

# Environment: Science and Policy for Sustainable Development

ISSN: 0013-9157 (Print) 1939-9154 (Online) Journal homepage: <https://www.tandfonline.com/loi/venv20>

## Climate Change in the American Mind: Data, Tools, and Trends

Matthew T. Ballew, Anthony Leiserowitz, Connie Roser-Renouf, Seth A. Rosenthal, John E. Kotcher, Jennifer R. Marlon, Erik Lyon, Matthew H. Goldberg & Edward W. Maibach

To cite this article: Matthew T. Ballew, Anthony Leiserowitz, Connie Roser-Renouf, Seth A. Rosenthal, John E. Kotcher, Jennifer R. Marlon, Erik Lyon, Matthew H. Goldberg & Edward W. Maibach (2019) Climate Change in the American Mind: Data, Tools, and Trends, Environment: Science and Policy for Sustainable Development, 61:3, 4-18, DOI: [10.1080/00139157.2019.1589300](https://doi.org/10.1080/00139157.2019.1589300)

To link to this article: <https://doi.org/10.1080/00139157.2019.1589300>



Copyright Copyright 2019 The Authors



Published online: 17 Apr 2019.



Submit your article to this journal [↗](#)



Article views: 8023




View related articles [↗](#)



View Crossmark data [↗](#)



Citing articles: 3 View citing articles [↗](#)



# CLIMATE CHANGE *in the American Mind:*

## Data, Tools, and Trends

by Matthew T. Ballew, Anthony Leiserowitz,  
Connie Roser-Renouf, Seth A. Rosenthal,  
John E. Kotcher, Jennifer R. Marlon, Erik Lyon,  
Matthew H. Goldberg, and Edward W. Maibach

**C**limate change is a major threat to ecosystems and people around the world.<sup>1</sup> Risk analysts, including the U.S. Department of Defense, rank climate change as one of the most serious threats to society.<sup>2</sup> The 2014 Synthesis Report of the Intergovernmental Panel on Climate Change (IPCC) states that “climate change will amplify existing risks and create new risks for natural and human

systems” unless it is addressed by substantial human action at a global scale.<sup>3</sup>

In the United States, however, only about half of Americans view climate change as a personal risk.<sup>4</sup> People generally have limited risk perceptions, in part because they lack personal experience with global warming and tend to view the negative impacts as distant in time (i.e., a future threat) and space (i.e., affecting only people, species, and places far away).<sup>5</sup> Furthermore, although most

Americans think the climate is changing, many tend to misunderstand or discount climate science.<sup>6</sup> Nearly half of the American public does not know or does not accept that global warming is human-caused.<sup>7</sup> The public also tends to misperceive or underestimate the pro-climate views of other Americans and thinks there is greater polarization between their own personal views and the views of others than is true.<sup>8</sup> For instance, although there is general bipar-

tisan support for many climate change mitigation policies, most Americans are unaware of this norm and tend to underestimate how much support there actually is in the United States.<sup>9</sup>

Together, these factors—including the public’s limited perception of the risks and the social consensus on climate change solutions—affect Americans’ views on the importance of climate change. Following President Trump’s announcement on June 1, 2017, that the United States would withdraw from the 2015 Paris Climate Agreement, an Ipsos/Reuters poll found that Americans still prioritized other issues, including terrorism, health care, the economy, and immigration, ahead of the environment and energy.<sup>10</sup> While public concern about climate change and its ranking as an issue priority have been rising over the past decade, the increase has occurred largely among Democrats. A 2018 Pew Research Center poll found a sharp increase in Americans’ ranking of climate change as a top government priority, rising from 28% in 2010 to 46% in 2018.<sup>11</sup> The increase was primarily driven by Democrats (+27 percentage points since 2010), with relatively

smaller changes among Republicans (+7 points). These findings align with an increase in partisan polarization regarding climate change among both political elites, particularly members of Congress, and the general public.<sup>12</sup> Consequently, the politicization of climate change drives conflict in climate-related discourse and constrains climate policy.<sup>13</sup>

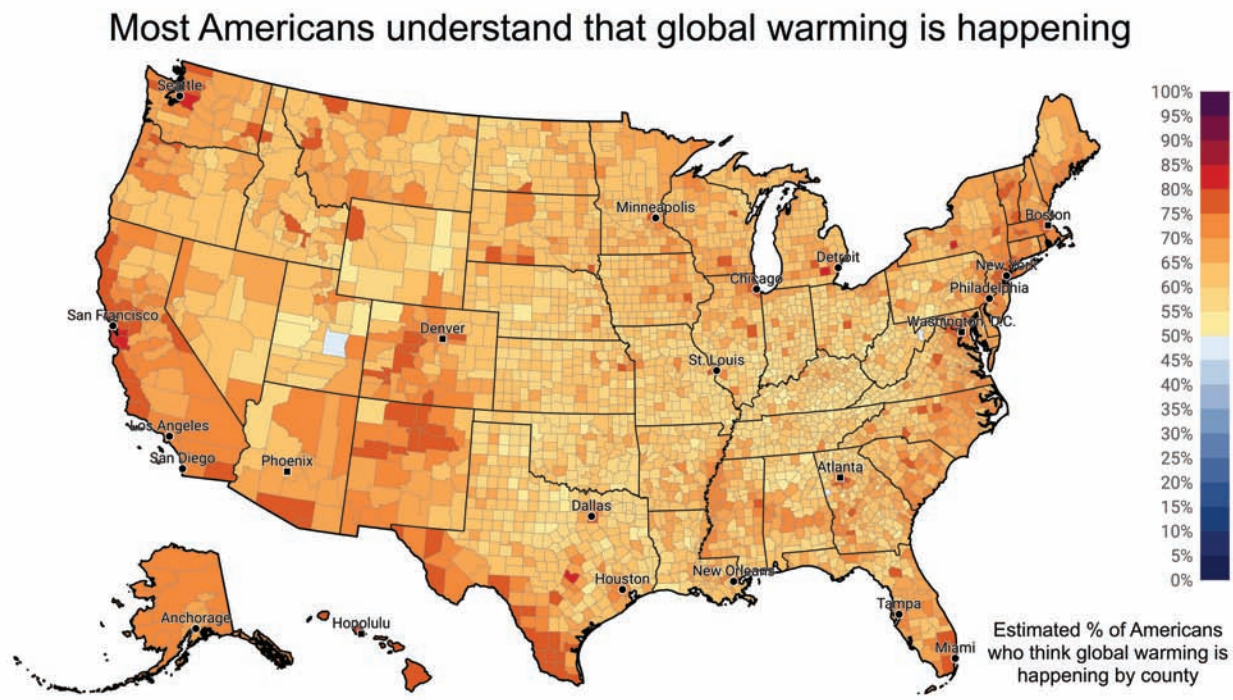
In this article, we examine how the general public in the United States has viewed global warming over the past decade, identifying important trends in public understanding of global warming, their perceptions of the risks, varying degrees of political polarization, and the public’s overall “silence” on the issue. Finally, we discuss how these data can support climate change communication strategies.

Efforts to communicate the realities as well as the social and political challenges of climate change are more likely to succeed when information is tailored to the diversity of views in the American public.<sup>14</sup> For the past decade, the Climate Change in the American Mind (CCAM) research project—twice-yearly nationally representative surveys conducted

jointly by the Yale Program on Climate Change Communication (YPCCC) and the George Mason University Center for Climate Change Communication (Mason 4C)—has sought to measure and understand Americans’ climate change beliefs, attitudes, and behavior, and the psychological, cultural, and political factors that influence them. In addition, YPCCC and Mason 4C aim to share data and tools with the climate change community, including scholars, practitioners, and decision makers, to improve the effectiveness of climate change communication in the United States. Thus, concurrent with this article, we are making CCAM data and an online data exploration tool available to the public.

### Climate Change in the American Mind: Publicly Available Data

The topline results of CCAM have been summarized in many reports and in the Yale Climate Opinion Maps (YCOM). They are used by governments, the news media, companies,



Source: 2018 Yale Climate Opinion Maps.



## Figure 1. Climate Change in the American Mind Items

### Beliefs

1. Global warming is happening
2. Global warming is caused mostly by human activities
3. Most scientists are convinced global warming is happening

### Risk Perceptions

4. Worried about global warming
5. Global warming is already harming people in the US
6. Global warming will harm me personally
7. Global warming will harm people in the US
8. Global warming will harm people in developing countries
9. Global warming will harm future generations
10. Global warming will harm plants and animals

### Support for Policies

11. Fund research into renewable energy sources
12. Regulate carbon dioxide as a pollutant
13. Set strict carbon dioxide limits on existing coal-fired power plants
14. Require utilities to produce 20% electricity from renewable sources

### Information Acquisition and Communication Behaviors

15. Discuss global warming with friends and family
16. Hear about global warming in the media

Source: *Climate Change in the American Mind*.

educators, and advocacy organizations to make strategic decisions and develop communication campaigns, programs, and messages to engage different constituencies.<sup>15</sup>

The publicly released data consist of 17 surveys conducted between 2008 and 2017 with a total of 20,024 American adults aged 18 years and older. The data include responses to 16 questions on global warming beliefs, risk perceptions, policy preferences, and information acquisition and sharing behaviors (see Figure 1), along with demographic and other related questions.<sup>16</sup> The data are weighted to align with U.S. Census parameters and adjusted by sample size to account for the different number of respondents from year to year.

