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Climate Change: US Public Opinion

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Abstract

A review of research findings and polling data about Americans' attitudes on climate change reveals a lack of meaningful long-term change in mass opinion. Instead, the structure of Americans' attitudes toward belief in climate change's existence, concern about its consequences, and demand for policy response is similar to that regarding many other issues in contemporary US politics: stability in aggregate opinion that masks partisan and ideological polarization enhanced by communications from elites. But features of the climate change problem elicit some distinctive determinants of opinion, including individuals' trust in science, risk processing, and personal experience. Although our review of the literature and data leaves us skeptical that majority opinion will spur elected officials anytime soon to undertake the costly solutions necessary to tackle this problem comprehensively at the national level, we identify several avenues by which attitudes might promote less substantial but nevertheless consequential policy action.

INTRODUCTION

Acknowledged by scientists and public affairs experts to be among the most challenging and troubling policy problems of our times, climate change is an issue about which the US public claims to be broadly aware. But despite an overwhelming scientific consensus about climate change's causes and consequences, Americans remain divided over whether the problem even exists—and more so over what should be done to fix it. The public's level of concern about climate change has not risen meaningfully over the past two decades, and addressing the problem with government action ranks among one of the lowest priorities for Americans.

Here we review the relatively scant literature in political science on Americans' attitudes about climate change, supplementing it with findings from psychology, sociology, communication studies, and other disciplines. We also provide an overview of opinion data on the multiple dimensions of belief, concern, and policy support in order to assess the evolution of the public's response to this issue during a period of rapidly expanding scientific knowledge. Our review focuses on opinion, not behavior, and therefore does not address research on political participation related to climate change or personal actions aimed at reducing climate impact.

Both the literature and the data support the disheartening conclusion that US public opinion—and the deadlocked American political structure more generally—is as deeply polarized on climate change as it is on other issues. The abstract, scientific nature of the issue amplifies the effect of elite-driven polarization on mass attitudes. But unlike many other issues, polarization has not yielded much of a constituency for action on climate change. Even liberals and Democrats who accept climate change science and express concern about global warming's effects rank the problem well below many other national priorities. This combination of polarization and low salience creates little incentive for national policy makers to advance major legislation to tackle the problem comprehensively. However, opportunities do exist for attitudes to motivate policy makers to take less substantial but still consequential actions as Americans begin to link climate change to extreme weather events and as states and localities respond to demands from their constituencies for better protection from climate change–related harm.

THE NATURE OF CLIMATE CHANGE AS A PUBLIC ISSUE

The geological record shows that for hundreds of thousands of years, greenhouse gases have played a vital role in trapping the sun's heat in the Earth's atmosphere, warming the planet's temperatures to levels needed for habitation by animal and plant life. But with the advent of the Industrial Revolution, emissions of greenhouse gases (including carbon, methane, and nitrogen) increased dramatically owing to human activities such as the extraction and generation of energy, farming and deforestation, manufacturing, and transportation. The concentration of these gases in the atmosphere has now reached levels unprecedented in Earth's history.

The concern that these increased levels of greenhouse gases are magnifying warming effects, disrupting normal weather patterns, and leading toward catastrophic consequences first came to broad public attention in 1988. That year, NASA scientist James E. Hansen testified before the US Senate that the warming caused by pollutants in the atmosphere that had been predicted by climate scientists had already begun. Nearly 30 years later, global surface temperatures are at their highest levels on record, having increased by 1.3°F to 1.9°F since the beginning of the twentieth century. Should greenhouse gas emissions proceed at unabated levels, by 2100 temperatures throughout most of the United States are projected to increase by another 7°F to 9°F (Melillo et al. 2014). Rising temperatures will reduce the habitability of the Earth's tropical zone and other regions, threaten food supplies and production, and increase the spread of disease. Within the United

States, other important impacts will include reduced water storage in lakes and snowpack, increased frequency and extremity of severe weather patterns such as floods and droughts, and rising sea levels that pose a danger to coastal populations.

Two broad categories of policy solutions have emerged to address the problem. The first is a set of interventions designed to mitigate the production of greenhouse gases with the goal of slowing and eventually halting the advance of climate change. The second is a set of strategies to adapt to the effects of climate change with the goal of reducing the damages caused in the present and future. (An additional approach, which proposes to employ climate engineering to remove carbon dioxide from the atmosphere, is only just beginning to receive attention from policy makers.) Several aspects of the climate change problem pose particularly difficult challenges to enacting an adequate policy response (Victor 2011, Bernauer 2013). Reducing greenhouse gas emissions is a classic example of the tragedy of the commons, where individual actors and states have little incentive to act alone to lessen their depletion of a global collective good. Both emission reduction and adaptation require the expenditure of up-front costs that, if successful, will stave off never-to-be-experienced long-term damage—policy for which election-oriented politicians can easily foresee receiving blame instead of credit. When these considerations are added to the fact that climate change cannot be solved by the market alone, the problem is put on a collision course with the phenomenon of American political polarization and the country's deep divide over the proper scope of government intervention.

Climate change also is an unusual issue in the realm of domestic public opinion. This review highlights three distinctive features of the issue. First and most fundamentally, there is disagreement about whether there exists any problem at all. Most other issues that polarize Americans have some level of common understanding about a societal ill—be it gun deaths, poverty, or unplanned pregnancies—even if there are strong divisions about whether and how government should be involved in fixing it. In the case of climate change, debates over policy have long been secondary to challenges to the basic science about the problem. Second is the invisibility of climate change and the uncertainty in attributing specific events and weather patterns to the broader phenomenon. In contrast to many other issues, people's understanding of the problem relies on expert opinion more than their own personal experiences or images they see portrayed in the media. Third is the idea of climate change as a distant phenomenon—occurring in the future and perhaps far away, with effects most severe in places outside the United States. Combined, the invisibility and distance create doubt about who might be at risk from global warming. Serious policy initiatives to address the problem would impose substantial costs throughout the population, and few Americans imagine themselves as beneficiaries of that investment.

