COMMUNICATING FOR A CHANGE: CLIMATE CHANGE EDUCATION STRATEGIES IN PUBLIC GARDENS

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ABSTRACT

A need exists among professional educators at public gardens for guidance on how best to communicate climate change as a phenomenon that obligates us to shift our behaviors and affiliations. Modes and content of communications advancing climate action in these spaces are challenged by a lack of coordination across the industry, and professional educators in this sector seek guidance on how to craft engaging and compelling narratives (Gough & American Public Gardens Association [APGA], 2014). These narratives need to meld interests of the botanic institution with current research on how to best communicate with the public on the topic of climate change to increase the likelihood that audiences will be better equipped and more empowered to take action. Many current resources either: 1) do not take into account the needs or perspectives of public gardens in their recommendations, or 2) fail to offer information in language or format that is accessible to everyone at a botanic garden who may wish to use it (e.g., volunteer docents, the elderly, those disinclined to grasp jargon-laden research, professional educators or our publics).

Central to every public garden are conservation, botanical and horticultural research, and education and public engagement. Gardens are keen to reach audiences with messages that inspire personal engagement with pressing issues like climate change but may lack effective tools to do so (Gough & APGA, 2014). Moreover, educational programs focusing on climate change at a public garden but lacking the botanical or horticulture context are awkward appendages. Gardens that wish to provide such programming must couch presentations within a mission-relevant frame. The good

news is that prime examples of climate change impacts on plants and the cultures and ecosystems they support are ubiquitous. But focusing too much on the negative impacts can be a turn-off to the very audiences professional educators are attempting to reach (Bhattachary *et al.*, 2008, ecoAmerica, 2015). So how do we navigate this “catch 22”? Insights gathered from recent research may help.

Based on the research reviewed for this paper, I take the view that, in addition to teaching people about the science of climate change, climate change education in public gardens should: 1) hone messaging for their local demographic; 2) harness the love of plants to propel individuals to engage in climate action behaviors; 3) assess the efficacy of their efforts; 4) incorporate improvements to their communications program; and 5) make findings available to the broader public garden community. Do not expect that people only need more information to change beliefs or to take novel climate actions. What follows will enable you and your organization to identify the social and psychological tone that best complements new knowledge to galvanize a positive and proactive response from your visitors. Ultimately, we want our audiences to feel empowered and equipped to act.

The first half of this paper synthesizes the work of communication researchers and social and behavioral psychology studies into a text that is accessible to professional public garden educators as well as volunteer docents. If successful, it will support myriad communication platforms from static communications (signage, displays, and webpage content) to live interactions (between professional staff and volunteers, tours,

and peer-to-peer discussions). The user will find literature-supported recommendations on: 1) how to refine your message for your local audience and for each tour group; 2) how to incorporate the values of your visitors into a powerful case for climate change action; 3) how to discover the right tone for the group or person you are speaking to; 4) utilizing locally-situated narratives to draw people into your presentation without arguing; and 5) knowing how the language in which you couch your message can improve its effectiveness. Educators must carefully craft messages for each audience, to the extent possible. Your tour guide(s) must be selected and trained carefully. And, the practitioner must have a firm understanding of both climate change and how to communicate it.

The last section of the report begins with a case study of the Climate Change Garden at the Cornell Botanic Gardens. Developed and installed in 2013 and 2014, the garden attempts to use plants to communicate the reality of climate change, and to generate constructive conversation and (hopefully) action. However, the messaging within and around that garden was not informed by the literature reviewed here. After a description of some of the communication media in the garden, I will demonstrate how concepts reported here can be applied in practice.

BIOGRAPHICAL SKETCH

Michael Roberts attended community college before transferring to Cornell University to complete his Bachelors of Science in Natural Resources in 2010. As an undergraduate he concentrated in Natural Resources Management and Planning. He was accepted into Cornell University's Graduate School in 2014, where he continued in his studies while working as a Steward for the Cornell Botanic Gardens. Since 2012, he has served on the Town of Ithaca's Conservation Board, of which he now Vice-chairs.

For Leslie and Anina

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SECTION 1

RESEARCH REVIEW

Below are findings from recent research on climate change education representing fields ranging from behavioral psychology to communication science and social psychology. From each I have pulled both the challenges environmental educators face when offering instruction on climate change and strategies that can help address these challenges.

Starting with the Audience

The importance of knowing your audience cannot be stressed enough. Short of launching a data collection campaign to find out who is visiting your gardens, you may find that you already have a good idea of who is strolling your beds. Do you have regular tours already established with local groups? Are there organizations that use your conference facilities with any frequency? What do you know about the field that brings the group together? What programming do you have for local schools, and how might your climate change message be best delivered to them? The truth is that this is a challenging task for busy professionals. If you do not have time to research the group in front of you, that's okay. You are no stranger to building rapport with your audience, a big part of which is to listen carefully to the individuals on your tour. Maybe you only identify one person out of 20 who might take to climate change as a conversation piece. Maybe someone will broach the subject for you. You just need to be well read on the subject and prepared when you see the opening.

As contentious an issue as climate change may be, people do not fall into only one of two camps. In fact, one prominent study identified six groups (n = 2,129) that the American public might fall into (Roser-Renouf, *et al*. 2015)[1]. The technical terminology is different, but you can think of these groups as being graded on a scale ranging from "Climate Change Is a Hoax" to "Climate Change is Armageddon." These poles, and the gradations between them, correspond to competing value systems which could be characterized by freedom-loving individualists and community-minded egalitarians. It shouldn't be any surprise that these different groups should be handled differently.

Over 70% of the populace comprises three distinct groups (the Alarmed, Concerned, Cautious, and Disengaged), and they should be the focus of your communication efforts. Why? Because they are the ones most likely to be moved to act or decide to believe in the phenomenon of climate change (Roser-Renouf, *et al*. 2015). There are specific recommendations for each group, and some recommendations that can be utilized with all four. But, before we get into that, we need to make a quick digression. The groups revealed in the Roser-Renouf *et al.* (2015) study correspond to other characteristics that prove useful in thinking about communication strategies. In addition to climate change beliefs, these groups were associated with certain policy preferences, political ideologies, party identities, values, beliefs their political actions will be effective, and consumer and political behavior (Rosner-Renouf, 2015; Maibach *et al.*, 2009;

[1] This is a great resource for anyone wanting to dig deeper into how different people in the US view the issue climate change and what tactics might be used to motivate them. The groups identified in the study are labeled as Alarmed (16%), Concerned (26%), Cautious (25%), Disengaged (5%), Doubtful (15%), Dismissive (13%).

