death/injury from climate events
1	Social science	Justice/Movement
1	Social science	Trauma
2	Impacts	Plant/Animals/Species/Biodiversity/Extinction
4	Impacts	Population, migration
4	Impacts	Extreme Weather - heat waves, hurricanes, blizzards
4	Impacts	Sea Level Rise, Storm surges, coastal erosion, sea water intrusion

4	Impacts	Fire
4	Impacts	Flood
3	Impacts	Drought, subsidence
3	Impacts	Energy sector
4	Impacts	Insect - changing vectors, geography, (mosquitoes, bark beetles, bees, etc.)
2	Impacts	Range shifts of species -- new ecologies
1	Impacts	Local/region/community
1	Impacts	Food supply, agriculture
1,4	Impacts	Case studies
4	Impacts	Extreme Weather - drought, heat waves, hurricanes, blizzards
1,4,5	Communication	Stories - power of narrative, individual stories of success
5	Communication	Mediums: social media, film making, marketing of ideas
5	Communication	effective use of metaphors, effective lexicon, effective framing
5,6	Communication	Teaching youth
1	Communication	Trauma
5	Communication	Use of metaphor
4	Action	Mitigation (of GHGs) and or "reduce future impacts"
4	Action	Adaptation
1,4	Action	Local success examples
4	Action	Adaptation strategies for cities, counties, regions
4	Action	Resilience - characteristics and attributes of resilient communities, permaculture
4	Action	Preparedness and Adaptation
3	Action	Water reuse, pee-cycling, humanure, graywater
1	Action	Personal footprint analysis

APPENDIX C: PARTICIPATORY SCIENCE OPPORTUNITIES

Participating in a community science project related to climate change is likely to be an effective way to deepen participants' understanding of the topics in the Climate Stewards lessons, and provide opportunities for ongoing engagement in science and with their communities. Hands-on data collection or processing can concretize learning and meaning by generating useful data which informs both climate science and Climate Stewards' experiences of climate change. Based on the draft syllabus in the strategic plan, here are some projects that may be useful to incorporate into the Climate Stewards curriculum, or to offer as an option for participants to pursue as part of their capstone project, or in their work after completing the course. Most of these projects are readily available and accessible, so they can be done without formal instruction and on participants' own schedules. These recommendations are organized by topic correlating to the draft syllabus.

Experiencing Change

1. I See Change:
   - **Description**: See Change is a platform for citizens to share observed changes in their communities and tell stories about climate change. Participants can download the I See Change app and upload photos related to ongoing investigations of climate change themes, for example evidence of early spring or sea level rise.
   - **Data use**: It is unclear what kind of formal data is generated by the I See Change program, but a stated goal of the program is that it ground truths data picked up by satellites in a collaboration with NASA.
   - **Advantages**: Using the app is simple and accessible to those with a smartphone. It may be valuable for participants in the Climate Stewards program to document how they experience local effects of climate change. It also would provide them with an opportunity to see what other people in their communities notice and mark as important to their experiences. It can be a helpful tool to gain familiarity with communicating climate change.
   - **Disadvantages**: There is limited concrete data generated (no clear accessible database to provide for climate scientists).

Community Resilience

2. King Tides Project:

- **Description**: Twice a year, when the Earth is closest to the moon (early December and January), volunteers document the effect that higher tides have on shorelines and coastal infrastructure by uploading photos of the effect of King Tides online.
- **Data use**: The photos are used to determine the vulnerability of coastal communities and to ground truth model predictions of sea level rise effects and are currently used by various organizations, agencies and nonprofits, including NOAA Coastal Services Center's [Sea Level Rise Viewer](#), the [Our Coast, Our Future](#) decision support tool, and the [California Natural Resources Agency](#).
- **Advantages**: Contributing to the King Tides Project may increase awareness of the threats of sea level rise, especially for those in coastal cities. Exposure to this project and its relevance to vulnerability may inspire trained Climate Stewards to then use it as a tool in their communities upon completion of the program. It requires no formal training or equipment, only a camera to photograph observed changes.
- **Disadvantages**: Implementing this project in the formal Climate Stewards curriculum may not be practical considering its specific timing and geographic constraints, but this can be overcome by familiarizing volunteers with it in the program so they may then use it on their own, as stated above.