### *Public Understanding of Global Warming Is Improving, but Remains Low*

In 2017, public understanding of fundamental scientific facts—that global warming is happening, that it is human-caused, and that most scientists are convinced that human-caused global warming is happening (i.e., the scientific consensus)—was similar to where it was a decade earlier (see Figure 2). Early in that period, from 2008 to 2011, public understanding dropped sharply. Since then, it has slowly returned to its prior levels. Longitudinal analyses of the initial downward trends from 2008 and 2011 found that the decreases were likely the result of a shift in politi-

*Los Angeles, California—The use of fossil fuels is a major source of carbon pollution that causes global warming. Air pollution is also still considered the leading environmental threat to public health, according to the 2018 Environmental Performance Index.*



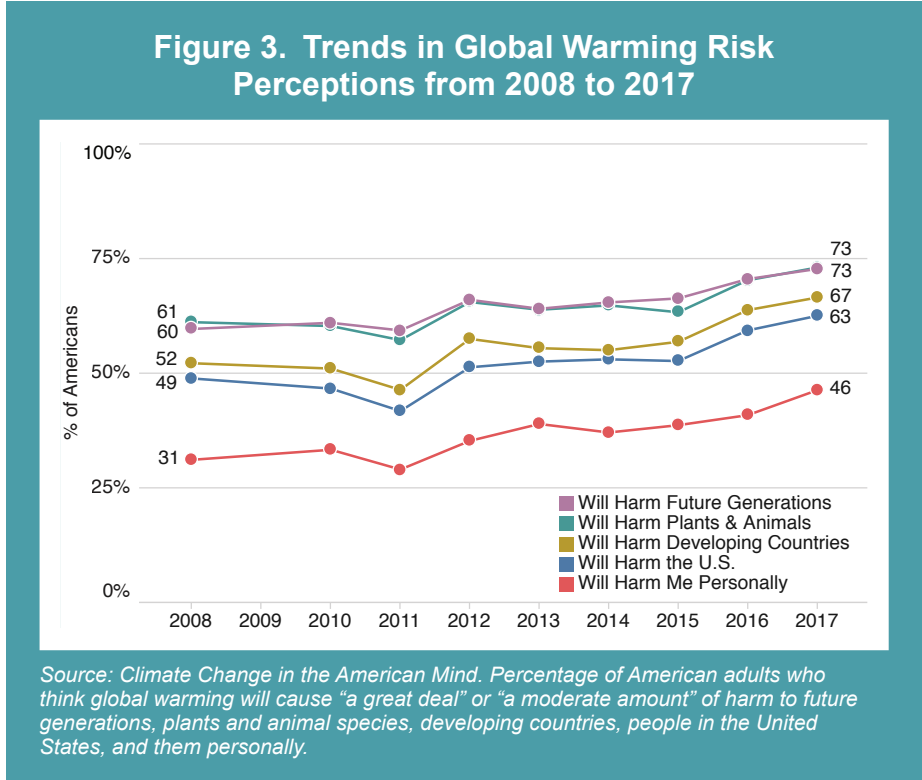
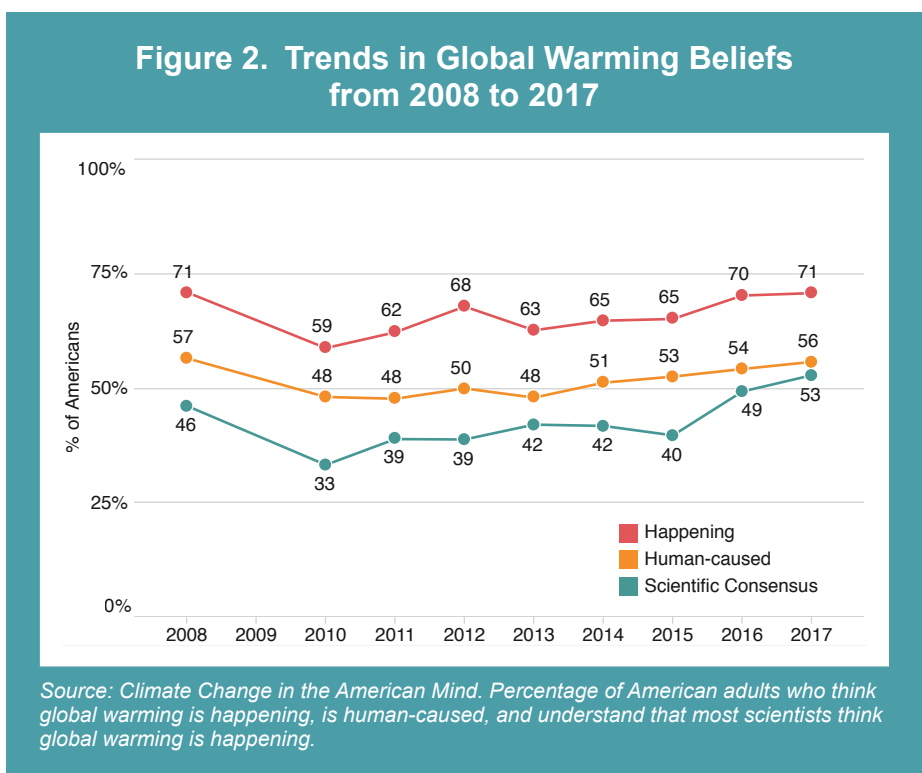
cal elite cues associated with the rise of the Tea Party (e.g., messages from political leaders, increased Congressional attention) rather than the economic recession or unusually cold weather.<sup>17</sup>

By 2017, the majority of Americans (71%) once again said global warming is happening, but just over half said that it is human-caused (56%) or were aware that most scientists are convinced of these facts (53%). Understanding that humans are causing global warming has risen the least over the decade, whereas knowledge of the scientific consensus has increased the most (+20 percentage points since 2010). Although more Americans are aware of the scientific consensus, the proportion still remains relatively low.

### Risk Perceptions Are Increasing, but Perceived Personal Risk Remains Low

Risk perceptions refer to assessments of the extent to which global warming is causing harm now and/or will cause harm in the future to different people and species. Since 2008, Americans' climate change risk perceptions have increased across the board. And as shown in Figure 3, perceptions that global warming will harm future generations and plants and animals (both 73% in 2017) have consistently remained higher than perceptions of personal harm (46%) or harm to people in the United States (63%). Americans report greater risk for people and species more distant in time and space than for themselves or their own localities, supporting previous research.<sup>18</sup>

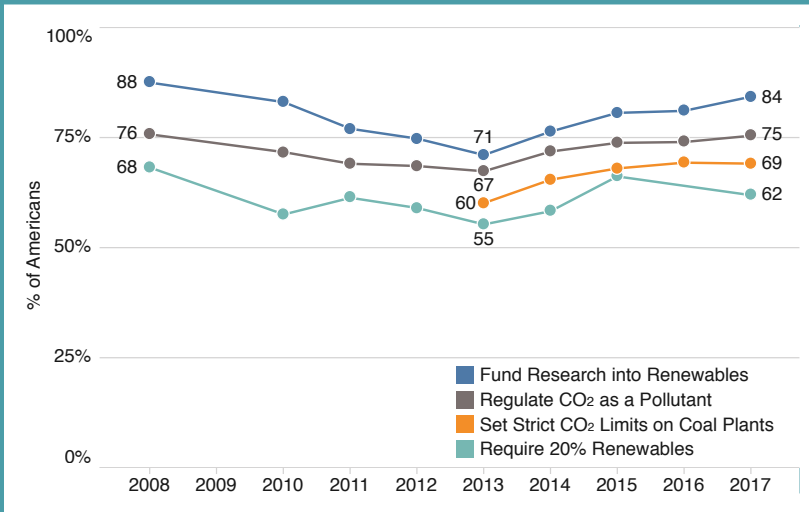
Although not displayed in the figure, worry about global warming—a more affective (as opposed to cognitive) measure of risk perception—follows a similar upward trend, increasing steadily from 51% of Americans in 2010 to 60% in 2017, returning to levels similar to 2008 (62%). Alongside the decline in public understanding from 2008 to 2011,



worry was likely affected by political elite cues, but perhaps by the economic recession as well.<sup>19</sup> At the time of the recession, economic concerns (e.g., fear of losing em-

ployment) might have eclipsed concern about climate change, which may reflect the "finite pool of worry" hypothesis, that increased worry about other issues leads

**Figure 4. Trends in Climate Change Mitigation Policy Support from 2008 to 2017**



Source: *Climate Change in the American Mind*. Percentage of American adults who “strongly” or “somewhat” support climate change mitigation policies.

**Few Americans Discuss Global Warming and Fewer Hear About It in the Media**

In 2008, only 40% of Americans reported occasionally or often discussing global warming with their family and friends, a proportion that fell to 30% in 2013 and rebounded partially to 36% by 2017. Even fewer Americans say they hear about global warming in the media: Fewer than one in four report hearing about it at least once a week (22% in 2015 and 23% in 2017). In other words, most Americans rarely hear or talk about global warming.