Leiserowitz *et al.*, 2011). As one moves from Concerned to Cautious to Disengaged, policy preferences shift from acceptance of government regulation to a belief that regulation does more harm than good. Similarly, the Disengaged believe people generally get what they work for and lean right of center politically. All of these traits are relevant to what you can bring into the conversation with any one group, particularly when you are talking about solutions and actions. Those leaning right politically might want to hear about the economic opportunities a response to climate change would bring. Those leaning left are going to be more receptive to government intervention, like cap and trade policies. It's good to have a hopeful, positive message on deck, but what constitutes hope or positivity varies among groups.

Let's start with the low hanging fruit. The 16% of the Americans that are truly alarmed by climate change should not be overlooked. While knowledge and concern are both high with this group, some individuals simply lack the efficacy needed to take meaningful actions. It is therefore recommended that you work to bolster not only this audience's capabilities and knowledge of positive climate actions (Bhattachary *et al.*, 2008), but also their personal and collective confidence to do so (Roser-Renouf, *et al*. 2015). Part of this is simply sharing narratives of collective action making a large difference in climate outcomes (Morton, Rabinovich, Marshall & Bretschneider, 2011). Offering opportunities for people to come together to take collective actions, whether with your garden or elsewhere, is strongly recommended. Programs in your area may leverage individual actions by reporting them, amplifying the perceived impact and building collective efficacy (See Affect).

So, what are the middle three groups looking for? Just as they are on the fence when it comes to their competing values, they are also less picky about the types of information they feel they need to act on climate change. Your job then is to include elements that speak to both community-minded and pioneering archetypes and gauge which is received better. If you listen to your groups' questions carefully, you may discover that one person just wants to know what they can do to help. Another may need more evidence that our climate is warming, and a third may need to know the process that drives the phenomenon. One item that appears to connect them is a weak appreciation for the degree of scientific consensus on the issue (Leiserowitz *et al.*, 2011). A key point to bring up is that 97% of actively publishing climate scientists agree that climate change is a phenomenon caused by humans (Cook *et al.*, 2016). The bottom line is to be prepared with your narrative. Scripts are great tools for keeping a docent or staff member on message, but it is advised that tour leaders practice handling probing questions or re-framing concepts in a different light.

Meeting the Audience Where They Are At

During a tour of your penstemon collection, you offer that issues have arisen in the collection of viable seed from your prized plants. You explain that the narrow window of bloom times and pollinator activity has been offset by the shift in the local climate, and the resulting misalignment means that the flowers do not bear fertile fruit. One of your audience members gives you a suspicious look and asks if you really believe that the climate is changing so drastically. You point out that this is not the only plant that is having such trouble reproducing in its native climate; moreover, your acknowledgement of climate change was a result of an accumulation of facts coupled with a concern to protect your children's quality of life. But you also ask them if they are avid gardeners, and inquire what changes they've seen in their activities in their gardens.

Connecting your audience's personal experience to the global phenomenon is a critical function of your educational program, and allows your attendees to enter the conversation on terms that are familiar to them.

Vignette 1.1 Incorporate messaging that connects with individuals based on their personal experience.

Every group—every individual—you speak with is going to be different in how they perceive climate change and themselves in relation to it. This is as much about using language that people are comfortable with as it is about using social in-group cues (see Values & Identity). Chances are that if a guest in your garden has elected to read signage or a display on climate change, or take part in a climate tour, they are not going be hostile to the concept. Often, the folks who are proactively engaging will only need hopeful messages that include collective and individual action stories to build their self-efficacy (Anderson, 2016; Volmert, 2014). Those who have initiated conversation or interest in climate change (those who you may deduce are of the Alarmed or Concerned camps) are the most open to negatively-framed narratives of climate change. But, if we focus on negative impacts with everyone, we run the risk of alienating or disengaging groups of people that are not yet ready for emotionally intense narratives of climate

change impacts (Dickinson, Crain, Yalowitz and Cherry, 2013; ecoAmerica, 2016; Morton, Rabinovich, Marshall and Bretschneider, 2011). For that reason, I caution environmental educators to use negative impacts sparingly, as over-doing it could dampen an audience's sense of efficacy.

Who Americans are in relation to their views on climate change is clearly much more nuanced than those opposed to or those for tackling the issue. Understanding who these groups are helps to shed light on how we can speak to different people in ways that they won't find offensive. But to get a better sense of what an individual needs to make decisions, change behaviors, or take action, we need to delve into the field of psychology.

Values & Identity

To some, values may be a squishy concept to bring into a discussion on climate change communication. However, values play a central role in decision making and action, and must be understood to know how they inform a person's beliefs and behaviors. Values have five distinguishing characteristics: 1) concepts, 2) concerned with desirable results or behaviors, 3) consistent across situations, 4) inform preferences and evaluation for behaviors or events, and 5) can be ordered by importance (Schwartz 1992). Included in Appendix A is a list of values, which are grouped by type. Take for example independence. How might a person who holds this value above others respond to a message from an untrusted authority figure that they must act against climate change? What might their response be to a statement that supports government intervention and

regulation of climate change solutions? How might their reaction differ if they were instead given more data (e.g., global or regional temperature records, carbon isotope ratios, or plant phenology records)? Consider carefully what values you are explicitly or tacitly endorsing in your conversation about climate change, and know that it is not just the message that is being evaluated for value cues—the messenger is being judged, too.

Climate change education designed to empower people to take action is better received when the audience believes that the communicating institution or person shares their fundamental values (Anderson, 2016; ecoAmerica, 2016; Volmert, 2014; Tajfel & Turner, 1979; Fielding and Hornsey, 2016). Fielding and Hornsey (2016), approaching the issue with a social identity[2] lens, found that those belonging to a perceived outgroup were not trusted to provide reliable information and were resisted. Outgroup and ingroup are simply shorthand references for people who share, or don't share, values. This concept can be taken one step further if we imagine two people whose values largely do not overlap as members of distinct cultures. They may view each other as foreign or alien, and whatever messages one may have for the other are evaluated and discounted. Why? Communications from an outgroup spokesperson are weighed against the norms[3] and values of the listener. Messages that conform to norms are judged as being good, while those more distant from those norms are seen as less

[2] Social identity was identified as, "those aspects of an individual's self-image that derive from the social categories to which he perceives himself as belonging." (Tajfel & Turner, 1979).
[3] I am borrowing the definition of descriptive norms here from Cialdini, Kallgren & Reno (1991) as the perception of what most people do. In this case, it is the perception of an individual as to what most people from their in-group does.

good (Adler, 1991; Fielding and Hornsey, 2016; Tajfel & Turner, 1979). As garden tour participants, your audience is listening for cues about what sort of person is hosting the tour. Is she like me? Do we share common values? Can I trust what she is telling me? If your organization is aware that its culture supports norms or values that diverge from the community it serves, staff may carefully select a messenger who locals identify with (Fielding and Hornsey, 2016), someone who won't be viewed as an outsider. There is another way around the in-group/out-group problem: by appealing to a super-ordinate identity.