3. [SKYWARN](#)
   - **Description**: The National Weather Service developed SKYWARN to improve its warnings of extreme weather events. Trained weather spotters can report severe and dangerous weather conditions to the NWS. This helps ground truth data that radars may not be able to pick up and provides information for warning systems.
   - **Data use**: The reports inform the National Weather Service so it can send appropriate warning messages during extreme weather events.
   - **Advantages**: SKYWARN trainings are free of charge, last about two hours, and take place in several locations throughout California. This could be another tool that Climate Stewards are introduced to in the program that can help improve their communities upon completion of the program. It may be valuable to arrange for a cohort to attend a training during the Climate Stewards course. This project would position Stewards to have an important role in their community's resilience, as well as expose them to the dangers of extreme weather events which are often exacerbated by climate change.

- **Disadvantages**: The training is a time commitment, and it is recommended that volunteers have access to communication such as HAM radio, so it is not immediately off the shelf.

Earth Systems Connections

4. GLOBE Cloud Protocol:
   - **Description**: Volunteers who choose to become a GLOBE trained citizen scientist can help ground truth data conducted by satellites on clouds, assisting scientists in improving their understanding of the relationship between clouds and climate. Users are notified when a satellite is nearby so they can time their observations, and they submit their observations based on a cloud protocol through the GLOBE observer app.
   - **Data use**: The NASA GLOBE Cloud Team will compare the submitted data with the satellite data for comparison/validation. They will send an email to the citizen scientist when their ground data matches the satellite data. By providing scientists with the ground perspective, volunteers help generate a better picture of the atmosphere that contributes to the Earth Radiation Budget.
   - **Advantages**: This project would be useful in the Climate Stewards program in a unit on atmospheric systems and the functioning of the climate system. The interaction with NASA when the ground data matches satellite data may help engage participants and inform their understanding of the role of clouds in the climate system. The Observer app makes this program fairly accessible for those with a smartphone once the training is completed.
   - **Disadvantages**: This program requires participants to be trained as a GLOBE citizen scientist before participating, which can be done online or at an in-person workshop. They must also request information about when satellites will be overhead, so there may be timing constraints.

5. Old Weather Project:
   - **Description**: Participants transcribe old, hand-written mariner ship logs from early 19th and 20th century, which computers are unable to do. Many of these logs hold information about meteorological and sea-ice data in the Arctic, which plays a large role in the global climate system.
   - **Data use**: Digitizing these handwritten logs makes the information recorded on them available to use as inputs to climate models.

- **Advantages**: This may be useful in a unit on the climate system as well as Earth's climate history. By actively processing data, Climate Stewards may benefit from exposure to climate modeling and the challenges associated with it. Participating in the program is easy and accessible with internet access.
- **Disadvantages**: It may not feel as hands-on for participants as other programs that generate new data.

6. Nature's Notebook and Project BudBurst:
   - **Description**: Climate Stewards can learn more about ecosystem changes due to climate change with these projects and collect data on phenology of plants and animals. Nature's Notebook and Project BudBurst are two different programs, but the goals of tracking phenology are similar.
   - **Data use**: The data generated by Project BudBurst becomes openly available for anyone, including researchers, on their online database. Examples of data generated by Nature's Notebook can be found here.
   - **Advantages**: Both programs are accessible by web or app and require in the field observations. This can be valuable to Climate Stewards' understanding of ecosystem impacts and changes of life cycle events as a result of climate change.
   - **Disadvantages**: No obvious barriers to participation.

7. Secchi Disk:
   - **Description**: Volunteers can contribute to marine phytoplankton health research with the Secchi app and a simple DIY piece of equipment. Volunteers on a boat simply lower their homemade (or purchased) Secchi disk into the ocean and record the depth at which they can no longer see the disk. The Secchi depth provides information about phytoplankton, which are sensitive to changes in ocean temperature.
   - **Data use:** The data generated is used by scientists to understand and document the changes to phytoplankton populations from warming sea surface temperatures, in response to a study that suggested a 40% decline in populations over the last 50 years.
   - **Advantages**: The equipment can be made at home or purchased, and the app can be used without internet access at sea. This could be useful for Climate Stewards to understand the effects of climate change on oceans and marine organisms.