AMERICANS' ATTITUDES IN THE AGGREGATE

Pollsters began asking Americans about global warming intermittently in the early 1980s, when the public dialogue—and therefore most opinion questions—referred to the problem as the “greenhouse effect.” A search of the Roper Public Opinion Archives finds the earliest such survey conducted in March 1981, shortly after the release of a report from outgoing President Jimmy Carter's Council on Environmental Quality warning about the effects of a buildup of carbon dioxide in the atmosphere (Opinion Research Corporation 1981). The poll showed that Americans were largely ignorant about the problem at that time. Only 38% said they had heard or read anything at all about the greenhouse effect. When this subset was asked what they thought was its cause, only half were willing to venture a guess. Nevertheless, nearly two-thirds of all respondents gamely said they were at least “somewhat concerned” about the greenhouse effect—a problem about which, just moments before, many had said they had never heard anything.

Trends in Attitudes and Current Public Opinion

The themes addressed in that first climate change survey have been revisited many times in opinion polls conducted during the 35 years since. The issue's rising prominence has been reflected in the frequency of this polling, while the language used to describe the problem in survey items has gradually changed; the prevalence of the terms "global warming" and "climate change" surpassed "greenhouse effect" in poll questions around the turn of the twenty-first century. Most survey questions have focused on the four goals of ascertaining (*a*) Americans' awareness and knowledge about climate change, (*b*) the extent to which they believe it is occurring, (*c*) their level of concern about the problem and the priority they attach to it, and (*d*) their support for particular types of policy response. A number of high-quality surveys (compiled by Bowman et al. 2016) have fielded consistently worded questions on these topics over the years, making it possible to assess how opinion has changed over time. Trends for several of these questions are displayed in **Figure 1**.

As we would expect for a problem that was previously unknown to most Americans, survey respondents' self-reported familiarity with climate change has grown steadily over time, with the share of the public professing to understand the issue rising from a bare majority in the early 1990s to roughly 4 in 5 Americans today (**Figure 1a**). But awareness of the issue does not translate into

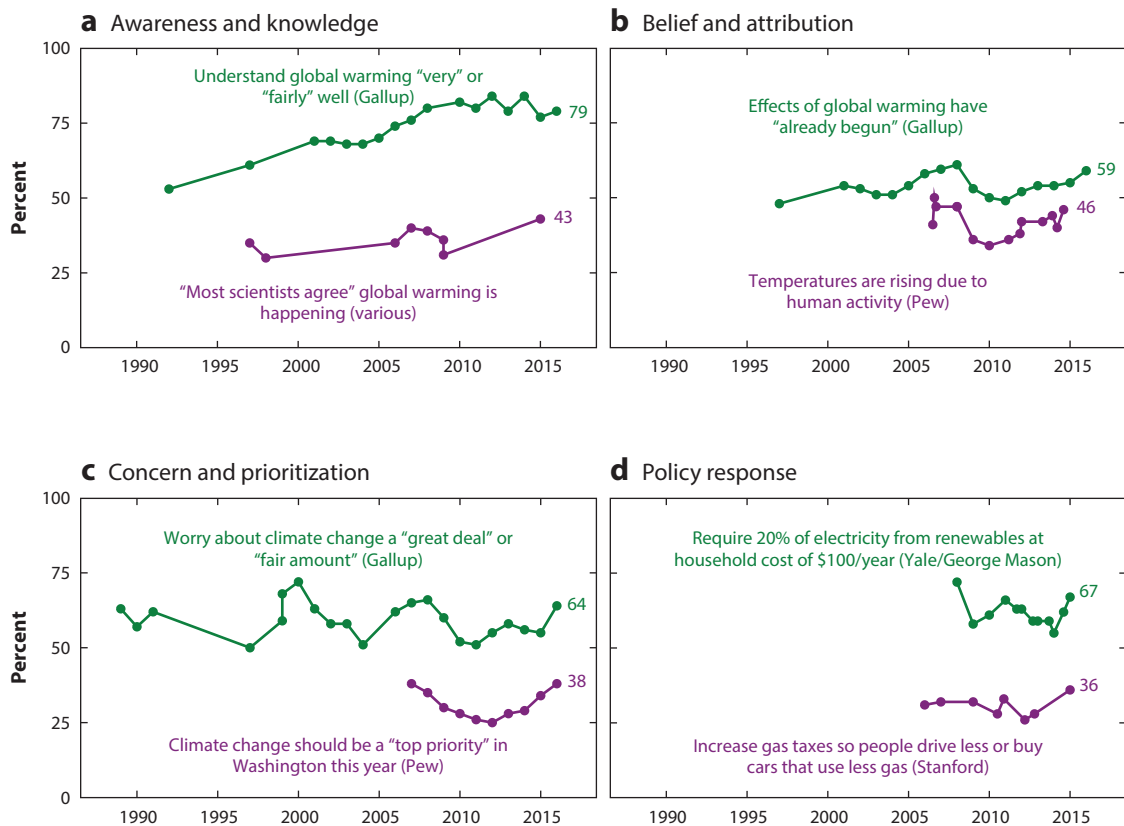


Figure 1

Trends in American public opinion on climate change, 1989–2016. Source: Survey data compiled by Bowman et al. (2016).

having factual knowledge about it, as less than a majority of Americans recognize that scientists overwhelmingly agree that climate change is happening. There remains substantial division in people's own beliefs about whether global warming effects have already begun, despite exposure to decades of messages from policy makers, scientists, and advocates (**Figure 1b**). Even among those who acknowledge the reality of global warming, many do not attribute it to human causes; the US public's acceptance of the existence of anthropogenic climate change hovers at present around a bare majority. Notably, there is no evidence of consistent long-term movement in public opinion toward a belief in human-caused global warming.