A super-ordinate identity taps into a value and behavior set that is more fundamentally situated across swathes of society and can cut across divisive identity types (See Vignette 1.2 for an illustration of how you might use this concept). American, parent, veteran, business-owner are all types of these identities that can allow people to bridge social barriers to pro-environmental behaviors and messages (Batalha and Reynolds, 2012; Fielding and Hornsey, 2016). This also builds rapport with your audience.

Super-ordinate Groups

Jacob Brown, a sharp elderly volunteer at your garden, has been giving tours to visitors for years, and you have recently trained him to speak on your initiatives addressing the garden's carbon footprint as he leads tours in the herb garden. More than just the programs themselves, you have instructed him in the finer points of relating to skeptical audiences. While speaking to a group of young alumni from a local college, Jacob notices the attention of a group of three young women waning as he wraps up the first segment on carbon off-sets. As he directs the crowd to the next stop on the tour he strikes up a conversation with two of the women, who - it turns out - are geotechnical engineers who started their own consulting firm after graduating. "You don't say?" says Jacob. "I retired from a geoscience lab that I founded in 1964. We had 187 employees and $58 million in contracts when I retired." The women's eyes light up and begin talking animatedly about the challenges they have had landing their first big clients.

Business-owner, American, parent, Muslim, immigrant are all examples of identity groups that underpin large sectors of society. We don't use them to manipulate people, but we can share them to connect our listeners with us and our message. What other super-ordinate groups can you think of?

Vignette 1.2 Using super-ordinate identity groups to connect with visitors is a powerful tool to break down social barriers to climate change messaging.

Another part of this rapport-building process sounds simple, but can be an effective means to break down social barriers. Using the pronouns "us" or "we" to reference the audience in conjunction with ourselves draws the speaker, the garden, and the audience member into the same social space (EcoAmerica, 2016). Allowing people to identify with you and your garden has another benefit. To some, their only reason for not participating in climate-positive actions are that they feel their efforts will be ineffectual against a global problem. By identifying with an institution that: a) has a louder voice; b) resources to leverage, and c) a clear plan to address climate change empowers the listener by providing some tangible "wins" already established by your institution. "Lending" your organization's climate change mitigation successes (on a

psychological level) is an important boost to a person's perceived efficacy to deal with the climate change issue. Efficacy will be discussed in detail later.

There are those who don't consider "believing" in climate change—let alone taking climate-mitigating actions—as something they can do simply because it is against how they view themselves (or groups they associate with). What may not occur to them are latent pro-environmental values and activities that their social circles already hold (e.g., responsible management of natural resources, respect for creation, exercising self and societal discipline, maintaining a clean environment to give to our children) (Schwartz, 1992). To reach audience members whom you suspect may fall into this group you must make those activities salient, and extend the underlying values to the topic of climate change (Felding & Hornsey, 2016). Several particular values deserve special attention for the potent resonance they have with Americans.

Protection, particularly when used in the context of preventing harm to human health, was a value that respondents indicated was most effective in advancing sentiments towards policy or attitudes (Simon, Volmert, Bunten, & Kendall-Taylor, 2014).[4] This was pronounced amongst those who self-identified as Republican. Responsible management, interconnection and innovation also performed well as frames in which to couch climate change discussions (Bales, Sweetland & Volmert, 2015). Both studies utilized the same data set, which was drawn from over 7,000 US voters. Other values

[4] Appendix A has a list of values borrowed from Schwartz's foundational paper *Universals in the content and structure of values;* this list sheds light onto values as the literature defines them, and how values are grouped by type.

identified as striking a chord (although not as strongly) with Americans are: opportunity, community, fairness, prosperity, hard work, patriotism, family, children, responsibility, protection, caring, freedom, independence (ecoAmerica, 2016; Volmert, 2014).[5] Which ones you elect to bring into your conversation should be dictated by the person or people you are speaking to.

Where appropriate, educators may also link values supporting their climate communications to the organization's larger goals (e.g., promoting good health and environmental conditions for families), which resonate with the values of most audiences (Anderson, 2016). In doing so you accomplish two things at once: 1) You lend the credibility of your institution to the argument for climate action, which strengthens your message; and 2) Those desiring to act may be inspired to partner with your garden (i.e., volunteering, starting a professional partnership or donating money). The point is that your garden can act as an opinion leader on the issue. All the values listed above can be directly referenced in communications, or serve as unifying themes to a communication strategy or tour script. Think of these values as organizing nuclei for a themed presentation on climate change. Appendix A groups values by type, and is a good resource for which values to use in conjunction with one another.

[5] Self-Transcendent/Openness to Change values categorized as Universalism/Biospheric (Unity with nature, A world of beauty, Protecting the environment) were significantly and positively correlated to multiple pro-environmental behaviors. The converse is true of values related to Self-Enhancing/Conservation (here conservation is used to indicate an unwillingness to accept change) – Social power, Authority, Influential and Preserving my public image (Karp, 1996).

When values are clustered into coherent groups they begin to sound much like political platforms or societal norms. Certain people or institutions will embody the core set of values for a social, political or religious group to a point that they become paragons for the groups. People of a social in-group will look to these leaders in their religious, social or political lives for guidance (Feilding & Hornsey, 2016). Such individuals or institutions are referred to as opinion leaders. Consider opinion leaders across some spectrum of society (politics is an easy enough example to imagine). Each in-group (party) has leaders who they look to for guidance and who help them understand events or policies that are otherwise too time consuming to digest cognitively. This can work to our advantage by identifying those surrogates of an affiliated in-group who are supportive of climate change policies and messaging (Feilding & Hornsey, 2016). That sounds abstract, but take this example: conservatives largely stack against climate change as an issue for a number of reasons. So, instead of trying to reference climate action in any sort of political context or referencing political leaders who are either for or against the issue, reference a leader of an in-group affiliated with the American conservative right: like Pope Francis, who in his 2015 encyclical *Laudato si'* equated harms to creation (including climate change) to sins against God. However, be careful to be authentic in what values and social groups you tap into. Bringing in other types of opinion leaders (e.g., a respected business person, or an advocate for social justice) and drawing parallels between that person and positions they have taken supporting climate change solutions is a sound tactic when used authentically and respectfully. Maintaining a trusting and positive rapport with your audience is foundational to environmental educators. Take care to strategically strike the right emotional note.