- **Disadvantages**: This project would be best for participants who live near the ocean and who have access to a boat, and likely would only be workable into the curriculum if a field trip was coordinated.

8. eBird:
    - **Description**: Birdwatchers can collect data on birds by using a checklist to record when and where they observed certain birds. They submit their observations online to provide distribution, abundance, habitat use, and trend information for bird research and models.
    - **Data use**: The data generated by the program is available online for free for anyone. The information from eBird has been used in several papers, programs, and models.
    - **Advantages**: There is no barrier to participation, and the program's algorithms ensure data quality by taking into consideration volunteers' geographic location to filter birds that are likely to be found in the region. This would be a great opportunity for Climate Stewards who already go birdwatching to also generate data useful for scientists, and it can be included in course discussions on biodiversity or ecosystem changes/climate change impacts.
    - **Disadvantages**: It may not be specific enough to climate change to include in the Climate Stewards program, but the connection can easily be drawn to its relevance to climate change impacts.

9. North American Bird Phenology Program:
    - **Description**: Between 1880 and 1970, the NABPP was a network of volunteers who recorded bird observations. Today, volunteers can transcribe those observation cards online to make the information recorded on them readily available.
    - **Data use**: The transcribed data contributes to the National Phenology Network database so it can be accessible for use in research.
    - **Advantages**: This is easily accessible for anyone with a computer and internet access, and it can be useful for Climate Stewards to understand data processing.
    - **Disadvantages**: This program may have less appeal because it does not require field observations, and it may not feel as rewarding for participants who lack an interest in birds. Like eBird, the connection to climate change is less explicit than some of the other programs on this list.

APPENDIX D: RESOURCES

Some resources included here will prove to be useful in making connections with others working on climate education and others will provide useful background to be used directly by participants in the initiative or need to be adapted to be used.

The following are of particular value for CA climate science, impacts, and mitigation efforts and will be particularly helpful in course delivery.
• California Fourth Climate Assessment (CEC/CNRA)
o http://resources.ca.gov/climate/safeguarding/research/
o The 4th Assessment will be released in mid-summer 2018 and will include a statewide synthesis report, nine regional reports spanning all regions of the state, and three topical reports on Oceans, Tribal and Indigenous Lands, and Environmental Justice. The regional reports in particular should provide an excellent basis for Climate Steward initiatives to tailor material to their local region.

• Indicators of Climate Change in California (CalEPA)
o https://oehha.ca.gov/climate-change/document/indicators-climate-change-california
o The climate indicators report was updated in 2018 and provides numerous examples of climate change trends and impacts in California

• Governor's Climate Change Pillars
o https://www.arb.ca.gov/cc/pillars/pillars.htm#factsheets
o The 'six pillars' outlines California's strategy to meet the carbon emissions reductions goals laid out in AB32 and other legislation. This web site has fact sheets on each pillar.

• Safeguarding California (CNRA)
o http://resources.ca.gov/climate/safeguarding/
o Safeguarding California is the state's primary analysis of impacts and climate adaptation challenges. The original report was issued in 2014 with an exhaustive update in 2018.

• Risky Business California report
o https://riskybusiness.org
o https://riskybusiness.org/site/assets/uploads/2015/09/California-Report-WEB-3-30-15.pdf

o   The Risky Business project is an independent analysis of economic impacts of climate change, led by Michael Bloomberg, Hank Paulson and Tom Steyer. While some have critiqued it for making overly confident projections at local scales, it is an important analysis linking climate change to a range of economic sectors.