Similar trends are found in levels of concern about climate change. The oldest public opinion time-series on global warming comes from Gallup, which since 1989 has asked people how much they worry about climate change as part of an annual survey on the environment (**Figure 1c**). Concern among the public is currently well below its high-water mark, which was recorded in 2000. Over time, fears about global warming have consistently been ranked lower than worries about other environmental problems—including pollution, water supply, and even species extinction and rainforest loss (Saad & Jones 2016)—and lower than concerns about almost all nonenvironmental problems (McCarthy 2016). Closely related to Americans' concern about climate change is the extent to which they believe the problem should be prioritized by policy makers. Prioritization in an annual survey conducted by the Pew Research Center hit an all-time high in 2016, but this masks two other pertinent facts: Recent levels represent recovery from a substantial decline in prioritization, and climate change still ranks consistently near the bottom of the nation's priorities. Although 38% of Americans thought climate change should be a “top priority” for Washington lawmakers in 2016, this placed the problem 16th out of 18 issues presented by Pew to survey respondents—lower than other abstract, hard-to-understand problems such as the budget deficit (named by 56% as a “top priority”) and tax reform (45%) (Pew Research Center 2016).

Measuring support for public policies designed to combat climate change is difficult because a full-fledged explanation of policies' benefits and costs can be lengthy—and therefore hard to present on an opinion survey. Polls tend to find the public's support for climate change initiatives to be quite high when questions are worded without explicit mention of potential costs, for example asking about support for tax breaks and government spending on the development of renewable fuels (Bowman et al. 2016, pp. 81–94). In contrast, Americans generally dislike climate change policies that would require raising their taxes, although support is higher when the payment is framed in terms of a generic “cost” (**Figure 1d**) or a tax on business. In either case, aggregate opinion on proposed policies has moved little over time. Furthermore, even the survey questions that address costs most explicitly still understate what would likely be the effective household price of a comprehensive national policy that substantially reduced greenhouse gas emissions. Overall, what the public thinks about policy response is probably the aspect of climate change opinion about which we know the least. This is partly because the proposed initiatives are complex and diverse and partly because the frames attached to different policy options have a strong effect on survey responses. These challenges complicate the interpretation of public opinion as registered in polls on climate change policies.

To put US opinion in context, consider Americans' attitudes on global warming alongside those of citizens of other nations. Global surveys fielded by Pew in 2015 found that the United States lags far behind countries in Latin America and Africa in the share of its citizens expressing concern about global warming. Levels of concern in the United States are also lower than in most European democracies, but the differences are more modest. A strong negative relationship exists between a nation's level of climate change concern and its carbon emissions per capita, a measure on which the United States is among the global leaders (Stokes et al. 2015).

Explaining Aggregate Opinion Trends

The data in **Figure 1** suggest three stylized facts about aggregate trends in US climate change opinion. First, global warming concern, belief, prioritization, and policy attitudes tend to move together. Sophisticated analyses confirm that overtime opinion movement on climate change has been strongly correlated across survey questions and polling organizations (Brulle et al. 2012). However, it is difficult to decipher the causal order in opinion formation. For example, intuition suggests that belief in global warming's existence should generate support for policy response. But some experimental work has found just the opposite: Disliked policies can in fact motivate skepticism about climate science (Campbell & Kay 2014).

Second, **Figure 1** shows that many measures of climate change concern peaked between 2006 and 2008 and declined thereafter. Scholarly work indicates that the rise is attributable in part to the release of the film *An Inconvenient Truth* in 2006, featuring former Vice President Al Gore, and his being awarded the Nobel Prize for Peace for his anti-global warming advocacy in 2007. These events coincided with several other developments in the electoral, judicial, and state policy-making landscapes to increase media attention to climate change (Boykoff 2007), which was followed by a rise in concern about the problem (Brulle et al. 2012). As for the subsequent decline in Americans' concern, scholars have presented persuasive evidence that the arrival of the Great Recession in 2008 was an important contributing factor (Brulle et al. 2012, Scruggs & Benegal 2012). This is one of many respects in which opinion on climate change is similar to attitudes on general environmental issues, which also have been shown to move in response to economic indicators such as unemployment and inflation rates (Guber 2013).

Third, as we write this in 2016, some of the trends in **Figure 1** are currently at or near historical national highs, hinting at the possibility of a development in American public opinion yet to be reflected in scholarly research. Upticks in opinion in many recent surveys are congruent with the notion that we may be witnessing a resurgence in the extent to which the public views climate change as a serious threat. We note that this change in opinion is concurrent with a recovering economy and with a recent increase in media coverage devoted to the issue (Andrews et al. 2016). Only time will tell whether this movement will persist.