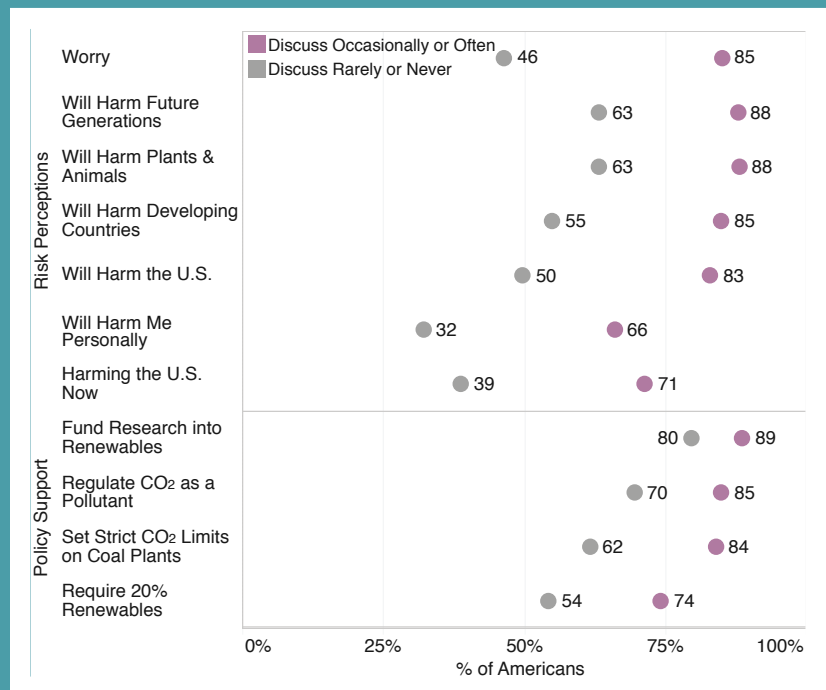
This “climate spiral of silence” has important implications for how people individually and collectively respond to climate change.<sup>22</sup> Previous research finds a positive relationship between discussing global warming and feelings of efficacy about addressing the problem.<sup>23</sup> It is also

to less worry about climate change.<sup>20</sup> An increase in extreme weather over the past few years, including more powerful hurricanes and stronger heat waves and droughts, may also be affecting risk perceptions as more Americans personally experience the impacts associated with climate change.<sup>21</sup>

**Most Americans Support Diverse Mitigation Policies**

Overall, there has been consistently strong public support for several climate change mitigation policies, especially funding research on renewable energy. Although support decreased across all policies from 2008 to 2013, it has risen in recent years, returning to levels comparable to 2008 (see Figure 4). On average, support for funding renewable energy research remains the highest (84% in 2017), followed by support for regulating CO<sub>2</sub> as a pollutant (75%), and setting strict CO<sub>2</sub> limits on coal-fired power plants (69%). Requiring utilities to produce energy from renewable sources has consistently received less support relative to the other three policies, but still has majority support (62%).

**Figure 5a. Global Warming Risk Perceptions and Policy Support by Frequency of Discussing Global Warming with Family and Friends**



Source: *Climate Change in the American Mind*. Risk perceptions and policy support among American adults who “often” or “occasionally” discuss global warming with family and friends compared with those who “rarely” or “never” discuss it (2016-2017).





Kenai Peninsula, Alaska—Glacial melting throughout Alaska has increased over the last few decades and is increasingly contributing to sea-level rise. Glacial thinning in Alaska between the mid-1990s to early 2000s has tripled in rate compared with the 1950s to 1970s time period.

Matthew Bailew

Source: Kenai Fjords National Park Alaska, National Park Service ([www.nps.gov/kefj/learn/nature/climatechangeimpacts.htm](http://www.nps.gov/kefj/learn/nature/climatechangeimpacts.htm)).

**Figure 5b. Global Warming Risk Perceptions and Policy Support by Frequency of Hearing about Global Warming in the Media**



Source: *Climate Change in the American Mind*. Risk perceptions and policy support among American adults who hear about global warming in the media “at least once a week,” “at least once a month,” or “several times a year” versus “once a year or less often” or “never” (2016-2017).

likely that hearing about global warming in the media and talking about it are linked to other beliefs and attitudes about the issue.<sup>24</sup> As shown in Figures 5a and 5b, people who often or occasionally discuss global warming with family and friends consistently have a greater understanding of global warming, higher risk perceptions, and stronger support for mitigation policies than people who rarely or never discuss it.<sup>25</sup> The pattern is similar among people who hear about global warming in the media at least several times a year, as compared to people who rarely hear about it (i.e., never or once a year or less often). In other words, social discourse about global warming is associated with positive attitudes and engagement with the issue. This relationship is also dynamic: People may be more likely to talk about global warming and pay attention to it in the media as they become more concerned and engaged with the issue.<sup>26</sup>

**Political Party and Ideology Divide Americans’ Views on Global Warming**

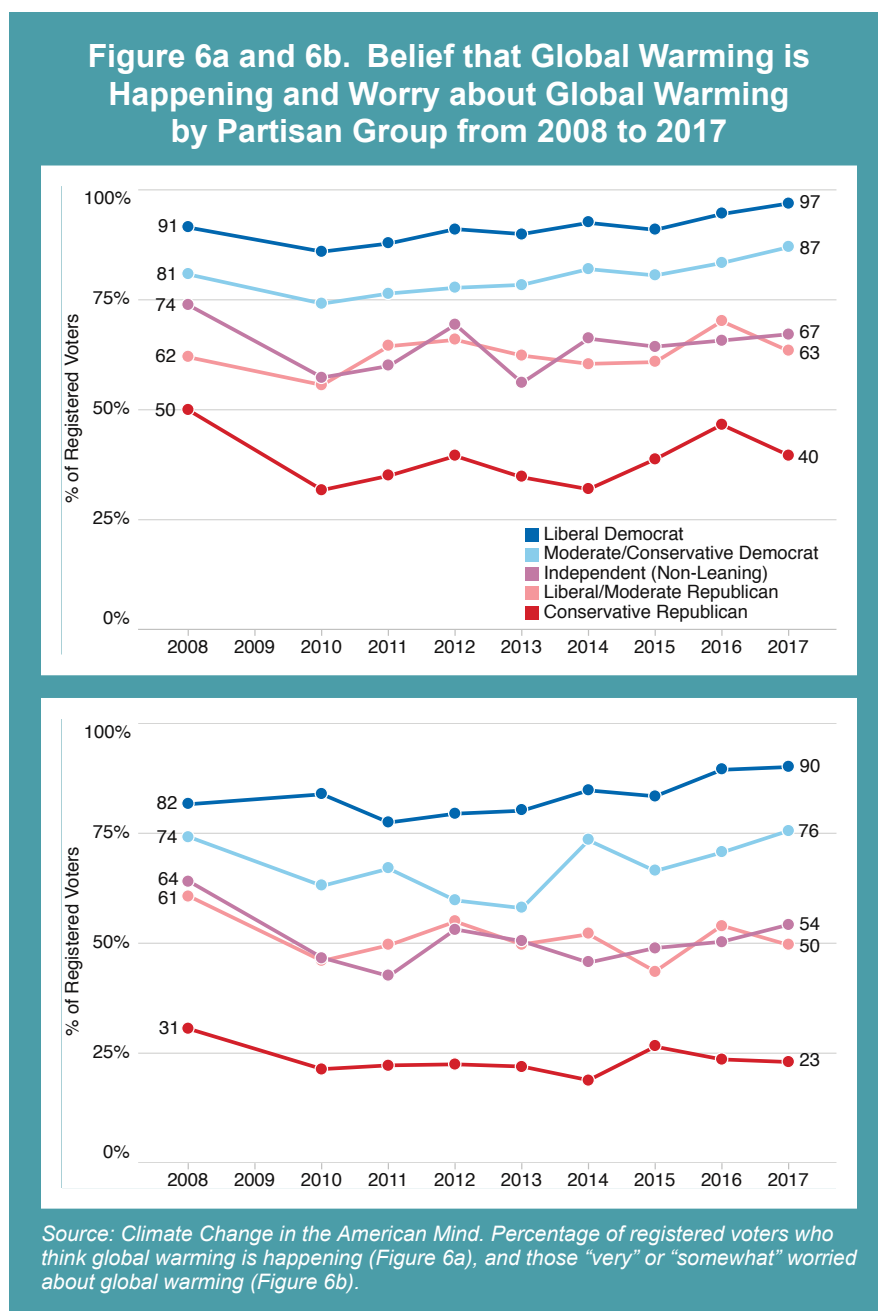
Political party and ideology are key determinants of global warming opin-

ions and can account for some of the observed changes in Americans' beliefs over time.<sup>27</sup> This relationship has also strengthened over time.<sup>28</sup> Deliberate organized climate change denial campaigns by major political, industry, and media leaders (e.g., fossil fuel corporations, conservative media, conservative think tanks) have amplified political polarization, the decline in global warming beliefs in the late 2000s, and distrust in science more generally.<sup>29</sup>