- Some suggestions for games to include during in person sessions are:
    - Mitigation BINGO
    - Climate JEOPARDY
    - Climate CASINO
    - Music and Art approaches (for the less-scientific-minded)

- Climate e-books by KQED (might be all we need for climate sci overview?)   http://ww2.kqed.org/education/e-books/
- National Network for Ocean and Climate Change Interpretation …   https://climateinterpreter.org/about/projects/NNOCCI
- "The Lancet: Climate Change and Health: (http://www.thelancet.com/infographics/climate-and-health)
- Lawrence Hall of Sciences a higher education curriculum on Communicating about Climate Change that I have found to be useful.   https://drive.google.com/drive/folders/0B2jLtNk-34TSfnVBTjFJOHA3djVVcXN3SVFnZWtqbTBoVXpLVWFLX3pldFZLTzhhV0JxSjA There is a lot of curriculum content on this drive.
- CLEAN Network - Climate Literacy and Energy Awareness Network   https://cleanet.org/clean/community/index.html
- CA Climate Clearinghouse http://resilientca.org/
- Elissa Lynn - From a Scientist's Perspective: California Naturalist Climate Story   https://www.youtube.com/watch?time_continue=10&v=kCJyWLIKs2k Great overview of climate change filmed and focused on California. 22 min video
- Skeptical Science https://www.skepticalscience.com/
- Carbon calculator for participant use https://coolclimate.berkeley.edu/calculator
- NOAA's Climate Portal   www.climate.gov/ (NOAA's Climate Portal
- https://serc.carleton.edu/integrate/workshops/index.html
- NNOCCI online training for aquarium interpreters

http://www.frameworksinstitute.org/climate-change-and-the-ocean.html https://frameworksacademy.org/products/changing-the-conversation-on-ocean-and-climate-change

- US Fourth National Climate Assessment http://www.globalchange.gov/nca4 (Fourth National Climate Assessment)

Name	Description	Link
NETWORKS		
National Network for Ocean and Climate Change Interpretation	NNOCCI is a network of individuals and organizations in informal education, the social sciences, and climate sciences. We are currently working in 170 institutions in 38 states. We share a commitment to using evidenced-based communications methods and providing the social and emotional support needed to engage as climate communicators.	https://climateinterpreter.org/about/projects/NNOCCI
CLEAN Network - Climate Literacy and Energy Awareness Network	The CLEAN Network is a professionally diverse community of over 630 members committed to improving climate and energy literacy locally, regionally, nationally, and globally, to enable responsible decisions and actions.	https://cleanet.org/clean/community/index.html
Planet Pledge	Planet Pledge is an alliance of philanthropies, institutional investors, and strategic advisors collaborating to deploy large-scale, worldwide investment and grantmaking solutions to climate change. We pledge climate action now, for a sustainable future on a thriving planet. It is founded by the Leonardo DiCaprio Foundation.	http://www.planetpledge.org/
UCAR - University Corporation for Atmospheric Research	*The University Corporation for Atmospheric Research is a nonprofit consortium of more than 100 North American member colleges and universities focused on research and training in the atmospheric and related Earth system sciences. UCAR manages the National Center for Atmospheric Research with sponsorship by the National Science Foundation. Through our community programs, UCAR supports and extends the capabilities of our academic consortium.*	https://www2.ucar.edu/
Next Generation Science Standards	The Next Generation Science Standards is a multi-state effort to create new education standards that are "rich in content and practice, arranged in a coherent manner across disciplines and grades to provide all students an internationally benchmarked science education." The standards were developed by a consortium of 26 states and by the National Science Teachers Association, the American Association for the Advancement of Science, the National Research Council, and Achieve, a nonprofit organization that was also involved in developing math and English standards.	https://www.nextgenscience.org/three-dimensions
Momentum: A new kind of politics	Momentum is a grassroots campaigning network of over 31,000 members, 200,000 supporters and 170 local groups that evolved out of Jeremy Corbyn's 2015 election campaign. Momentum is mobilising the mass campaigning movement that we need to get Labour into government.	www.peoplesmomentum.com/
NON-PROFIT		