National-level aggregates mask a great deal of heterogeneity in attitudes across states and localities. Subnational opinion covaries with these jurisdictions' demographics and political leanings (Howe et al. 2015). Less clear is whether people who live in places more vulnerable to the harmful effects of climate change are any more concerned than those in other locales. With respect to opinion trends, data limitations at the subnational level generally inhibit our ability to examine long time-series. In two states where similar questions have been asked repeatedly—California (a 2006–2015 series on climate change's threat to the state's future) and New Hampshire (a 2010–2015 series on climate change belief)—aggregate opinion has not changed meaningfully over time, consistent with national trends (Baldassare et al. 2015, Hamilton et al. 2015).

INDIVIDUAL CORRELATES OF ATTITUDES

Turning to individual-level opinion, attitudes about climate change divide less clearly along demographic lines than for many other policy areas—perhaps reflecting that unlike many other public problems, the population affected by climate change is diffuse and difficult to define. Vulnerability to climate change risks—a function of both geography and personal circumstances—is widely dispersed across the population, and many who experience climate change consequences do not attribute them as such. It is little surprise, then, that Americans' opinions on the issue are shaped as strongly by their risk perceptions and experiences with the weather as they are by

personal characteristics. As we discuss further below, all of these predictors pale in comparison to the political covariates of partisanship and ideology.

Demographics

The demographic characteristics that most strongly and consistently predict climate change attitudes after controlling for partisanship are gender and religiosity. Myriad studies have shown that women express higher levels of belief and concern about the problem than men do (O'Connor et al. 1999, Leiserowitz 2006, Brody et al. 2008, McCright & Dunlap 2011, Egan & Mullin 2012), consistent with well-established findings that women are more risk averse than men (Slovic 1999). Fewer studies include measures of religiosity in their analyses, but those that do consistently find less belief and urgency about climate change among more religious adults, especially within certain denominations (McCright & Dunlap 2011, Egan & Mullin 2012, Arbuckle and Konisky 2015). Findings for other personal characteristics that are often associated with policy attitudes—race, age, education, and income—are mixed. Although some research finds more resistance to the concept of climate change among whites and older Americans, in many other studies these relationships are not evident. Some of these mixed findings can be attributed to inconsistency in the attitudinal predispositions that are included in published models. Most of the research on individual-level differences in climate change attitudes controls for political preference through partisanship or ideology. But many studies take the additional step of including indicators of environmental preferences or interest group participation that, unsurprisingly, are very strongly associated with climate change opinion and are arguably its effect rather than its cause. Even taking into account these different approaches to model specification, however, demographics account for surprisingly little of the variation in how people perceive this problem.

Risk Perceptions

More influential are psychological factors related to how individuals process risk. Because climate change is an abstract and distant phenomenon, and individuals do not have experiences that can be attributed to it with certainty, the cognitive frameworks we use to process information have important bearing on the perceptions we form (Weber 2010). Scholars have given particular attention to cultural orientations, showing that worldviews related to social relationships (a hierarchical versus egalitarian orientation, for example) are strongly associated with perceptions of the problem (Leiserowitz 2006, Kahan et al. 2012, Hornsey et al. 2016). In the absence of direct personal experience, people also rely on information provided by others. Trust in scientists and climate change policy elites therefore is also an important predictor of climate change belief, concern, and policy support (Lubell et al. 2007, Malka et al. 2009). But even in this domain, politics intercedes. Because climate change has become one of the most visible science-related political issues, it is now difficult to unravel the causal order between perceptions of scientists and stances on climate change itself (Leiserowitz et al. 2013).

Personal Experience and Vulnerability to Climate Change

Although uncertainty prevails in attaching any individual experience to climate change, those who are less familiar with the science and the politics surrounding the problem still are likely to form judgments based on the readily available information that comes from daily life. Typically, the most accessible experience that is perceived to be relevant is exposure to local temperature. Temperature is a low-quality source of information about the problem, but one that the public

strongly associates with climate change (Borick & Rabe 2014). Across observational and laboratory studies, results consistently show a positive relationship between exposure to warmer temperatures and higher levels of global warming belief (Joireman et al. 2010, Egan & Mullin 2012, Deryugina 2013, Shao et al. 2014, Zaval et al. 2014). The effect is substantively large, rivaling those of gender and religiosity, but it is of short duration—even following pronounced exposure during a heat wave (Egan & Mullin 2012). Experience with short-term weather conditions appears not to alter deep-seated judgments about climate risks but instead offers a readily available, salient point of information to use in forming question responses. Consequently, its effect can be counteracted by prompting respondents to consider longer-term weather trends (Druckman 2015).

Although local weather conditions are an important factor in explaining variation in individuals' reported climate change beliefs, we would expect them to influence aggregate opinion only in the rare case of a single weather pattern dominating the nation's population centers around the time of a survey. It is possible that lasting change in attitudes will be produced not by variable short-term temperatures but instead by exposure to extreme, memorable events such as floods, drought, and severe storms. Research analyzing the effects of individual weather-related events indicates that they can produce a substantively meaningful, though often short-lived, shift in people's climate change concerns (Konisky et al. 2016).

THE DOMINANT INFLUENCE OF PARTISAN POLARIZATION

Although demographics, cultural predispositions, and personal experiences all contribute to individual perceptions and attitudes about climate change, far more influential—and with more profound implications for aggregate opinion—is the role of political predispositions. Where measures of partisanship or political ideology are included in models of individual opinion, they typically dominate all other relationships. Results in the United States are clear and consistent: Democrats and liberals are substantially more likely to believe the science about human-caused climate change, to express concern about its effects, and to support policy action, than are Republicans and conservatives. Partisan divisions on the issue are not limited to the United States: A meta-analysis of 25 polls and 171 studies in 156 countries showed that identification with conservative parties and ideology strongly and consistently predicted climate change skepticism across political settings (Hornsey et al. 2016).