For instance, research on the e-mail hacking scandal of the Climatic Research Unit at the University of East Anglia in November and December of 2009 suggests that the so-called "climategate" event had a significant negative impact on public opinion on global warming and fostered an "erosion of public trust in scientists," especially among conservatives.<sup>30</sup> Political shifts in Congress (i.e., political elite cues) also drove declines from 2008 to 2011. Specifically, the rise of the Tea Party and the Koch brothers' network encouraged denialism in Republican discourse.<sup>31</sup>

Although polarization by political party in the United States is one of the strongest predictors of beliefs and attitudes about climate change, there are important ideological nuances within political parties. Republicans and Democrats can be ideologically moderate or strongly conservative or liberal in their political views. However, there has been an "increasing alignment between party identification and political ideology, with Republicans becoming increasingly conservative and Democrats increasingly liberal."<sup>32</sup> As party affiliation and political ideology align, the impact of partisanship on opinions and behavior becomes stronger. This has been referred to as an effect of "aligned partisan identities," which has important implications for understanding the political polarization of global warming responses.<sup>33</sup>

The CCAM data reveal large differences between Americans with strongly aligned partisan identities, relative to those less ideologically aligned.<sup>34</sup> In comparison to liberal/moderate Republicans, conservative Republicans are



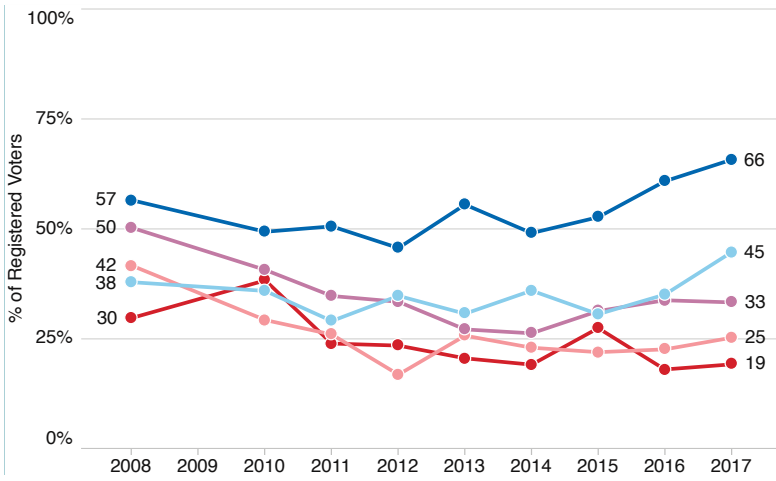
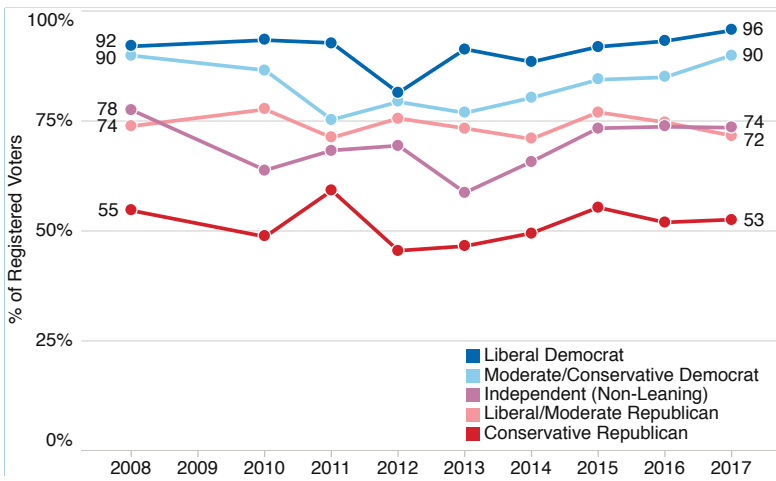
much less convinced global warming is happening, are less worried about it, and are less supportive of climate policies (see Figures 6a, 6b, and 6c).<sup>35</sup> In most cases, liberal/moderate Republicans have views more similar to Independents than to conservative Republicans. In contrast, differences in global warming opinion between moderate/conservative and liberal Democrats are less pronounced. These results suggest that there is generally less ideological

polarization in global warming opinion within the Democratic party than the Republican party.

One divergence from this pattern is the extent to which Republicans and Democrats discuss global warming with their family and friends (see Figure 6d). Liberal Democrats discuss global warming much more frequently than do moderate/conservative Democrats, who talk about it at a rate more comparable to that of Independents. Regardless, the rate at



**Figure 6c and 6d. Support for Regulating CO<sub>2</sub> as a Pollutant and Discussing Global Warming by Partisan Group from 2008 to 2017**



Source: *Climate Change in the American Mind*. Percentage of registered voters who “strongly” or “somewhat” support regulating CO<sub>2</sub> as a pollutant (Figure 6c), and those who “often” or “occasionally” discuss global warming with family and friends (Figure 6d).

cans were less polarized in their climate change beliefs than were Republicans from older generations.<sup>36</sup> We find a similar pattern in the CCAM data (see Figure 7).<sup>37</sup> For instance, Millennial Republicans are more likely than older generations of Republicans to think global warming is happening and human-caused, understand that most scientists agree about human-caused global warming, and worry about global warming. Among Democrats, there is a similar pattern in some beliefs and risk perceptions, but generational differences are not as strong or consistent.

There are also clear generational differences in the extent to which Republicans and Democrats discuss global warming with family and friends and hear about it in the media. Although Millennial Republicans are more likely than older Republicans to think global warming is happening, is human-caused, and perceive it as a serious risk, they are less likely to discuss it with their family and friends, and much less likely to hear about it in the media at least once a week. This pattern is similar among Democrats; in fact, Millennial Democrats and Republicans tend to have similarly low levels of hearing about global warming in the media.

### Implications for Climate Change Communication

Climate Change in the American Mind (CCAM) data can help climate change communicators better understand trends in public opinion, inform their strategies to engage the public, and encourage action across diverse groups of Americans. We find that, although climate change is a highly politicized issue and views starkly differ across different groups of people, public understanding and perception of the problem are generally improving and there is strong bipartisan support for several climate change mitigation policies. The following strategies include some suggestions based on Americans’ responses to climate change observed in our CCAM data.

which Democrats talk about the issue has increased over the past decade, while the rate among Republicans has fallen.

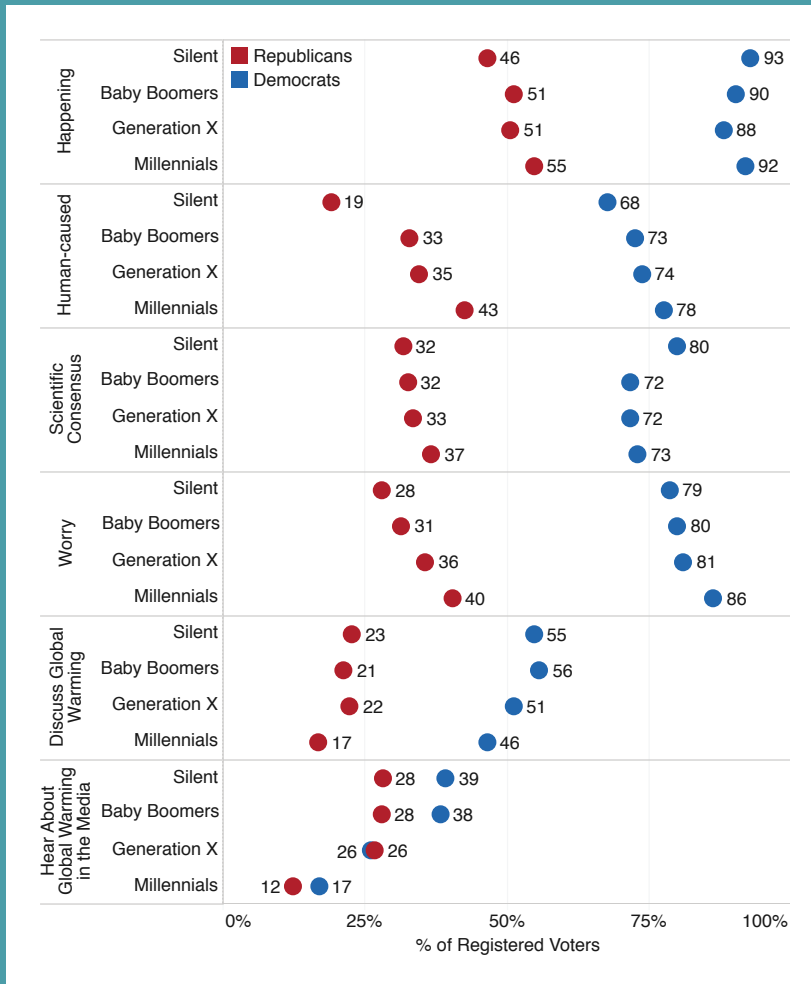
Although there are stark political differences in global warming beliefs and risk perceptions, there is a general social consensus regarding policy preferences. In fact, a large majority of Republicans support several mitigation policies. Further, there is more consensus on supporting research funding for renewable

energy relative to other policies (e.g., regulating CO<sub>2</sub>), and the political divide regarding research funding has been narrowing in recent years.