Affect

This next point is simple: keep your message positive (Anderson, 2016; Bhattachary *et al.*, 2008; ecoAmerica 2015). While this is a good axiom to follow, it would be impossible to adhere to 100% of the time. When negative impacts (e.g., more frequent damaging weather, sea-level rise, spread of ecological and agricultural pests) associated with climate change cannot be avoided, pair them with solutions or pivots to opportunities that they present. Anderson (2016) recommends that educators attempt to trigger three emotional responses through their communications: efficacy, hope, and concern.

What is efficacy? This is a trickier question than one might think as there are varying types of efficacy. Here I refer to self-efficacy and collective efficacy. Self-efficacy is a personal assessment of one's capabilities to "deal effectively with different realities" (Bandura, 1986). In this context, our listener is judging if they can effectively approach the problem of climate change and how much effort they think they will need to invest. Some of the strategies discussed later help nurture self-efficacy in your audience. Collective efficacy, rooted in self-efficacy, is a communal sense that concerted effort will solve the problem at hand (Bandura, 1986) (see "Local Impacts" section below). For many people, grappling with a concept as large and complex as climate change can be an emotional quagmire. Just the sort of problem to elicit detachment, dispirited resignation, or confusion. If you wish to instill hope, you need to offer climate change on a local, manageable scale (e.g., "Ithaca Climate Change") addressed with readily available resources.

Concern is driven by a narrative that does two things: 1) It addresses issues and objects important to your listeners and which are affected by climate change (e.g., effect on local businesses/economy, protecting the health of our families); and, 2) It fills important knowledge gaps by offering a picture of climate change as a process driven by certain mechanisms (FrameWorks Institute, 2014). What would that sound like in practice? Maybe: Carbon emitted from human activities increases the percentage of carbon in our atmosphere. The additional carbon acts like a blanket that makes our planet warmer than it would be otherwise. A warmer planet means our farmers must deal with greater uncertainty related to more extreme weather events, or that our beaches are eroding, which threatens our safety and the local economy. Remember: you are not making an argument; you are sharing their concerns (e.g., protecting your audience's family's health, managing resources responsibly, or finding ways to innovate our way out of a problem).

Maintaining a positive message and instilling a sense of hope may not be your first idea of what climate change brings to mind. But key research shows that to draw people into meaningful engagement with climate change solutions we must create uplifting narratives that leave the listener feeling empowered (Bhattachary *et al.,* 2008; ecoAmerica, 2015). As it happens, taking part in a collective action creates a sense of belonging and enhances a person's feeling of empowerment, or self-efficacy (Anderson, 2016; Volmert, 2014). You can see how this might form a virtuous cycle where the positive feedback a participant receives from taking part in a collective action would propel that person to continue engaging with the climate-constructive activity. Think also

of how you can create narratives that speak to the opportunities that climate change affords us. There are new job fields that are growing fast in the U.S. tied directly to climate change adaptation and abatement efforts. Think of wind turbine manufacturing, engineering and maintenance; solar and geothermal energy systems installation and maintenance; home and industrial weatherizing businesses that are all creating jobs all over the country. And, just as each of these career prospects put people to work, they save consumers money. Painting a picture of a nation coming together (utilizing the theme of collective action, and building collective efficacy) will be a powerful motivator, especially among those who already understand the importance of action (Leiserowitz *et al.*, 2011).

Leading by Example

While on a tour in your peony garden one of your attendees inquires about the rain barrels stationed at the downspouts on your visitor center. He is concerned that the obvious maintenance infrastructure negatively impacts the garden for visitors. You light up with a smile. This was an intentional move made by the Director of Horticulture to not only display the garden's efforts to manage costs, but to spark conversations on the topic of climate change mitigation practices that your garden is advancing.

"They're beautiful, aren't they?", you say. Indeed, the four 100-gallon repurposed wine barrels procured from a local winery are rustic but elegant and are a part of a 20 barrel system supporting the garden at large. "After assessing our carbon footprint, we found that one of our Achilles heels was the amount of water we consume. All of our water came from the lake, which needs to be pumped uphill. With our rain catchment system we offset our water consumption significantly, cut our carbon emissions by 10%, reduced expenses, and the plants are healthier since they're now being watered with more acidic rainwater. We understand that the visibility of the barrels is aesthetically unconventional, but we also feel strongly that what they do for us imbues them with a unique appeal."

Showcase your garden's successes in reducing its contribution to climate change. It may precipitate generative conversation and boost self-efficacy.

Vignette 1.3 Leading by example when it comes to climate actions draws your audience in and reduce your footprint.

There is a caveat to the keep-it-positive maxim: if the individual is already on board with your climate change action message, negative framing *does* provide an impetus to act (Morton, Rabinovich, Marshall and Bretschneider, 2011). This underscores the importance of knowing your audience. If you know that the group or person you are speaking with appreciates the necessity to address climate change, offering some concrete, local examples of how climate change impacts are going to be felt in their hometown can have a galvanizing effect on the individual.

Local Impact, Local Actions

In their 2009 paper, *An Iconic Approach for Representing Climate Change,* O'Neill and Hulme found that focusing on local icons and concerns improved an individual's receptivity to the message content. This finding was supported by Scannell and Gifford (2011) whose research indicates that: 1) localized messaging is associated with greater climate change engagement, and 2) those with strong place attachments engage more with the issue. What does this mean? Take your audience back to where they're from referencing local icons in your dialogue (e.g., beaches, mountains, lakes, rivers and/or the livelihoods that depend on them). Placing a discussion in distant locations, albeit with stunning impacts, alienates the listener from the effects of climate change, and belittles whatever remedy they might have otherwise had. Look to your coastline, the local ski industry, your gardens, local agricultural enterprises, or flood maps of the nearest river for inspiration. Remember to use impacts (rising sea levels, unpredictable and disruptive weather patterns, increasing temperatures) in your narrative only sparingly, and try to pair them with a pivot to solutions or an appeal to a common value. Your goal is to present climate change as a manageable problem, conceived by our audience on a scale no larger than their home state, their hometown, or their own block.

Incorporate Local Knowledge and Experience

Your communications coordinator is guiding a tour for local garden club members through the crabapple collection of your arboretum when she makes a comment regarding the disturbances climate change can have on dormancy requirements of ornamental crabapples and fruit trees. An attendee, who is also a long-time volunteer at your garden, and is well known for her sharp mind and love of defying direction from gardeners, cuts across your train of thought: “You know I hear so many of you crow on about how terrible climate change will be for agriculture, but nobody ever seems to acknowledge that a warmer climate here would enable us to grow all sorts of things that we couldn’t before. I would love to grow citrus in North Carolina!”