Partisanship as a Moderating Variable

Accounting for the influence of political predispositions is critical for understanding other forces on climate change opinion. This may seem intuitive to political scientists, but scholarship coming from other disciplines has not always considered how politics shapes public perceptions of the issue. For example, extensive work in science communication has focused on testing the “deficit model,” which attributes skepticism about climate change science to a lack of information. Improve people's understanding of science, this model suggests, and the public's beliefs about climate change will come closer to reflecting established science on the issue. Early work testing the relationship between knowledge and climate change beliefs failed to find support for the model. More recent research suggests an explanation: Political leanings moderate the effect of information on climate change belief. A series of studies has shown that education, self-rated knowledge, and science comprehension are positively related to belief among Democrats and liberals, whereas the relationship for Republicans and conservatives is weak or even negative (Malka et al. 2009, McCright & Dunlap 2011, Guber 2013, Hamilton et al. 2015, Kahan 2015). Based on these

findings, providing more information to climate skeptics will do little to lead them to belief, and it may even backfire.

Polarization in opinion also is important to consider when evaluating the potency of messages about climate change. Scholars have dedicated considerable attention to measuring the effectiveness of communicating with different frames, including dire messages (Feinberg & Willer 2011); information about local impacts (Wiest et al. 2015), public health (Myers et al. 2012), or high levels of public concern (Wood & Vedlitz 2007); and arguments based on norms and science (Bolsen et al. 2014) or self-interest and morality (Albertson & Busby 2015). They also have examined how policy support responds to the provision of information about scientific consensus (van der Linden et al. 2015) and about specific details of institutional and policy design (Bechtel & Scheve 2013, Tingley & Tomz 2013). These studies vary in the extent to which they examine whether partisans differ in how they process information. Many who have searched for partisan contrasts have uncovered them, typically finding that frames move opinion more for Republicans and conservatives than for Democrats and liberals (Hardisty et al. 2009, Gromet et al. 2013). For example, question-wording experiments have shown that “global warming” is more polarizing than “climate change” because Republicans respond more negatively to the former term than the latter (Villar & Krosnick 2010, Schuldt et al. 2015). Some studies have shown evidence of a boomerang effect, in which any frame communicating the negative impacts of climate change reduces Republican support for mitigation policy (Hart & Nisbet 2012, Zhou 2016).

It is unsurprising that people should interpret frames through a partisan lens, because opinion formation on climate change may be particularly susceptible to motivated reasoning, in which people selectively process new information to reach a preordained conclusion that reinforces their beliefs (Kunda 1990, Kahan 2015). The complex scientific content of the climate change issue can make it difficult for individuals to form their own judgments about the accuracy of climate science or the potential impacts of climate policy, leading most to look to partisan elites for information about the quality of evidence and the likely effects of policy proposals. Moreover, because climate change impacts are perceived as psychologically, geographically, and temporally distant, people think their personal stakes in the issue are low, and they have little motivation to be accurate in their conclusions. These conditions make it more likely that people will demonstrate a bias in favor of information that supports their prior opinions. They are less critical in accepting arguments and evidence that confirm preexisting attitudes, and they discount information that challenges their beliefs. Partisan bias affects not only reasoning; political scientists have shown it also distorts Americans’ beliefs about objective facts regarding public affairs (Bartels 2002, Jerit & Barabas 2012). Consistent with this line of research, studies have found ideology and partisanship to have strong effects on perceptions of objective conditions related to recent temperature, hurricane strength, and exposure to drought and floods, even when controlling for actual local conditions (Goebbert et al. 2012, Shao et al. 2017).

Polarization Over Time

As is the case for most other issues in American politics, opinion on global warming has become increasingly polarized across partisan and ideological lines since the 1990s (Krosnick et al. 2000, McCright & Dunlap 2011, Guber 2013). The trend for climate change is particularly stark because attitudes at the beginning of this period were characterized by quite low degrees of polarization. This is illustrated by analyzing two of the Gallup time-series discussed above (in **Figure 1b** and **c**) by respondents’ partisan identification. As shown in **Figure 2a**, Americans of all partisan orientations consistently expressed a similar amount of worry about global warming in surveys administered in 1989, 1990, and 1991. But by 1997, concern had dropped sharply among

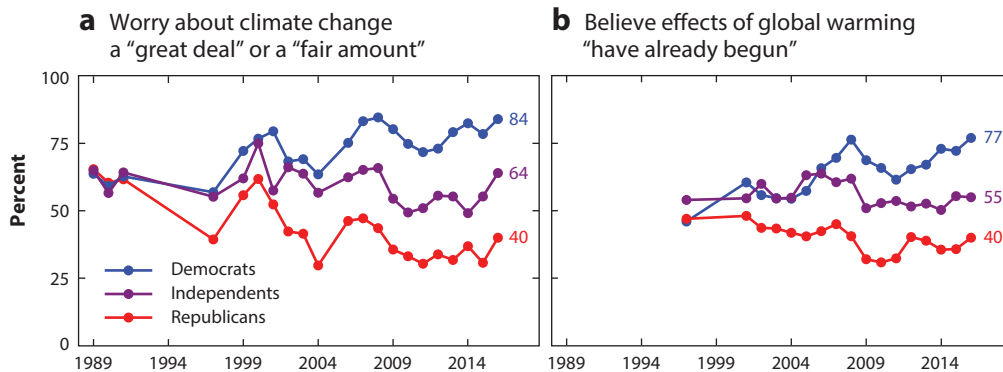


Figure 2

Polarization in American public opinion on climate change, 1989–2016. Source: Gallup.