### Political Party Differences in Opinions and Behaviors Vary Across Generations

A recent 2018 Pew Research Center poll found that Millennial Republi-

**Figure 7. Global Warming Views and Behaviors by Political Party and Generation**



Source: *Climate Change in the American Mind. Views and behaviors of Republican and Democratic registered voters by generational cohort (2016-2017). Percentages for hear about global warming in the media refer to those who say "at least once a week."*

### Facilitate Interpersonal Dialogue to Break the Silence, Promote Social Norms, and Enhance Climate Literacy

Interpersonal communication about climate change, such as conversation among family and friends, is integral to raising awareness and enhancing personal engagement in the issue.<sup>38</sup> We find that while most Americans are worried about the problem, two-thirds rarely or never talk about it with their family or friends. Consequently, most Americans are likely unaware that many of their

friends and family members are also concerned about climate change and support many policy solutions, leading to social misperceptions and self-silencing.<sup>39</sup> In fact, people tend to “grossly overestimate the numbers of people who reject the existence of climate change in the broader community.”<sup>40</sup> Together, these social dynamics and misperceptions promote a self-reinforcing “spiral of silence” where people do not discuss climate change because they think others do not care about it.<sup>41</sup> Ultimately, the climate spiral of silence impedes public engagement because interpersonal in-

teraction and awareness of social consensus are instrumental to public recognition and collective action.<sup>42</sup> Our data support this: People who rarely or never discuss global warming with their family and friends are consistently less likely than people who frequently or occasionally discuss it to think global warming is happening, perceive it as a risk, and support mitigation policies. The same is true for people who rarely hear about the issue in the media relative to those who hear about it more frequently.

Increased interpersonal conversation and positive media coverage, therefore, have the potential to enhance public understanding that climate change beliefs are common (i.e., descriptive norms) and that other people also support action (i.e., injunctive norms), which in turn can strengthen individual pro-climate beliefs and social norms over time.<sup>43</sup> The more people hear others—especially family and friends—talk about their concerns about climate change (including support for climate change mitigation policy), the more awareness and concern will spread through people’s social networks and foster broader engagement on the issue.<sup>44</sup> Indeed, a meta-analysis of 42 interventions aimed at increasing pro-environmental behavior found that the most effective social influence strategy used opinion leaders to spread information through their social networks.<sup>45</sup>

The consensus that humans are responsible for current global warming is well established in climate science.<sup>46</sup> Yet only half of American adults understand this, and only half know that most scientists think that global warming is happening (see Figure 2). Moreover, only about one in five know that more than 90% of climate scientists are convinced that human-caused warming is happening.<sup>47</sup> Communicating the scientific consensus has been found to be a gateway to public understanding that global warming is happening and human-caused, which in turn promotes support for taking climate action.<sup>48</sup> Conversations and communication that address these misperceptions may also help to reverse the climate spiral of silence by improving

public understanding of the issue and, in turn, giving individuals greater confidence in their ability to express their views about the topic.<sup>49</sup>

Repetition is also important in making conversations and messages have a lasting impact. Given the complex media environment in the United States, including the active dissemination of misinformation (e.g., confusing people about the scientific consensus regarding human-caused climate change), attitudinal changes can be short-lived.<sup>50</sup> However, people can be effectively “inoculated” against false information with explanations that some groups are intentionally working to cast doubt on the scientific facts.<sup>51</sup> Message repetition reminds people of the correct information while building their resistance to the false messages they may encounter.

Educators should encourage Americans to discuss climate change, and re-

searchers could support educators’ efforts with field experiments assessing the effectiveness of various strategies for increasing interpersonal communication. Recently, The Nature Conservancy developed a “Can We Talk Climate?” guide based on CCAM findings.<sup>52</sup> For instance, many people report that they do not discuss global warming because they feel they do not know enough about it.<sup>53</sup> According to The Nature Conservancy, one way to begin the conversation is to connect climate change to personal experiences and shared values.<sup>54</sup> Museums and other educational centers, including zoos and aquariums, can also educate the public about climate change, break the climate silence, and help visitors understand how they can take individual and collective action.<sup>55</sup>

Campaigns to break climate silence might also focus on understanding and

reaching out to specific groups who may have unique communication habits and needs. For example, Millennials are less likely than older generations to discuss global warming and hear about it in the media, suggesting that different strategies are needed to start the conversation among younger Americans.

### *Localize and Personalize Climate Issues*

While public global warming risk perceptions have increased substantially in recent years, the percentage of Americans who view global warming as a personal and local threat remains low. This is not surprising, given that people often perceive climate change as a distant, abstract problem and have a limited understanding of nature’s cause-and-effect processes.<sup>56</sup> When people view climate change as an abstract issue dis-



*A march in Washington, D.C., in support of funding for science and scientific research.*



**The more people hear others—especially family and friends—talk about their concerns about climate change ... the more awareness and concern will spread through people's social networks and foster broader engagement on the issue.**

tant in time and space, as opposed to a concrete issue with visible impacts, they feel less threatened or responsible.<sup>57</sup> Experience can be a powerful teacher, but in light of the widespread conflation of weather and climate change, political partisans can misinterpret a single weather event as evidence for their point of view, such as Senator James Inhofe (R-Oklahoma) bringing a snowball to the Senate floor in February 2015 as evidence that climate change is not occurring.<sup>58</sup> Personal experience of extreme events, such as hurricanes or flooding, connected to climate change can elevate risk perceptions, policy support, and pro-environmental behavior.

<sup>59</sup> Currently, the effects of personal experience on climate change opinions in the United States are relatively small, but as extreme weather increases in frequency and severity, the effects of personal experience may grow as well.<sup>60</sup> Personal experiences also have the strongest impact on climate change beliefs among the least engaged segments of the American population.<sup>61</sup> Among communities most vulnerable to climate change, emphasizing the inequities associated with the impacts of climate change may also promote engagement, given that perceiving one's group to be at a disadvantage motivates collective action.<sup>62</sup>



iStock/Manny Chavez

*More people across the globe are personally feeling the effects of global warming. In the United States, wildfires have been increasing in duration and frequency since the 1980s. The effects of global warming will increase the likelihood of more intense and longer lasting wildfire seasons, threatening human life, health, and well-being. Source: Union of Concerned Scientists.*

Thus, interventions can focus on conveying local climate information and risks to increase public understanding that climate change is happening here and now.<sup>63</sup> For example, Climate Matters is a reporting resources program that applies this strategy by producing localized analyses of climate impacts (e.g., extreme heat events) and climate solutions (e.g., solar energy potential) for use by TV weathercasters and other journalists in their locally focused reporting.<sup>64</sup>

### **Focus on Solutions as Societal Gains**

Our data indicate that support for policies that mitigate global warming is relatively high and has increased in recent years. However, support for funding renewable energy research is higher than support for regulatory policies. Climate change solutions are typically framed in public and scientific discourse as societal losses, resulting from carbon taxes and corporate regulations, and “loss” frames may not be as conducive to public support relative to “gain” frames focusing on the benefits of action.<sup>65</sup>

More attention to and conversation about the co-benefits to society provided by climate policies and other climate solutions—especially those that accrue in the near versus the distant future (e.g., clean air and water, public health benefits, economic growth, technological advancements)—are likely to promote enhanced public and political will in support of those policies. Hopeful emotions, which may be activated during discussions of solutions, are also predictive of greater support for climate policy.<sup>66</sup>

### **Know Your Audience**

Political views remain strong determinants of climate change opinions. Although climate change beliefs, as well as risk perceptions and policy support, have all increased in recent years, conservative Republicans remain outliers relative to other Americans. This has important implications for how to engage different political groups to promote climate change attitudes and

behaviors. A number of promising strategies are discussed in the following.

Republicans and conservatives may be skeptical of climate change, in part, because some proposed solutions to the problem, such as more government regulation, conflict with their ideological views (i.e., solution aversion).<sup>67</sup> For example, Republicans who read about a free-market solution to reducing climate change (leading the market in green technology) were much more likely than Republicans who read about a restrictive policy solution (setting greenhouse gas emission policies) to accept climate science, think that climate change is happening and human-caused, and believe that people can reduce climate change.<sup>68</sup> In fact, the free-market solution frame “produced striking and dramatic effects: reducing or entirely erasing ideological line differences in environmental skepticism and shift rates of agreement nearly 40%.” Focusing on economic solutions as societal gains and engaging the ideological views of Republicans and conservatives may help decrease climate change denialism and foster attitude change.

Messages that capitalize on the moral values of ingroup loyalty, authority and respect, and purity might also particularly resonate with the moral concerns of conservatives.<sup>69</sup> A recent study finds that appeals to these moral values, such as communicating that environmental protection is “a matter of obeying authority, defending the purity of nature, and demonstrating one’s patriotism to the United States,” have an especially positive effect on the environmental attitudes and behaviors of conservatives.<sup>70</sup>

Interventions might also attempt to shift perceptions of how other conservative or Republican ingroup members view climate change. According to social identity processes, people who share the same political views or identities can have a strong influence on each other’s climate opinions.<sup>71</sup> A recent study of political support for a carbon tax suggests that perceptions of how much fellow party members supported the tax weighed heavily in both Democrats’ and Republicans’ decisions to support it.<sup>72</sup>

Helping Republicans, especially moderate Republicans, understand that many other party members think climate change is happening and/or support climate policy (i.e., that those are the group norms) might help shift opinions and attenuate polarization within this group.