Interfaith Power & Light – A Religious Response to Global Warming	*Interfaith Power & Light is a nonprofit mobilizing a religious response to global warming. The mission of Interfaith Power & Light is to be faithful stewards of Creation by responding to global warming through the promotion of energy conservation, energy efficiency, and renewable energy.*	www.interfaithpowerandlight.org/
Community Alliance with Family Farmers	*The Community Alliance with Family Farmers (CAFF) is a California-based nonprofit that builds sustainable food and farming systems through local and statewide policy advocacy and on-the-ground programs in an effort to initiate institutionalized change. CAFF's programs address current problems and challenges in food and farming systems, creating more resilient family farms, communities and ecosystems.*	https://www.caff.org/
Skeptical Science	*Skeptical Science is a non-profit science education organisation, run by a global team of volunteers. The goal of Skeptical Science is to explain what peer reviewed science has to say about global warming.*	https://www.skepticalscience.com/
Climate Generation: A Will Steger Legacy	*Climate Generation, a Will Steger Legacy, is a nationally connected and trusted nonprofit dedicated to climate literacy, climate change education, youth leadership and citizen engagement for innovative climate change solutions.*	https://www.climategen.org/
Climate Stewards	*Climate Stewards was started by A Rocha and is now an independent NGO, but still very much part of the A Rocha network. We work to raise awareness and empower people to combat climate change, and facilitate climate change mitigation projects in Ghana, Kenya and Mexico.*	https://www.climatestewards.org/
Alliance for Climate Education	*ACE is a 501(c)3 nonprofit that provides educational resources on climate science and justice, as well training for young climate leaders. ACE educates young people on the science of climate change and empowers them to take action.*	https://acespace.org/
Northwest Earth Institute | Living Sustainably | NWEI	*The Northwest Earth Institute is a nonprofit organization in Portland, Oregon, with the intention of "inspiring people to take responsibility for Earth." [1] Northwest Earth Institute was started in 1993 by native Oregonians Jeanne and Dick Roy and currently develops and implements programs designed to motivate individuals and organizations to take action toward a sustainable future.*	https://www.nwei.org/
Think Resilience - Resilience	*Resilience.org is a program of Post Carbon Institute (PCI). Resilience.org aims to support building community resilience in a world of multiple emerging challenges: the decline of cheap energy, the depletion of critical resources like water, complex environmental crises like climate change and biodiversity loss, and the social and economic issues which are linked to these.*	www.resilience.org/think-resilience/
Movement Strategy Center	*The Movement Strategy Center (MSC) is a national intermediary that promotes a national movement-building strategy, and supports organizations to work more collaboratively and sustainably.*	movementstrategy.org/
Movement Generation	*Movement Generation Justice & Ecology Project is a nonprofit inspires and engages in transformative action towards the liberation and restoration of land, labor, and*	movementgeneration.org/

	culture. We are rooted in vibrant social movements led by low-income communities and communities of color committed to a Just Transition away from profit and pollution and towards healthy, resilient and life-affirming local economies. See http://movementgeneration.org/wp-content/uploads/2016/11/JT_booklet_English_SPREADs_web.pdf	
Summer Grassroots Training (SPROG) | Sierra Club	Sprog is a one-week leadership training program offered by the Sierra Club that teaches tools for environmental and social justice activism to young people across the country. Whether you're already involved in a campaign or group, or you're just starting to explore ways to make change in the world, Sprog gives you the knowledge and skills to make an impact.	https://www.sierraclub.org/youth/summer-sprog-training
Climate Nexus | Changing the Conversation on Climate	Climate Nexus is a nonprofit strategic communications group dedicated to highlighting the impacts of climate change and clean energy solutions in the United States. With backgrounds spanning science, journalism, government, public affairs, corporate sustainability, consulting, policy and filmmaking, our team brings these diverse skills to partners in the science, business, public health, environmental and policy fields.	https://climatenexus.org/
Sustainable Agriculture Education: SAGE	SAGE is a nonprofit focused on revitalizing agricultural places near cities where farming and local food culture can thrive and be celebrated. They work in Urban-Edge Agricultural Revitalization and Urban-Rural Connections.	www.sagecenter.org/
Point Blue | Conservation Science, PRBO	Point Blue is a non-profit conservation science organization focused on conserving wildlife and ecosystems through research, outreach and partnerships. Through science, partnerships and outreach, Point Blue's 140 scientists work to maximize nature's benefits for wildlife and people in our rapidly changing world.	www.pointblue.org/
State Innovation Exchange	The State Innovation Exchange (SIX), formerly American Legislative and Issue Campaign (ALICE), is a nonprofit organization established in September 2012 by the Center on Wisconsin Strategy (COWS) at the University of Wisconsin–Madison. The State Innovation Exchange (SiX) is a national resource and strategy center that supports state legislators in advancing and defending progressive policies across the country. With a long-term vision of building progressive power and infrastructure at the state level, we have built a network of more than 1,500 elected officials who represent all 50 states.	https://stateinnovation.org/
Climate Access I Sharing What Works	Climate Access is a nonprofit organization building political and public support for equitable climate solutions through our learning network of climate leaders, pilot engagement projects and strategic services.	https://climateaccess.org/who-we-are
THINK TANK		
National Center for Atmospheric Research	*NCAR is a federally funded research and development center sponsored by the National Science Foundation and devoted to service, research and education in the*	https://ncar.ucar.edu/