Republicans compared to Democrats, the beginning of a gap between partisans that has widened over time and currently stands at more than 40 percentage points. Trends have been similar on Gallup's question asking respondents if and when they think the effects of global warming will begin (**Figure 2b**). In 1997, equal shares of Democrats and Republicans said these effects had already started. Over the course of two decades, the partisan difference on this item swelled to more than 30 percentage points. Increasing polarization thus underlies—and helps explain—the aggregate stability over time in trends on these and other climate change attitudes shown in **Figure 1**. In most cases, increases in climate change belief, concern, and prioritization among Democrats have been largely cancelled out by concurrent declines among Republicans.

Explaining Polarization

Many political scientists will find these dynamics unsurprising, as the development of ever-stronger relationships between partisanship and attitudes is a signature characteristic of contemporary American public opinion on a wide range of issues over the past few decades (Abramowitz & Saunders 2008, Levendusky 2009). Polarization among partisan elites tends to precede that among the public, as shown when trends in the parties' congressional roll call votes are compared to rank-and-file partisans' opinions on issues such as civil rights (Carmines & Stimson 1989) and abortion (Adams 1997). Mass polarization has typically taken place earliest and has remained most pronounced among members of the public who pay close attention to politics (Layman & Carsey 2002), in part because the well-informed accept and integrate messages about issues communicated by like-minded elites while rejecting those delivered by the other side (Zaller 1992).

Polarization on climate change attitudes—and on environmental attitudes more generally—has largely followed a similar path. The appearance of climate change on the nation's agenda took place after a period in which mass opinion on the environment had proven remarkably resistant to growing divides among partisan elites. A gap between Democrats and Republicans in congressional roll call votes on the environment has existed since at least the early 1970s (Shipan & Lowry 2001, Lindaman & Haider-Markel 2002). Surveys of national convention delegates found Democrats prioritizing the environment more than their Republican counterparts at least since 1972, and the divide has grown larger over time. The Democrats' "ownership" of the environment in public opinion surveys—reflecting the party's substantially greater commitment to prioritizing

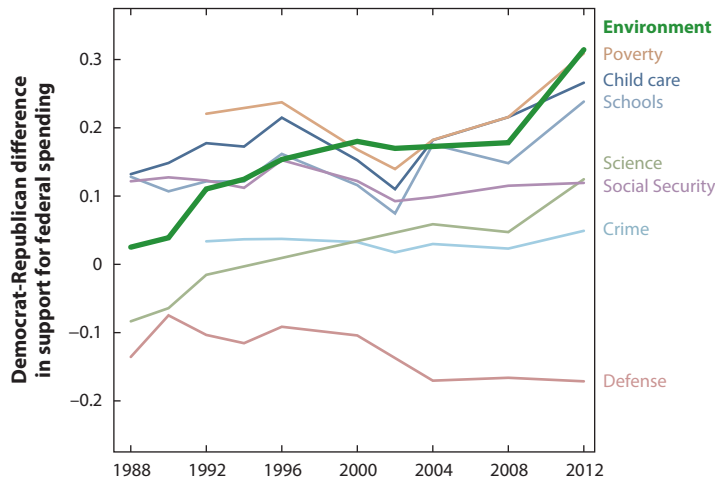


Figure 3

Partisan polarization in Americans' federal spending priorities, 1988–2012, scaled from zero (no polarization) to one (maximum polarization). Source: American National Election Studies Cumulative File.

environmental problems with government legislation and spending—grew faster than that party's dominance on any other issue between 1970 and 2011 (Egan 2013).

But substantial opinion differences on environmental issues between partisans in the electorate lagged those among elites by decades. Partisan attitude polarization did not emerge until the mid-1990s on environmental concerns such as pollution (Guber 2013) and spending on environmental protection (McCright et al. 2014). Once partisan polarization on the environment began, it proceeded to grow in a dramatic fashion (**Figure 3**). In 1988, Democrats and Republicans surveyed by the American National Election Studies (ANES) were nearly equally supportive of federal spending on “improving and protecting the environment.” Partisan differences in spending preferences in 1988 were larger even on relatively uncontroversial issues such as Social Security and schools. But over the course of a little more than 20 years, the environment was transformed from the least to the most polarized issue in this ANES series. By 2012, the gap between partisans on this question had grown to 0.3 on a zero-to-one scale. Questions from other surveys confirm growing levels of partisan polarization in concern about environmental problems (Guber 2013) and voters' prioritization of these problems (Egan 2013). The environment is thus a prime example of an “issue evolution” in which attitudes among partisans in the electorate have come to mirror the divided positions taken by partisans in government (Lindaman & Haider-Markel 2002). Polarization on general environmental issues has almost certainly reinforced (and perhaps been aggravated by) polarization on the specific issue of climate change.