Furthermore, partisan alignment is a particularly important factor because those with strong partisan identities are more likely to take political action and vote.<sup>73</sup> Because there is more variation in climate opinions among Republicans, and conservative Republicans tend to skew the opinions of the party as a whole, there are opportunities for communicators to engage moderate Republicans by bolstering their pro-climate views and support for climate policy. For example, republicEn is an organization of (“EcoRight”) Republicans who are convinced that climate change is happening and believe that free-market policies—like a revenue-neutral carbon tax—should be implemented to address it.<sup>74</sup> Organized groups such as these can strengthen the pro-climate views of Republicans and raise public awareness that Republicans also desire solutions to climate change. Efforts might also particularly focus on younger (e.g., Millennial) Republicans who hold more positive attitudes toward climate change mitigation policies than older generations of Republicans.<sup>75</sup> This may be especially important given that we find Millennials (both Republicans and

**More attention to and conversation about the co-benefits to society provided by climate policies and other climate solutions—especially those that accrue in the near versus the distant future ... —are likely to promote enhanced public and political will in support of those policies.**

Democrats) are less engaged in climate change discourse compared to their older counterparts.

There are other important cultural factors beyond the partisan gap that also deserve further attention.<sup>76</sup> For example, nationally representative surveys find that Latino Americans are more engaged with global warming than are non-Latinos, and Latinos are more likely to think human-caused global warming is happening, perceive greater risk, and support climate policies.<sup>77</sup> Given that Latinos currently represent 17% of the American population and are growing as a demographic group, efforts might focus on engaging Latino communities, as well as other racial/ethnic minorities and demographic groups (e.g., the poor) that are disproportionately impacted by climate change.<sup>78</sup>


## Using Climate Change in the American Mind Data for Research and Program Planning


Climate Change in the American Mind (CCAM) data are available for researchers, journalists, educators, and policymakers. The data are currently being used in the Yale Climate Opinion Maps (YCOM), which reveal the diversity of American opinion nationwide.<sup>79</sup> The interactive maps allow visitors to explore public opinion at the state, congressional district, metropolitan, and county levels. In 2017, *The New York Times* used the maps to depict climate change opinions across congressional districts and the extent to which Republican views vary geographically.<sup>80</sup> The National Oceanic and Atmospheric Administration (NOAA) and Climate Literacy & Energy Awareness Network (CLEAN) also recommend the interactive maps for educators and students to promote climate literacy.<sup>81</sup> Likewise, educators and advocates might use the maps to promote the broad consensus on climate change solutions as a way to foster pro-climate norms. *The New York Times* also recently used the maps to show that the majority of Ameri-


cans agree on climate change policies—a trend that is often overlooked in the present context of extreme political partisanship in the United States.<sup>82</sup>


The publicly available data described here provide tools to understand how the diverse U.S. population views and responds to climate change. As we highlight in this article, public opinion about climate change is shifting in a positive direction, and there are important trends to consider when developing communication campaigns. Together, these research insights can support the efforts of climate change communicators to further engage Americans in climate change solutions.


### ORCID

Matthew T. Ballew  <https://orcid.org/0000-0002-2939-4969>


Anthony Leiserowitz  <https://orcid.org/0000-0001-5349-409X>


Connie Roser-Renouf  <https://orcid.org/0000-0002-1110-1187>

Seth A. Rosenthal  <https://orcid.org/0000-0003-0950-2261>

John E. Kotcher  <https://orcid.org/0000-0003-4789-1384>

Jennifer R. Marlon  <https://orcid.org/0000-0002-8299-9609>

Matthew H. Goldberg  <https://orcid.org/0000-0003-1267-7839>

Edward Maibach  <https://orcid.org/0000-0003-3409-9187>

**Matthew T. Ballew**, a postdoctoral associate at the Yale Program on Climate Change Communication (YPCCC), specializes in social psychology. **Anthony Leiserowitz**, director of YPCCC and a senior research scientist at the Yale University School of Forestry & Environmental Studies, is an expert in climate change opinion and communication. **Connie Roser-Renouf**, retired associate research professor at the George Mason University Center for Climate Change Communication (Mason 4C), is an expert in climate change opinion and communication. **Seth A. Rosenthal**, project director at YPCCC, specializes in survey and experimental methodology. **John E. Kotcher**, research assistant professor at Mason 4C, specializes in science, environmental, and risk communication. **Jennifer R. Marlon**, a research scientist at YPCCC, is an expert in geography and data modeling. **Erik Lyon**, social data scientist at YPCCC, specializes in energy economics and data analytics. **Matthew H. Goldberg**, a postdoctoral associate at YPCCC, specializes in social psychology. **Edward W. Maibach**, director of Mason 4C and professor at George Mason University, is an expert in climate change opinion and communication.

The Climate Change in the American Mind project is supported by the 11th Hour Project, the Energy Foundation, the Grantham Foundation for Protection of the Environment, the TomKat Foundation, and the MacArthur Foundation.

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

© 2019 The Authors. Published with license by Taylor & Francis Group, LLC.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way.

### NOTES

1. Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (IPCC, Geneva, Switzerland, 2014), <http://www.ipcc.ch/report/ar5/syr/> (accessed 17 October 2018).

2. U.S. Department of Defense, *Quadrennial Defense Review* (Washington, DC, 2014).

3. IPCC, note 1, page 13.

4. A. Leiserowitz, E. Maibach, S. Rosenthal, J. Kotcher, M. Ballew, M. Goldberg, and A. Gustafson, *Climate Change in the American Mind: December 2018* (Yale University and George Mason University, New Haven, CT: Yale Program on Climate Change Communication, 2018), <http://climatecommunication.yale.edu/publications/climate-change-in-the-american-mind-december-2018/> (accessed 7 March 2019).

5. E. Maibach, "Increasing Public Awareness and Facilitating Behavior Change: Two Guiding Heuristics," in L. Hannah and T. Lovejoy, eds., *Climate Change and Biodiversity*, second edition (New Haven, CT: Yale University Press, in press). See also E. U. Weber and P. C. Stern, "Public Understanding of Climate Change in the United States," *American Psychologist* 66 (2011): 315–28.

6. Weber and Stern, note 5. See also Leiserowitz et al., note 4.

7. Leiserowitz et al., note 4.

8. M. Mildemberger, and D. Tingley, "Beliefs About Climate Beliefs: The Importance of Second-Order Opinions for Climate Politics," *British Journal of Political Science* (2017): 1–29.

9. Mildemberger and Tingley, note 8.

10. Ipsos Public Affairs, *Reuters/Ipsos Data: Core Political (06/07/2017)* (Paris, France: Ipsos, 2018), <https://www.ipsos.com/en-us/news-polls/reuters-ipsos-core-political-2017-06-07> (accessed 17 October 2018).

11. Pew Research Center, *Economic Issues Decline Among Public's Policy Priorities* (Washington DC: Pew Research Center, 2018), <http://www.people-press.org/2018/01/25/economic-issues-decline-among-publics-policy-priorities/> (accessed 17 October 2018).

12. R. E. Dunlap, A. M. McCright, and J. H. Yarosh, "The Political Divide on Climate Change: Partisan Polarization Widens in the US," *Environment: Science and Policy for Sustainable Development* 58 (2016): 4–23. See also R. J. Brulle, J. Carmichael, and J. C. Jenkins, "Shifting Public Opinion on Climate Change: An Empirical Assessment of Factors Influencing Concern Over Climate Change in the US, 2002–2010," *Climatic Change* 114 (2012): 169–88.

13. P. S. Hart and E. C. Nisbet, "Boomerang Effects in Science Communication: How Motivated Reasoning and Identity Cues Amplify Opinion Polarization About



Climate Mitigation Policies," *Communication Research* 39 (2012): 701–23.

14. C. Roser-Renouf, N. Stenhouse, J. Rolfe-Redding, E. Maibach, and A. Leiserowitz, "Message Strategies for Global Warming's Six Americas," in A. Hansen and R. Cox, eds., *The Routledge Handbook of Environment and Communication* (New York, NY: Routledge, 2015), pp. 368–86.

15. Yale Program on Climate Change Communication, *Yale Climate Opinion Maps*, <http://climatecommunication.yale.edu/visualizations-data/ycom-us-2018/?est=happening&type=value&geo=county> (accessed 17 October 2018).