Charlie, your coordinator, laughs sympathetically and smiles. She knows the volunteer well, and she also knows that she comes from an old tobacco farming family. “It’s true: there may be unexpected or even obvious benefits to a warmer climate here. And I don’t mean to avoid them to bias anyone’s views. But consider for a moment a farmer here in Asheville. He wants to grow whatever is going to make him the most money over the life of the crop. Other than the familiarity he might have with one fruit or grain, he doesn’t care much what that is. The transition from a zone 7a to 9a would not be smooth or predictable. Forcing him to adapt to a new crop would cost him dearly in equipment purchases and time learning new cultivation skills. Making choices that curb climate change in turn helps him by keeping familiar crop options on the table.”

By focusing on local concerns, especially those that are of known importance for particular audiences, a tour leader can connect to individuals’ values. (See Appendix A for a list of values.)

Vignette 1.4 Honor local values and concerns by bringing them into your conversation.

The complement to identifying what in your area is threatened is focusing on what people and groups in the community are doing to alleviate impacts, adapt, or abate climate change-aggravating behaviors (Bhattachary *et al.*, 2008; O’Neil & Hulme, 2009). It’s a safe assumption by your tour participants that if your garden has taken the time to put together a talk on climate change, you are going to be a good resource for what is

going on in the community and how they can get involved. Providing ready opportunities for individuals or groups to pursue climate actions—at your garden, or elsewhere—is a key element in engaging people positively. A few delicate points are worth zeroing in on. It very well may be that your garden is already doing something to reduce its impact, model climate positive operations, or help others improve theirs. Find ways that your visitors can take part in the project. Find solutions that your visitors could adopt in their own homes and landscapes, and don't be shy about providing contact information for local businesses or programs that offer relevant services (e.g., solar electricity/hot water installation, weatherizing contractors, county programs supporting energy efficiency initiatives; for a fuller list of potential actions, see Appendix B). Consider that instilling positive and empowered feelings about what you are doing for your community—as a source of reliable information and a place for meaningful action—is a powerful marketing and membership tool for your garden in addition to furthering the educational component of your mission.

Rather than focus on degrees Celsius or millimeters of sea level rise—which are often distant concepts in space and time to people—you could talk about concrete ways communities around the country are already adapting to or addressing problems they're seeing in their towns. You might mention that insurance companies (conservative institutions who know how to gather data and respond to new developments in technology or the environment) are adjusting coverage rates and premiums to reflect the shifting climate. You could even focus on what changes to weather patterns or ocean temperatures could mean for the local economy or cultural icons (e.g., Jake's

Crab Shack) (O'Neill & Hulme, 2009). Focusing on climate change impacts that are meaningful to your tour group can be a real challenge if you draw visitors from diverse geographies. You and your education staff need to do your homework to find out as much about the visitors coming into your gardens as possible. What do the economies of their home cities and towns rest on? What natural icons in their town are important to them (lakes, rivers, mountains or beaches)? This may be too much to ask of staff at some gardens where tour groups come in rapid succession. Do the best you can. If possible, keep notes on groups that may be back for tours in the future so you have a quick reference when they book the following year. Otherwise, the best you may be able to manage is to ask probing questions and listen carefully to clues about what is important to them in their hometowns, and bring that into your dialogue on climate change.

Science Literacy

Including a basic narrative of what is going on with our atmosphere and where the additional CO_2 is coming from should be a part of your discussion with your audience. If you are foggy on the details, you can use the following:

1. Carbon-based energy sources like coal and petroleum are mined and turned into many kinds of fuels.
2. The fuels are burned, releasing CO_2 gas into the atmosphere.
3. Concentrations of CO_2 increase creating a heat-trapping blanket around the globe.

This is the processes of climate change in its simplest form. The climate change elevator pitch, if you will. There are many other elements (e.g., methane gas, carbon sinks, warming oceans, melting ice, increased cloud cover) that could be incorporated

into a fuller narrative, and it is good to be conversant with those facts. But, keeping a simple 1-2-3 narrative will help cement the concept in people's minds. Not everyone is skeptical of climate science, but for those who are a key sticking point is whether that carbon is coming from human activities and not some other natural source. Evidence supporting human-driven climate change is clear. Carbon released into the atmosphere derived from petroleum or coal that was trapped for millions of years below ground was shielded from the sun's radiation, giving "fossil fuel"-derived carbon a distinct signature. This signature carbon has shifted from its historic proportion to other isotopes of carbon in our atmosphere, a shift that correlates with the beginning of the industrial revolution, and the beginning of the overall increase of carbon dioxide in our atmosphere (Shoemaker, 2010).

Plants can play a central role in this story. Petroleum and coal were once ancient plants. The only type of carbon plants store in their tissues (carbon-13) is still present in the fuels humans mine and burn. Once it is released into the atmosphere through combustion the overall CO_2 concentration increases. But this isn't the only source of CO_2. Although it accounts for much less, deforestation adds one unit of CO_2 to the atmosphere for every eight that burning fossil fuels does (Shoemaker, 2010). Carbon-12, -13 and -14 are all present in earth's atmosphere and were in a stable ratio to one another until the industrial revolution. That shift in the relative proportion of carbon-13 to other forms of atmospheric carbon tells climate scientists that some new source has been dumping enormous quantities of carbon into the atmosphere. The terrestrial

biosphere is able to store two units of carbon for every one emitted by deforestation, but imagine how much more could be stored if deforestation wasn't the problem it is!

Your audience may only know portions of the processes described above. The literature suggests that people are prone to habitual gaps in their understanding of climate change as a physical process. Identifying those gaps and working the missing concepts into a larger causal process of events addresses the issue and helps cement understanding (Anderson, 2016; Bales, Sweetland & Volmert, 2015; Volmert, 2014). For example, you might use the imagery of emitted carbon acting like a heat-trapping blanket for the globe (ecoAmerica, 2016). It's simple, visually evocative and easy to remember. How else might you correct gaps in your audience's knowledge? A few strategies are shown to work: 1) repeat the correct process, preferably in different forms, as often as you can; 2) do not ask your audience member(s) to repeat an incorrect process of climate change; 3) approach the climate change process as a co-discovery exercise—pose questions that guide the discovery in a logical way (Redlawsk, Civettini, & Emmerson, 2010).

A conversation about the process of climate change will inevitably lead to a discussion of what the consequences are of a warmed planet. Morton *et al.* (2011) found that the lack of *certainty* people feel around the eventuality of climate change impacts gives them a reason not to act. To exemplify this, consider the how the language of science might sound to someone unfamiliar to the field. Statements of probability are not claims of certainty, and when they are translated to secondary or tertiary sources they sound

like “may”, “could”, “increased”, “decreased” or “likely”. These are not words that inspire action. Where probabilistic (uncertain) statements cannot be avoided, know that individuals who are insecure in their sense of self-efficacy are likely to respond poorly to the message (Grothmann & Patt, 2005). In the face of this perceived uncertainty those who are not already on-board with climate change messages will respond poorly to negatively framed statements (Morton, Rabinovich, Marshall and Bretschneider, 2011). With groups that have expressed a feeling of being daunted by the prospect of tackling climate change, or if they are skeptical that climate change will impact them meaningfully, keep your message focused on the opportunities it presents. Thinking back on the section on Affect, you should identify these people as prime candidates for messaging highlighting how important and effective collective actions are.