A Campaign of Climate Skepticism

The reasons offered by Republicans and conservatives for their opposition to taking action on climate change echo closely the messages promulgated by a concerted, elite-driven challenge to climate science that now spans nearly three decades. The goals of this program have been to heighten public skepticism about global warming and to bolster opposition to policies that would limit greenhouse gas emissions. Beginning in the late 1980s, a network of think tanks and advocacy groups formed with funding from conservative donors began to dispute the growing scientific

consensus about climate change causes and impacts. Their activities included publications (books, reports, op-eds, newspaper columns), media appearances, grassroots mobilization, and outreach to Republican politicians (McCright & Dunlap 2003, Jacques et al. 2008, Elsasser & Dunlap 2013). In the 1990s, media coverage and congressional testimony on climate change began to feature climate change skeptics as frequently as researchers presenting the scientific consensus (McCright & Dunlap 2003). Business groups—particularly the fossil fuel industry, which stood to bear the highest concentrated costs from any climate change policy—engaged in their own campaign to spread climate change denial, engaging corporate-backed scientists to create a false perception of scientific uncertainty (Oreskes & Conway 2010). Scholars who have evaluated the environmental response to this movement have found weaknesses in its mobilization, its strategy and message, and its inability to elevate climate change to the top of the Democratic Party’s agenda (McCright & Dunlap 2003, Nisbet 2011, Guber & Bosso 2013). Whatever the reason, those who sought to raise public concern about climate change were unable to prevent the growth of skepticism that began registering in polls among Republicans in the mid-1990s.

The media played an important role in transmitting and amplifying messages of climate skepticism and denial. As the public was learning about the problem in the 1990s, the mainstream media’s adherence to the journalistic norm of balancing coverage between two sides of a dispute resulted in misrepresentation of climate change science, understating the scientific certainty about human contribution to the problem (Boykoff 2008). By the late 2000s, the narrative of climate change as a hoax perpetrated by scientists played a dominant role in Fox News coverage of the issue and received substantial attention on MSNBC and CNN as well (Mayer 2012). At the same time, media coverage of wildfire, drought, and extreme weather events has rarely mentioned climate change (Moser 2014), failing to improve public understanding of potential impacts.

We note that scholars have not identified a direct causal link between climate change skepticism campaigns and individual attitudes. But because the frames and language employed by the countermovement have become part and parcel of messages about climate change delivered by conservative and Republican elites (Elsasser & Dunlap 2013), they are critical to understanding the nature of mass polarization on this issue.

SALIENCE AND THE ISSUE-ATTENTION CYCLE

A final important aspect of US public opinion on climate change is that Americans attach a low level of salience to the issue. In Gallup’s open-ended surveys asking people to identify the most important problem facing the country, the number of people citing climate change is negligible, and on average only about 1% of the population names any environmental issue at all (Comparative Agendas Project 2016; see <http://www.comparativeagendas.net/us>). Even among those who accept the science and say they are worried about global warming’s effects, prioritization of the problem is low. In 2016, for example, Pew found Democrats prioritizing climate change lower than several concerns not traditionally associated with their party, including terrorism and crime.

Of course, government action happens all the time on issues few consider to be a top priority. But the effort to slow global warming is additionally challenged by the fact that the issue has no core constituency with a concentrated interest in policy change. For sure, there are voters particularly vulnerable to the extreme weather that poses risks in terms of human health and economic losses. But as long as climate scientists hesitate to pin blame for any one storm, drought, or flood on climate change, ordinary Americans are unlikely to make such attributions. In this context, people are most likely to think that the problem affects their lives through its impact on daily weather. But in most places in the contiguous United States, winters have warmed considerably while summers (unexpectedly) have not, meaning that the vast majority of Americans have experienced

year-round weather conditions that have become more comfortable over the last 40 years. Seasonal temperature patterns are not projected to become less pleasant until some point in the middle of this century, making it unlikely that daily weather will mobilize demand for action on climate change anytime soon (Egan & Mullin 2016).

Climate change's low salience, punctuated by brief intervals of heightened concern, are characteristic of what Downs (1972) identified almost 50 years ago as an "issue-attention cycle." According to Downs, the public often greets a newly discovered problem with enthusiasm for solving it. But as the public realizes the cost of addressing the problem, interest declines, and the problem fades from national prominence until some new event refocuses public attention on the issue. Writing in the early 1970s, Downs used his model to examine attention to environmental quality, especially air pollution. Climate change is an even better fit for the three conditions Downs identified that make a problem susceptible to the cycle: Few people suffer directly from the problem, a majority of people benefit from arrangements that cause the problem, and the problem has no "intrinsically exciting qualities" that capture and sustain media attention.

CONCLUSION: HOW OPINION MIGHT CATALYZE POLICY CHANGE

Our assessment is that many aspects of Americans' attitudes on climate change discussed thus far—including widespread skepticism about its existence, low levels of concern and salience, and tepid support for the costly policies needed to halt its advance—make it improbable that public opinion in its present state will play a decisive role in catalyzing demand for policy. Thus, to the extent that effective policies to reduce greenhouse gas emissions are undertaken at the national level, it is likely that they will be implemented in ways that are difficult to trace to reelection-oriented politicians (Victor 2011). However, even in the face of these constraints, opportunities may exist for opinion to play a meaningful role in policy change. We conclude this review by briefly discussing four of them.

Linking Climate Change to Extreme Weather

Extreme weather and its consequences certainly have no trouble garnering media attention, and one possible shift in the near future is that the salience of global warming will rise as the link between weather events and climate change strengthens in the public's mind. Americans' exposure to droughts, severe storms, heat waves, wildfires, and other climate change–related hazards is on the rise (Melillo et al. 2014), and scientists are growing less cautious about attributing these events to climate change (National Academies of Sciences, Engineering and Medicine 2016). An open question about the effect of such extreme events on opinion is the extent to which motivated reasoning dampens their potential to shift attitudes among Republicans and conservatives, at least in the absence of new signals from elites. More likely is that the increasing prevalence of such events will raise the issue's importance among climate change believers and prompt them to demand policy response.