16. Yale Program on Climate Change Communication (YPCCC) and George Mason University Center for Climate Change Communication (Mason 4C), "Climate Change in the American Mind: National Survey Data on Public Opinion (2008–2017) [dataset]," Open Science Framework (2019), [doi: 10.17605/OSF.IO/W36GN], <https://osf.io/w36gn/> (accessed 26 March 2019). Visit the link for the data set, codebook, and detailed information on sampling and survey methodology. Percentage points are rounded to the nearest whole number. Not all questions were asked in every wave. The following items were not asked in the following waves: knowledge of scientific consensus (October 2015); risk perception that global warming will harm plants and animals (October 2015); support for requiring utilities to produce at least 20% of their electricity from renewables (October 2015, March and November 2016, and June 2017); support for regulating CO<sub>2</sub> (May 2011); support for setting strict CO<sub>2</sub> limits on coal power plants (2008–2012 waves; asked only for half of the sample in December 2013—these data were not included in the 2013 percentages); and frequency of hearing about global warming in the media (2008–2014 waves; November 2016). Other variables in the data beyond those discussed in this article include gender, race, income, education, age, and region. To view the interactive data visualization tool, visit <https://climatecommunication.yale.edu/visualizations-data/americans-climate-views/> (accessed 26 March 2019).

17. M. Mildemberger and A. Leiserowitz, "Public Opinion on Climate Change: Is There an Economy–Environment Tradeoff?" *Environmental Politics* 26 (2017): 801–24. See also Brulle et al., note 12.

18. A. A. Leiserowitz, "American Risk Perceptions: Is Climate Change Dangerous?," *Risk Analysis: An International Journal* 25 (2005): 1433–42.

19. J. T. Carmichael and R. J. Brulle, "Elite Cues, Media Coverage, and Public Concern: An Integrated Path Analysis of Public Opinion on Climate Change, 2001–2013," *Environmental Politics* 26 (2017): 232–52.

20. E. U. Weber, "What Shapes Perceptions of Climate Change?," *Wiley Interdisciplinary Reviews: Climate Change* 3 (2010): 338.

21. A. Spence, W. Poortinga, and N. Pidgeon, "The Psychological Distance of Climate Change," *Risk Analysis: An International Journal* 32 (2012): 957–72. See also K. Akerlof, E. W. Maibach, D. Fitzgerald, A. Y. Cedeno, and A. Neuman, "Do People 'Personally Experience' Global Warming, and If So How, and Does it Matter?," *Global Environmental Change* 23 (2013): 81–91.

22. E. Noelle-Neumann, "The Theory of Public Opinion: The Concept of the Spiral of Silence," *Annals of the International Communication Association* 14 (1991): 256–87. See also E. Maibach, A. Leiserowitz, S. Rosenthal, C. Roser-Renouf, and M. Cutler, *Is There a Climate 'Spiral of Silence' in America: March 2016* (Yale University and George Mason University, New Haven, CT: Yale Program on Climate Change Communication, 2016), <http://climatecommunication.yale.edu/wp-content/uploads/2016/09/Climate-Spiral-Silence-March-2016.pdf> (accessed 17 October 2018).

23. N. Geiger, J. K. Swim, and J. Fraser, "Creating a Climate for Change: Interventions, Efficacy and Public Discussion About Climate Change," *Journal of Environmental Psychology* 51 (2017): 104–16.

24. L. Feldman, T. A. Myers, J. D. Hmielowski, and A. Leiserowitz, "The Mutual Reinforcement of Media

Selectivity and Effects: Testing the Reinforcing Spirals Framework in the Context of Global Warming," *Journal of Communication* 64 (2014): 590–611.

25. In Figures 5a and 5b, percentages refer to those "Very" or "Somewhat worried" about global warming; thinking that global warming will harm plants and animals, future generations, developing countries, the United States, and you personally "A great deal" or "A moderate amount"; and "Strongly" or "Somewhat" supporting policies.

26. Feldman et al., note 24.

27. M. J. Hornsey, E. A. Harris, P. G. Bain, and K. S. Fielding, "Meta-Analyses of the Determinants and Outcomes of Belief in Climate Change," *Nature Climate Change* 6 (2016): 622–26.

28. Dunlap et al., note 12.

29. R. E. Dunlap and A. M. McCright, "Organized Climate Change Denial," in J. S. Dryzek, R. B. Norgaard, and D. Schlosberg, eds., *The Oxford Handbook of Climate Change and Society* (Oxford, UK: Oxford University Press, 2011), pp. 144–60.

30. A. A. Leiserowitz, E. W. Maibach, C. Roser-Renouf, N. Smith, and E. Dawson, "Climategate, Public Opinion, and the Loss of Trust," *American Behavioral Scientist* 57 (2013): 818–37.

31. Mildemberger and Leiserowitz, note 17.

32. Dunlap et al., note 12, page 15.

33. L. Mason, "I Disrespectfully Agree: The Differential Effects of Partisan Sorting on Social and Issue Position," *American Journal of Politics* 59 (2015): 131.

34. See also A. Leiserowitz, E. Maibach, S. Rosenthal, J. Kotcher, M. Goldberg, M. Ballew, A. Gustafson, and P. Bergquist, *Politics & Global Warming: December 2018* (Yale University and George Mason University, New Haven, CT: Yale Program on Climate Change Communication, 2019), <http://climatecommunication.yale.edu/publications/politics-global-warming-december-2018/> (accessed 7 March 2019).

35. Analyses by political party and political ideology include only registered voters. Respondents were categorized as Democrats if they self-identified as a Democrat or reported that they were Independents or "Other" who also think of themselves "as closer to the Democratic party," whereas those who self-identified as a Republican or said that they think of themselves "as closer to the Republican party" were categorized as Republican. Following this, Democrats were categorized as "Liberal Democrats" if they said they are "Very" or "Somewhat" liberal, or "Conservative/Moderate Democrats" if they said they are "Moderate, middle of the road" or "Very" or "Somewhat" conservative. Similarly, Republicans who self-reported that they are "Very" or "Somewhat" conservative were categorized as "Conservative Republicans," whereas those who said they are "Moderate, middle of the road" or "Very" or "Somewhat" liberal were categorized as "Liberal/Moderate Republicans." The category "Independents" includes respondents who identified as "Independent" or "Other" and further said "Neither" when asked if they consider themselves closer to the Democratic or Republican party.

36. C. Funk and M. Hefferon, *Many Republican Millennials Differ with Older Party Members on Climate Change Energy Issues* (Washington DC: Pew Research Center, 2018), <http://www.pewresearch.org/fact-tank/2018/05/14/many-republican-millennials-differ-with-older-party-members-on-climate-change-and-energy-issues> (accessed 17 October 2018).

37. Generational cohorts follow Pew Research Center's categorizations of birth year (1928–1945: Silent; 1946–1964: Baby Boomers; 1965–1980: Generation X; 1981–1996: Millennials). Visit <http://www.pewresearch.org/topics/millennials> for more details. As described in note 35, references to Republicans and Democrats throughout include respondents who initially identify as either a Republican or Democrat, as well as those who do not initially identify as Republicans or Democrats but who say they "are closer to" one party or the other (i.e., "leaners") in a follow-up question. The category "Independents" does not include any of these "leaners." Per-

centages in Figure 7 refer to the proportion of registered Republican and Democratic voters in each generational cohort who think global warming is happening, human-caused, and that most scientists think global warming is happening, are "Very" or "Somewhat" worried about global warming, "Often" or "Occasionally" discuss global warming with family and friends, and hear about global warming in the media "at least once a week."

38. N. Geiger and J. K. Swim, "Climate of Silence: Pluralistic Ignorance as a Barrier to Climate Change Discussion," *Journal of Environmental Psychology* 47 (2016): 79–90.

39. Ibid.

40. Z. Leviston, I. Walker, and S. Morwinski, "Your Opinion on Climate Change Might Not Be as Common as You Think," *Nature Climate Change* 3 (2013): 1.

41. Maibach et al., note 22.

42. S. Heald, "Climate Silence, Moral Disengagement, and Self-Efficacy: How Albert Bandura's Theories Inform Our Climate-Change Predicament," *Environment: Science and Policy for Sustainable Development* 59 (2017): 4–15.

43. R. B. Cialdini, R. R. Reno, and C. A. Kallgren, "A Focus Theory of Normative Conduct: Recycling the Concept of Norms to Reduce Littering in Public Places," *Journal of Personality and Social Psychology* 58 (1990): 1015–26.

44. Geiger and Swim, note 38.

45. W. Abrahamse and L. Steg, "Social Influence Approaches to Encourage Resource Conservation: A Meta-Analysis," *Global Environmental Change* 23 (2013): 1773–85.

46. J. Cook, N. Oreskes, P. T. Doran, W. R. Anderegg, B. Verheggen, E. W. Maibach, ... and K. Rice, Consensus on Consensus: A Synthesis of Consensus Estimates on Human-Caused Global Warming," *Environmental Research Letters* 11 (2016): 048002.

47. Leiserowitz et al., note 4.

48. S. L. van der Linden, A. A. Leiserowitz, G. D. Feinberg, and E. W. Maibach, "The Scientific Consensus on Climate Change as a Gateway Belief: Experimental Evidence," *PLoS ONE* 10 (2015): e0118489.

49. N. Geiger, B. Middlewood, and J. Swim, "Psychological, Social, and Cultural Barriers to Communicating About Climate Change," in M. C. Nisbet, S. S. Ho, E. Markowitz, S. O'Neill, M. S. Schäfer, and J. Thaker, eds., *The Oxford Encyclopedia of Climate Change Communication: Vol. 3* (Oxford, UK: Oxford University Press, 2017), pp. 312–28.