One more item about data-driven messages: avoid falling into the trap of the knowledge deficit model (Wynne, 1992). The basic idea behind this failed model is that the only thing holding a person back from believing or behaving differently is that they lack some critical information (Irwin & Wayne, 1996). It is not as though information or an understanding of the science behind climate change is not important in shaping views, but it is certainly a more complex matter to change people’s views and behaviors than to dump data on them.

Framing

Communication framing refers to the anatomy of the communication process—“words, phrases and images used to convey the central idea of a message (Chong &

Druckman, 2007). It is how we talk about what we are talking about, and encapsulates nearly every strategy for communication covered this report. As educators, framing is used to present a concept in a way that is more palatable to your audience, or to elicit or avoid certain types of responses. And, certainly, choosing carefully the values you reference in your messages and narratives are a key component of framing. In fact, some values already mentioned are frames in which to couch your pleas for action (e.g., responsible management and protection of people and places) (Simon *et al.,* 2014).

There is a simple way to frame a discussion when making reference to probabilities. Focus on the concept you want to stick in your listener's minds when you are framing your climate change impact talking points. Take this example: there's a 49% chance of dangerous climate change if the global average temperature rises above 2.85 degrees Celsius (Mastrandrea & Scheider, 2004). The referenced 49% represents the loss outcome, and will stick in the listener's minds only because it was the probability that was mentioned. (Never mind that there is a greater probability (51%) that dangerous climate change will not happen at this temperature threshold.) This is termed equivalency framing (or sometimes just foregrounding), where the reader/listener's attention is drawn towards the probability that is mentioned (Druckman, 2001; Morton, Rabinovich, Marshall & Bretschneider, 2011). I strongly recommend that your pair this tactic with positive messages; such as, 97% of climate scientists agree that humans are responsible for climate change (Cook *et al.*, 2016).

Another key finding in the literature on framing is to avoid “loss” or “sacrifice” framing (Gifford & Comeau, 2011; Morton, Rabinovich, Marshall & Bretschneider, 2011; Spence and Pidgeon, 2010). What does this mean? It means that when talking about an impact of climate change that threatens something of value, your audience is less likely to want to engage positively with climate change actions. Couple this with the idea of fore-grounding, and you can dull the bite of a negative impact. For example: There is a 99% chance that the globe won’t experience a sea-level rise greater than one meter in the next 100 years (Titus & Narayanan, 1995). Why would you use this? Recall that building a sense of collective and self-efficacy is tied closely to instilling hope. This statement provides a grounded fact regarding sea-level rise in the face of hyperbolic statements of calamity that may discourage someone from acting. For individuals who are ambivalent on climate change (those in the Cautious or Concerned group from the Six Americas study) it is especially important to foster efficacy (Leiserowitz *et al.*, 2011). Including motivational framing that includes positive values and visions had a significant effect on participants’ perceived confidence of their ability to address climate change challenges (Gifford & Comeau, 2011).

There is nuance to the research on negative framing. A study of a large group of birders found that negative framing had a positive impact on a respondent’s intent to act on climate change, but only when paired with the non-human object, birds (Dickinson et al., 2012). Considering that they were birders, this is not surprising. The authors were careful to say that the results were not generalizable given the sampling method, but it

may provide a conceptual node for environmental educators who regularly work with cohorts of people with a shared object of interest, like plants.

You should have different talks (utilizing different frames) for the various audiences you will encounter. Are you giving a tour of your penstemon collection to a local garden club? Maybe they would respond better with a hopeful tone that references the scientific consensus around the issue. Is there a group of millennials from the local liberal arts college learning their trees? Framing climate change in terms of its impacts to the local ecosystems, and suggesting collective actions they can take will build the efficacy and hope they will need to be productive. If this sounds like a broad brush is being used to approach these groups, it is. I do not recommend you fall into stereotyping your tour groups, and as practicing professionals in the field you need to look for quick clues as to who your audience is. For that, nothing beats your careful observations of them as you begin to open the conversation on climate change.

Summary

According to the Six Americas study, Americans exist on a spectrum when it comes to their views on climate change, a spectrum that is composed of six distinct groups. These groups also correspond to policy preferences, political party affiliation and whether government regulation would be welcome (Roser-Renouf, *et al*. 2015; Maibach et al., 2009; Leiserowitz et al., 2011). Having some idea of who the individual or group in front of you is is critical to what type of message and frame you should bring into the conversation. The groups described in the Six Americas study also hold distinct sets of

values, which play a crucial role in how the individual processes new information, and whether it is consistent with the value set of their social in-group. Your job here is to build rapport with them by highlighting your common values, and how their values already support acting on climate change (Anderson, 2016; ecoAmerica, 2016; Volmert, 2014; Tajfel & Turner, 1979; Fielding and Hornsey, 2016).

You also must attempt to build self-efficacy with all your audiences. Many need to be given hope that something they do will make a difference. Talk about the positive projects that are already making strides towards abating climate change (Anderson, 2016; Bhattachary et al., 2008; ecoAmerica 2015). Those who are uncertain of climate change or lack robust self-efficacy respond poorly to negatively framed statements (Grothmann & Patt, 2005; Morton, Rabinovich, Marshall and Bretschneider, 2011). Those most engaged with climate change (the Alarmed) can take more negative messaging, but will require concrete actions that they can take to make a difference. Your message will be better received generally if you focus on the impacts and actions your audience can participate in in the places they are most familiar with, particularly if icons from the area are affected (O'Neill and Hulme, 2009; Bhattachary et al., 2008).

Including an overview of climate change as a process can be simple, and plants make a good unifying theme. Underscore the scientific consensus on climate change, and keep your descriptions of the process short. Use simple metaphors and repeat the correct process as often as you can (Redlawsk, Civettini, & Emmerson, 2010). Avoid asking your audience for their understanding of the causes of climate change as repeating

misconceptions usually reinforces them (Bales, Sweetland & Volmert, 2015; Volmert, 2014). Finally, be conscientious about what sort of probabilities you mention in your narrative. Your tour attendees tend to remember best the probability that you state (Druckman, 2001; Morton, Rabinovich, Marshall & Bretschneider, 2011.) Most of the communication practices discussed in this paper are tactics for how you speak to your audiences about climate change, whereas framing can be thought of as your strategy for organizing those tactics into a coordinated plan for your communications.