Adaptation as Well as Mitigation

If the connection between extreme weather and climate change is strengthened, this may expand the national conversation from mitigation alone to adaptation and resilience. Even under the most optimistic emissions scenarios, infrastructure investments will be needed to reduce the harmful effects of climate change on Americans. This is already well understood among planners, engineers, and state and local public officials responsible for protecting communities, but it has usually been

absent from the broader public conversation—and from political science research (Javeline 2014). We know little about public opinion on adaptation, and the politics of adaptation differ from mitigation in important ways. Many adaptive strategies require government spending on tangible projects for which elected officials can take credit, and such initiatives may more easily find support among those who accept that temperatures are rising but refuse to attribute this to human causes. On the other hand, there is little evidence that preventing harm from natural disasters yields political returns (Healy & Malhotra 2009).

Focusing on Tangible Consequences

As this review has shown, two challenges to creating solutions to the climate change problem are its abstract, intangible nature (which makes it hard for the public to understand and care about global warming) and its tragedy-of-the-commons features (which reduce the incentives for any polity to act alone). What gets lost in this characterization is that a substantial share of global warming emissions also causes immediate, localized damage to people, crops, and the drinking water supply. A focus on the tangible cobenefits of climate change policies, such as reductions in asthma and lung cancer, may provide a more promising way to build public support for them (Ansolabehere & Konisky 2014; but see Bernauer & McGrath 2016).

Subnational Policy Corresponds with Opinion

The gross state products of California, Texas, and New York now each surpass \$1 billion, which would rank all three among the world's top 20 economies if they were separate nations. Thus, although the structure of the climate change problem ideally calls for solutions at the global and national levels, some American states and localities can potentially have a meaningful impact on global warming by acting individually. Many significant and innovative policy initiatives in the United States are taking place at the subnational level (Betsill & Rabe 2009). The nonpartisan Center for Climate and Energy Solutions (2014) tracks climate change policies implemented by each state, including those regulating energy, transportation, and building sectors. Treating these policies as a simple additive index, **Figure 4** shows that their adoption is highly correlated with state residents' attitudes on climate change (as estimated by Howe et al. 2015). Traced in the figure with a best-fit regression line, the very strong correlation between state policy and public opinion is similar to that political scientists have found across many other issues (Erikson et al. 1993). Other factors undoubtedly confound or mediate the effect of state public opinion on policy, particularly state residents' overall ideology and partisan control of state governments. Nevertheless, this strong relationship indicates that meaningful policy is being enacted in places that have a concentration of climate change concern. A consequence of this subnational policy activity is marked variation in Americans' exposure to climate change risks and to the costs of emissions reductions.

CLIMATE CHANGE, PUBLIC OPINION, AND POLITICAL SCIENCE

Taken together, these themes suggest how political scientists and other scholars who study attitudes about climate change might redeploy our efforts to better understand American public opinion on this issue. Prior research has focused heavily on the public's belief in anthropogenic climate change—why it is so low, what shifts it, and what its impact can be on other attitudes. The literature is now due for a reorientation toward investigating aspects of public opinion that might promote and inform policy response, even under conditions of widespread public skepticism

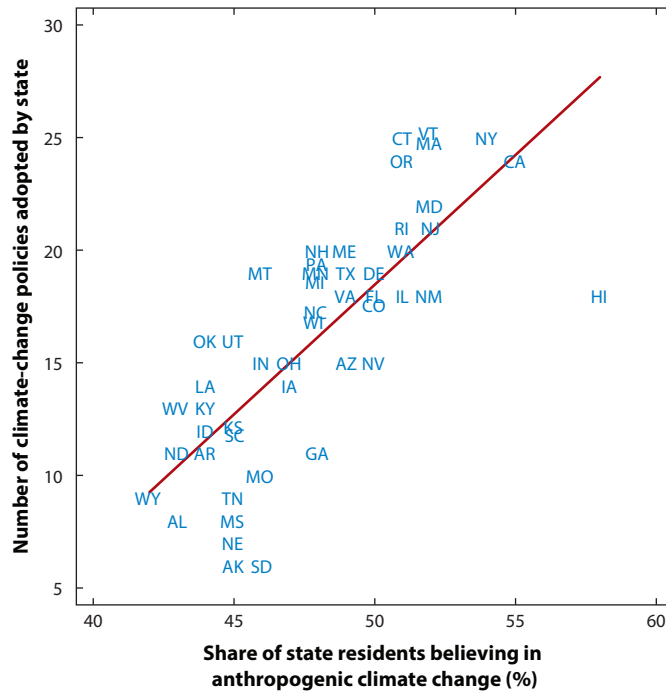


Figure 4

The relationship between state climate change opinion and policy (with best-fit regression line). Sources: Number of climate-change policies adopted by state, Center for Climate and Energy Solutions (2014); share of state residents believing in anthropogenic climate change, Howe et al. (2015). Overlapping states have been slightly adjusted on the plot for clarity.

about climate change science. Improved understanding about how Americans interpret extreme weather and coincidental pollution and their willingness to pay for cost-effective energy efficiency and adaptation strategies at all levels of government can help identify pathways for mobilizing political support for policy change. American public opinion about the abstract, ideologically fraught concept of climate change is now deadlocked to the same demoralizing extent as is national politics and policy. By contrast, attitudes on the tangible consequences of climate change may present greater opportunities for taking substantive action to solve the problem—and therefore merit increased attention from scholars of American public opinion.

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