50. S. van der Linden, A. Leiserowitz, S. Rosenthal, and E. Maibach, "Inoculating the Public Against Misinformation About Climate Change," *Global Challenges* 1 (2017): 1600008.

51. J. Cook, S. Lewandowsky, and U. K. Ecker, "Neutralizing Misinformation Through Inoculation: Exposing Misleading Argumentation Techniques Reduces Their Influence," *PLoS ONE* 12 (2017): e0175799.

52. The Nature Conservancy, *Can We Talk Climate*, <https://www.nature.org/en-us/what-we-do/our-priorities/tackle-climate-change/climate-change-stories/can-we-talk-climate> (accessed 17 October 2018). See also J. Twedt, *Climate Conversations*, <http://www.judytwedt.com/climate-conversations.html> (accessed 8 November 2018).

53. Leiserowitz et al., note 4.

54. The Nature Conservancy, note 52.

55. J. K. Swim, N. Geiger, J. Fraser, and N. Pletcher, "Climate Change Education at Nature-Based Museums," *Curator: The Museum Journal* 60 (2017): 101–19.

56. Leiserowitz, note 18.

57. Spence et al., note 21.

58. Communication with the public might emphasize personal experiences, through narratives, scenarios, and recall, to promote engagement, according S. van der Linden, E. Maibach, and A. Leiserowitz, "Improving Public Engagement with Climate Change: Five 'Best Prac-

65. "Insights From Psychological Science," *Perspectives on Psychological Science* 10 (2015): 758–63. However, beliefs and ideology can shape perceptions of personal experiences with global warming and, thus, bias responses to experiences; see P. D. Howe and A. Leiserowitz, "Who Remembers a Hot Summer or a Cold Winter? The Asymmetric Effect of Beliefs About Global Warming on Perceptions of Local Climate Conditions in the U.S.," *Global Environmental Change* 23 (2013): 1488–500.

59. Personal experience with extreme weather events linked to climate change predicts risk perceptions; see S. van der Linden, "On the Relationship Between Personal Experience, Affect and Risk Perception: The Case of Climate Change," *European Journal of Social Psychology* 44 (2014): 430–40. Personal experience also predicts policy support, according to L. Rudman, M. C. McLean, and M. Bunzl, "When Truth Is Personally Inconvenient, Attitudes Change: The Impact of Extreme Weather on Implicit Support for Green Politicians and Explicit Climate-Change Beliefs," *Psychological Science* 24 (2013): 2290–96. See also A. Spence, W. Poortinga, C. Butler, and N. F. Pidgeon, "Perceptions of Climate Change and Willingness to Save Energy Related to Flood Experience," *Nature Climate Change* 1 (2011): 46–49; and J. R. Marlon, S. van der Linden, P. D. Howe, A. Leiserowitz, S. L. Woo, and K. Broad, "Detecting Local Environmental Change: The Role of Experience in Shaping Risk Judgments About Global Warming," *Journal of Risk Research* (2018): 1–15.

60. E. U. Weber, "Experience-Based and Description-Based Perceptions of Long-Term Risk: Why Global Warming Does Not Scare Us (Yet)," *Climatic Change* 77 (2006): 103–20.

61. T. A. Myers, E. W. Maibach, C. Roser-Renouf, K. Akerlof, and A. A. Leiserowitz, "The Relationship Between Personal Experience and Belief in the Reality of Global Warming," *Nature Climate Change* 3 (2013): 343–47.

62. Perceptions of group-based inequities can spur collective action; see M. Van Zomeran, T. Postmes, and R. Spears, "Toward an Integrative Social Identity Model of Collective Action: A Quantitative Research Synthesis of Three Socio-Psychological Perspectives," *Psychological Bulletin* 134 (2008): 504–35. See also A. R. Pearson, M. T. Ballew, S. Naiman, and J. P. Schuldt, "Race, Class, Gender and Climate Change Communication," in M. C. Nisbet, S. S. Ho, E. Markowitz, S. O'Neill, M. S. Schäfer, and J. Thaker, eds., *The Oxford Encyclopedia of Climate Change*

*Communication: Vol. 3* (Oxford, UK: Oxford University Press, 2017), pp. 349–74.

63. C. Jones, D. W. Hine, and A. D. Marks, "The Future is Now: Reducing Psychological Distance to Increase Public Engagement with Climate Change," *Risk Analysis* 37 (2017): 331–41.

64. Climate Central, *Climate Matters*, <http://media.library.climatecentral.org> (accessed 17 October 2018).

65. van der Linden et al., note 58. See also P. G. Bain, M. J. Hornsey, R. Bongiorno, and C. Jeffries, "Promoting Pro-Environmental Action in Climate Change Deniers," *Nature Climate Change* 2 (2012): 600–3.

66. N. Smith and A. Leiserowitz, "The Role of Emotion in Global Warming Policy Support and Opposition," *Risk Analysis* 34 (2014): 937–48.

67. T. H. Campbell and A. C. Kay, "Solution Aversion: On the Relation Between Ideology and Motivated Disbelief," *Journal of Personality and Social Psychology* 107 (2014): 809–24.

68. *Ibid.*, page 821.

69. J. Graham, J. Haidt, and B. A. Nosek, "Liberals and Conservatives Rely on Different Sets of Moral Foundations," *Journal of Personality and Social Psychology* 96 (2009): 1029–46.

70. C. Wolsko, H. Ariceaga, and J. Seiden, "Red, White, and Blue Enough to Be Green: Effects of Moral Framing on Climate Change Attitudes and Conservation Behaviors," *Journal of Experimental Social Psychology* 65 (2016): 7.

71. A. M. Bliuc, C. McGarty, E. F. Thomas, G. Lala, M. Berndsen, and R. Misajon, "Public Division About Climate Change Rooted in Conflicting Socio-Political Identities," *Nature Climate Change* 5 (2015): 226–29.

72. P. J. Ehret, L. Van Boven, and D. K. Sherman, "Partisan Barriers to Bipartisanship: Understanding Climate Policy Polarization," *Social Psychological and Personality Science* (2018): 1948550618758709.

73. Mason, note 33.

74. republicEn, <http://www.republicen.org> (accessed 17 October 2018).

75. See also Funk and Hefferon, note 36.

76. A. R. Pearson and J. P. Schuldt, "Bridging Climate Communication Divides: Beyond the Partisan Gap," *Science Communication* 37 (2015): 805–12.

77. A. Leiserowitz, M. Cutler, and S. Rosenthal, *Climate Change in the Latino Mind: May 2017* (New Haven, CT: Yale University, Yale Program on Climate Change Communication, 2017), <https://climatecommunication.yale.edu/wp-content/uploads/2017/09/Climate-Change-Latino-mind-May-2017.pdf> (accessed 17 October 2018). See also A. R. Pearson, J. P. Schuldt, R. Romero-Canyas, M. T. Ballew, and D. Larson-Konar, "Diverse Segments of the US Public Underestimate the Environmental Concerns of Minority and Low-Income Americans," *Proceedings of the National Academy of Sciences* (2018): 1–6.

78. National Research Council, *Adapting to the Impacts of Climate Change* (Washington, DC: National Academies Press, 2010) <https://www.nap.edu/catalog/12783/adapting-to-the-impacts-of-climate-change> (accessed 17 October 2018).

79. P. D. Howe, M. Mildenerger, J. R. Marlon, and A. Leiserowitz, "Geographic Variation in Opinions on Climate Change at State and Local Scales in the USA," *Nature Climate Change* 5 (2015): 596–603. See also M. Mildenerger, J. Marlon, P. D. Howe, and A. Leiserowitz, "The Spatial Distribution of Republican and Democratic Climate Opinions at State and Local Scales," *Climatic Change* 145 (2017): 539–48. See note 15 for URL.

80. Public opinion across congressional districts: N. Poppovich, J. Schwartz, and T. Schlossberg, "How Americans Think About Climate Change, in Six Maps," *The New York Times*, 21 March 2017, <https://www.nytimes.com/interactive/2017/12/14/climate/republicans-global-warming-maps.html> (accessed 17 October 2018). Republican opinion across the United States: N. Poppovich and L. Albeck-Ripka, "How Republicans Think About Climate Change—In Maps," *The New York Times*, 14 December 2017, <https://www.nytimes.com/interactive/2017/12/14/climate/republicans-global-warming-maps.html> (accessed 17 October 2018).

81. National Oceanic and Atmospheric Administration (NOAA), *Yale Climate Opinion Maps—U.S. 2016*, <https://www.climate.gov/teaching/resources/yale-climate-opinion-maps-us-2016> (accessed 17 October 2018).

82. N. Poppovich, "Where Americans (Mostly) Agree on Climate Change Policies, in Five Maps," *The New York Times*, 1 November 2018, <https://www.nytimes.com/interactive/2018/11/01/climate/climate-policy-maps.html> (accessed 2 November 2018).

Contact SALLY WRIGHT  
to advertise in

Environment

Phone: 540/454-6746

or E-mail: [wrightssallyb@gmail.com](mailto:wrightssallyb@gmail.com)