SECTION 2

FROM THE FIELD

Cornell Botanic Gardens is a public garden established as an educational conservatory for the University's botany students in 1875. Situated adjacent to Cornell's Ithaca campus, the gardens serve to fulfill the educational mission of the university through horticultural displays of herbs, native flora, ornamental annuals and perennials, trees from around the globe, a shrub collection, and a vegetable garden. In May of 2014, Cornell Botanic Gardens installed a climate change garden with the intention of increasing visitor understanding of the phenomenon (Cerra, Wien & Skelly, 2015). Conceptually simple, the garden allows visitors to see and feel an approximation of the environmental impacts of climate change, as it is projected to advance in upstate New York by 2050. Twelve paired beds are situated symmetrically, six inside and six outside of a high tunnel (Figure 1). Each planted bed in the high tunnel has a twin located just outside of the structure. The additional heat in the high tunnel shifts emergence, growth rates, phenology and availability to pollinators enough that a casual observer might distinguish noticeable variations between one bed and its pair on the outside of the structure.

Figure 2.1 The Climate Change Garden. Photo courtesy of Josh Cerra

A series of five primary signs have been placed through the garden, drawing visitors through the space with explanations of what the viewer is seeing and how the garden should be “read.” Additional signage identifies plants and allows visitors to note and leave their impression of the garden on a whiteboard stationed next to the exit. Other signs are used to draw the attention of the visitor to challenges a plant type may face with projected climatic projections (Figure 2). In the next section, I analyze text from one of the signs in the garden through the lens of what has been presented in this paper.

Figure 2.2 Secondary signage in the Climate Change Garden. Photo courtesy of Jay Potter

Trained staff guide tours through the garden which allows for higher quality interpretation than signage alone and enables the curious to pose questions. Data are collected from visitors to assess their attitudes and beliefs about climate change, both before and after touring the garden. Educators interested in adopting the same or similar model should consider carefully the utility of having signage that is intended to be experienced in a sequence, and whether it works in the space selected for the garden.

The staff member responsible for guiding climate change garden tours shared her views of what seemed to work well in the garden as communication tools. For instance, concepts that are detailed on any given panel should be paired with planted beds containing specimens that clearly illustrate the concept. This is similar to a point made earlier that messaging is more impactful when it is consistent across your gardens, and ideally with climate messaging seen at other gardens (Gough & APGA, 2014). Certainly,

the same wisdom can apply to your methods of communication across gardens and media types (here it is considered that the plants of the Climate Change Garden are a type of communication medium). She went on to note that it was challenge to guide groups through the garden because she was uncertain of the communication goals of the sign, and intent behind what plants were selected that year for the beds. She suggested that being able to discuss these points with the garden and communication staff working behind the scenes would enable her to better interpret what was going on in the garden to her audiences. Lastly, she also noted that visitors responded to messaging better when they had a guide to orient them through the experience than when they were left to experience the garden on their own (D. Levy, personal communication, October 25, 2016).

The climate change garden communicator also thought that addressing several challenges would improve the effectiveness of reaching visitors. First, the heat of the high tunnel, especially in the summer months, was a challenging environment for some people, and created a distraction from her message. It is generally good advice to choose more comfortable locations along your tour route to stop and talk, but this is doubly so in a plastic shelter in the summer! Second, she felt some plants might better show visitors the problems plants and pollinators face when specialist bugs hatch too early or late for their preferred flower. Public gardens should select plants carefully and seek the input of their number one resource: the gardeners! Finally, volunteer docents were reluctant to assume the responsibility of guiding tours in the climate change garden because they did not feel well-enough informed on the issue. This can be addressed with a few educational sessions, conversations, and peer-to-peer practice

(such as role-playing). Take the time to cultivate the knowledge of your educators and make sure they feel confident in their understanding and delivery methods. Generally, the careful planning advocated for earlier (carefully crafting messages for your local audience, conscientious selection of your tour guide, and reading the literature on communicating climate change) will create the right environment for success.

Application

So how does the garden described above measure up to the strategies recommended in this paper? Who might this garden speak effectively to, and how might messaging be improved to broaden its appeal?

The first observation is that the entire concept of the garden is based on an impact-driven narrative. Recall that this can work against attempts to reach people who have trouble accepting climate change messaging. So, while some "believers" may find inspiration in the format of the garden, this may not be the case for climate science skeptics. The concept of the garden is novel though, and can be refined to incorporate improvements to align its communications strategy with research to support the project's impact goals. Before any other recommendations are made, it will be helpful to take a closer look at the messaging within and around the Climate Change Garden.

The text below comes from the first sign in the series mentioned above, and is the first messaging a visitor would see upon entering the garden. The text reads:

> *Climate scientists project average temperatures in central New York will rise, with more and longer lasting heat waves. Average precipitation is*

projected to increase with a greater likelihood of extreme precipitation. To understand how plants may be affected by similar temperature and precipitation changes, we are using this high tunnel to compare how the same plants perform inside and outside of it. While we can't simulate climate change, we are modifying conditions inside the high tunnel throughout the season by raising the temperature and adjusting watering patterns consistent with climate projections for 2050. Each day, staff record observations on how these conditions affect the plants' growth.
Climate models project average annual temperatures could rise up to 3.3°F by 2020, up to 6.3° by 2050 and up to 9.9°F by 2080.
Average annual precipitation is projected to increase up to 7% by 2020, 10% by 2050 and up to 14% by 2080.
Be a scientist!
We invite you to share your observations on our write boards. Are plants flowering, fruiting, or dying out? How many flowers or fruits do they have? To point out changes that are occurring, look for the information tags placed throughout the garden.

To begin, signage can only reach so many different types of people at once. The static text can only be designed to be truly effective with one type of audience. An electronic interactive display would reach a broader audience, especially if responses to prompts on the screen crafted what messaging appeared on subsequent pages/displays. The text above—presenting so many facts and predictions—is speaking to someone who is already on board with the concept of climate change. There is a lot of information presented here, but as I mentioned in the first section on Starting with Your Audience, we cannot expect to reach people with just data and facts. The groups of Americans we are trying to reach need to hear about the scientific consensus around climate change (Rosner-Renouf, 2015; Maibach *et al.*, 2009; Leiserowitz *et al.*, 2011). Some in these groups (those of the Disengaged camp) tend to believe that problems arising from climate change are distant and far in the future. The format of the garden may inadvertently bolster this misconception by looking at 2050 as a benchmark, looking

past the impacts that are being felt locally and around the world now. There is also a powerful analogy right in front of the reader, but it does not get proper attention in this or other signs in the garden: the plastic of the high tunnel is acting just as greenhouse gasses do in our atmosphere. Drawing the reader's attention to such a conceptually simple parallel would be a wonderful tool to fix the concept in a visitor's mind.