	atmospheric and related sciences. Significant additional support is provided by other U.S. government agencies, other national governments, and the private sector. This organization is associated with UCAR.	
Ayni Institute	*Ayni Institute, a movement strategy research and training organization, launched the Momentum training institute, and focuses its work on strategies for social transformation around a set of core values and approaches, including how to take the long view on social change, how decentralized 'swarm' organizing works, and how to collaborate across different theories of change. 'Ayni' is a Quechua word meaning 'reciprocity' and the institute draws on indigenous and ancestral outlooks and practices.*	https://ayni.institute/
Frameworks Institute on Effective Communications	*FrameWorks Institute helps non-profits re-think their messages to simplify complicated ideas, move issues through Congress, and influence public opinion.*	https://www.frameworksinstitute.org
UNIVERSITIES		
International Student Carbon Footprint Challenge	*The International Student Carbon Footprint Challenge (ISCFC) is one of the centerpieces of the I2SEA project. It provides a forum for students from all over the world to evaluate, compare and discuss their carbon footprint with their peers. It allows students to quantify their greenhouse gas emissions, to compare differences between locales, and to foster discussion about the sources of those emissions. It is intended to promote students thinking about meaningful alternatives that students can implement in their own lives.*	footprint.stanford.edu/
Yale Program on Climate Change Communication	*Yale Program on Climate Change Communication conducts scientific research on public climate change knowledge, attitudes, policy preferences, and behavior, and the underlying psychological, cultural, and political factors that influence them. They also engage the public in climate change science and solutions, in partnership with governments, media organizations, companies, and civil society, and with a daily, national radio program, Yale Climate Connections.*	climatecommunication.yale.edu/
PEOPLE		
Joseph J. Romm, Climate Expert at Center for American Progress	*Joseph J. Romm (born June 27, 1960) is an American author, blogger, physicist and climate expert who advocates reducing greenhouse gas emissions and global warming and increasing energy security through energy efficiency, green energy technologies and green transportation technologies. Romm is a fellow at the Center for American Progress.*	https://en.wikipedia.org/wiki/Joseph_J._Romm
Katharine Hayhoe | Climate Scientist at Texas Tech University	*Katharine is a professor in the Department of Political Science and director of the Climate Science Center at Texas Tech University, part of the Department of Interior's South-Central Climate Science Center. My research currently focuses on establishing*	katharinehayhoe.com/wp2016/

	a scientific basis for assessing the regional to local-scale impacts of climate change on human systems and the natural environment.	
[Kathryn Lyddan, Assistant Director for the California Department of Conservation's Division of Land Resource Protection](#)	*Kathryn Lyddan is the Assistant Director for the Department of Conservation's Division of Land Resource Protection. She joined the Division in December 2016 and will guide it in providing tools and implementing programs to help Californians make wise land-use decisions regarding some of the most productive farmland and diverse open spaces in the world.*	http://www.conservation.ca.gov/index/AboutUs/Pages/Kathryn-Lyddan.aspx
[Adrienne Maree Brown](#)	*Adrienne Maree Brown is author of Emergent Strategy: Shaping Change, Changing Worlds and the co-editor of Octavia's Brood: Science Fiction from Social Justice Movements. She is a writer, social justice facilitator, pleasure activist, healer and doula living in Detroit.*	adriennemareebrown.net/
[Renee Lertzman, PhD | Psychological Insights for a Changing Planet](#)	*Renee is an internationally recognized thought leader and adviser, and works with organizations, professionals, and practitioners from government, business, philanthropic, and non-governmental sectors to design research tools, brand strategy, trainings, workshops, engagement practices, and strategies suited for the uniquely challenging nature of environmental work.*	reneelertzman.com/