In addition, there is no apparent attempt to reach the reader through shared values or group identity. Remember that your visitors need information *and* a values-based appeal to make decisions and change their views. Connecting with them on shared values recognizes the fuller conception of how people make decisions in their lives.

To be fair, the goal of the sign is not to convince readers that climate change is a real and pressing threat. Much of the text in this and the rest of the signage throughout the garden looks past the goal of convincing the public of the phenomenon and focuses on the impacts a changed climate would have on plants. Who might this strategy work for? It seems clear that this display garden is meant for those who already understand that global warming is a threat. That is fine, but if the end goal of climate change education is to inspire the educated to act on their new understanding, how does the Climate Change Garden perform? Does signage offer actions visitors can take? Does it connect them to groups or resources in the community that are moving on climate-positive actions? This analysis shows that there is work yet to do to utilize best communications practices within the Cornell Climate Change Garden.

In light of the literature reviewed in this paper, I offer the following recommendations for Cornell Botanic Gardens:

1. Assess carefully who the target audience is and consider some tailored tweaks to make your signage and tours more appealing to them.
2. Include text that draws an analogy between the heat-trapping plastic of the high tunnel and atmospheric carbon and methane. This could be reinforced with the heat-trapping blanket metaphor.
3. Offer details of the process driving and science behind climate change, such as, drawing the causal link to human activities (e.g., "The carbon in the CO_2 that humans produce is just one of many types of carbon found in our atmosphere naturally. Because the balance of this type of carbon is shifting in the atmosphere we know that the fuels we burn are the source of the increased carbon.")
4. Underscore the scientific consensus on the issue, and reinforce it with an easy analogy (e.g., "Wouldn't you listen if there was similar consensus around the bad health impacts from smoking (ah-hem!)?")
5. Make an appeal to common values of your target audience.
6. Offer specific actions and resources.
7. Consider the use of interactive, electronic displays that could speak more directly to the person using it.
8. Use select opinion leaders for your target audience where possible.

Cornell Botanic Garden's Climate Change Garden holds great potential to reach people through an experience steeped in readily accessible concepts and intellectual stimulation. The project coordinator for the garden is actively searching for partners to collaborate on establishing similar gardens around the globe as an educational tool and to create a networked educational resource.

CONCLUSION

If it seems as though there is overlap amongst the recommendations and strategies outlined in this report there is. Talking about social identity and how it informs a person's decision to engage with climate change is next to impossible without a conversation on shared values. Referencing common values to spark concern for a place will necessarily involve using local icons and impacts. And of course, impacts should not saturate the conversation so much as to leave your audience feeling hopeless about the prospects for meaningful change.

As a part of your climate change communication plan, you must have actions ready to suggest to garden visitors. Appendix B lists actions your garden staff might consider suggesting to your visitors. There is a plethora of resources detailing climate responsive actions from all corners of industry, government. and the non-profit sector to pull from, and this list is an infinitesimal tip to a large iceberg of information. So, dig deeply. Simply making suggestions as to what a person can do may be all they are looking for to take one more step, one more action against climate change.

It is not possible to speak to all groups all the time. As our analysis of the Cornell Botanic Gardens' Climate Change Garden shows there is only so much flexibility one has when drafting static text. Is there any value in attempting to reach one group of potentially persuadable people over another? That question is best answered by the practitioner and her team of educators. Maybe they would see more value in motivating Concerned individuals to act. They alternately may see more value in reaching the Disengaged crowd to shift popular belief. Regardless of what you choose to do in your

gardens, think carefully about the tools presented here and how they can apply to your unique set of circumstances.

APPENDIX A

Table 1 Values and their typology adapted from Schwartz (1992)

Value Type	Values
Universalism	Equality, Broadminded, World at Peace, Social Justice, Inner Harmony, Protecting Environment, Unity with Nature, World of Beauty, Wisdom
Self-direction	Freedom, Creativity, Choosing Own Goals, Curious, Independent
Stimulation	Daring, Exciting Life, Varied Life
Hedonism	Enjoying Life, Pleasure
Achievement	Self-Respect, Intelligent, Successful, Capable, Ambitious, Influential
Power	Social Power, Wealth, Authority, Healthy, Social Recognition, Preserving Public Image
Security	Social Order, Family Security, Clean, Reciprocation of Favors, Sense of Belonging, National Security
Conformity	Self-Discipline, Honor Parents, Obedient, Politeness
Tradition	Detachment, Humble, Devout, Moderate, Respect, Tradition, Accepting Portion in Life
Benevolence	Spiritual Life, Forgiving, Honest, Loyal, Helpful, Responsible, True Friendship, Meaning in Life, Mature Love

APPENDIX B

Actions with which to engage your public

Your garden should invite its visitors to engage positively with global climate change, and they need not all be related to gardening. There was a general lack of engagement among those identified in the Six Americas study as Concerned or Cautious on the issue. Some needed to be empowered to do so, others were floundering for ideas of what to do, or felt as though whatever it is they thought of just would not be effective enough. Part of your job will be to build up their perceived self-efficacy and provide meaty options for gardeners and other visitors to take action, like:

- Experiment with new species of plants to adapt to a shifting climate (Cornell Botanic Gardens, 2015).
- Move up planting and harvesting dates (Cornell Botanic Gardens, 2015).
- Reduce water consumption by using mulches or using captured rain water (Cornell Botanic Gardens, 2015).
- Select multiple types of plants to bloom at the same time to support pollinators.
- Reduce or replace the use of nitrogen fertilizer (Cornell Botanic Gardens, 2015).
- Practice low/no till gardening (Cornell Botanic Gardens, 2015).
- Contact their representatives in local government, state government and Congress and urge them to support climate change-mitigating legislation.
- Commit to taking alternative transportation to work, even if only for one or two days a week.
- Replace incandescent or compact fluorescent bulbs with LED bulbs (potentially reducing electricity consumption from light by an order of magnitude!)
- Make the next car purchase with ultra-fuel efficient cars in mind.
- Conserve water consumption. Pumping water is a huge source of CO_2 emissions.
- Install solar panels or wind turbines, or opt to buy green energy from their local utility.
- Take vacations closer to home. Per mile, flying is greener than driving, but you just go so much further in a plane you emit many times more carbon than driving.
- Weatherize your home to heat and cool more efficiently, and think of how landscaping might help create windbreaks or shade for a home.
- Purchase energy efficient appliances.
- Waste less food, and eat fewer meals that include meat.
- Become an opinion leader by encouraging others to take meaningful actions to curb climate change.

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