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Does it matter if people think climate change is human caused?

Joel Hartter[a,b,*], Lawrence C. Hamilton[b,c], Angela E. Boag[a], Forrest R. Stevens[d], Mark J. Ducey[b,e], Nils D. Christoffersen[f], Paul T. Oester[g], Michael W. Palace[h]

[a] University of Colorado, Environmental Studies Program, Boulder, CO, USA
[b] Carsey School of Public Policy, University of New Hampshire, Durham, New Hampshire, USA
[c] Department of Sociology, University of New Hampshire, Durham, New Hampshire, USA
[d] University of Louisville, Department of Geosciences, Louisville, KY, USA
[e] University of New Hampshire, Department of Natural Resources and the Environment, Durham, New Hampshire, USA
[f] Wallowa Resources, Enterprise, OR, USA
[g] Oregon State University, College of Forestry, LaGrande, OR, USA
[h] University of New Hampshire, Institute for the Study of Earth, Oceans, and Space, Durham, New Hampshire, USA

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ABSTRACT

There is a growing consensus that climate is changing, but beliefs about the causal factors vary widely among the general public. Current research shows that such causal beliefs are strongly influenced by cultural, political, and identity-driven views. We examined the influence that local perceptions have on the acceptance of basic facts about climate change. We also examined the connection to wildfire by local people. Two recent telephone surveys found that 37% (in 2011) and 46% (in 2014) of eastern Oregon (USA) respondents accept the scientific consensus that human activities are now changing the climate. Although most do not agree with that consensus, large majorities (85–86%) do agree that climate is changing, whether by natural or human causes. Acceptance of anthropogenic climate change generally divides along political party lines, but acceptance of climate change more generally, and concerns about wildfire, transcend political divisions. Support for active forest management to reduce wildfire risks is strong in this region, and restoration treatments could be critical to the resilience of both communities and ecosystems. Although these immediate steps involve adaptations to a changing climate, they can be motivated without necessarily invoking human-caused climate change, a divisive concept among local landowners.

Practical Implications

Despite scientific consensus that climate is changing, beliefs about causal factors vary widely among the general public in the United States, influenced by cultural, political, and identity-driven views. In eastern Oregon, a semi-arid region dominated by dry forest, the effects of a warmer climate during the next few decades include reduced productivity and health of forests, increased wildfire occurrence, and reduced water supplies. These effects would have a significant impact on both natural resource conditions and human welfare, especially in the Blue Mountains and adjacent communities.

Surveys of the public in this region have demonstrated that belief in human-caused climate change is relatively low compared to the national average, although most agree that climate is changing, whether from natural or human causes. Most people support active forest management (forest thinning, surface fuel reduction) and restoration to reduce the likelihood of high-intensity wildfires that would damage timber and threaten local communities. Fuel reduction and restoration are climate-smart management practices, regardless of the motivation.

In fact, collaborative efforts are already underway in eastern Oregon to reduce fuel loadings near communities. In addition, federal agencies, non-governmental organizations, and watershed councils are working with ranchers and farmers to explore ways to capture spring runoff and improve irrigation efficiency. These efforts reflect the perspectives of individual landowners focused primarily on short-term change and short-term management objectives, in contrast to the much longer temporal scale at which climate change is

* Corresponding author at: University of Colorado, Environmental Studies Program, Sustainability, Energy and Environment Community, 4001 Discovery Drive, UCB 397, Boulder, CO 80309, USA.
E-mail address: joel.hartter@colorado.edu (J. Hartter).

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usually perceived.

Although ongoing actions may be adequate in the short term, planning and management at long temporal and broad spatial scales are less likely to occur if landowners do not believe that climate change is here to stay. Long-term planning is challenging and not typically a consideration for most landowners. Creating resilient landscapes at broad spatial scales (thousands of hectares) would encompass and/or overlap multiple ownerships, requiring collaboration to implement forest management practices and other activities. In addition, multiple constraints to active management—limited budgets, federal and state regulations, air quality restrictions for prescribed burning, complicated review processes—make it difficult to implement large projects.

A culturally attuned communication process that respects beliefs of local stakeholders and leadership can be used to overcome ideological barriers. Consensus messaging also provides a way to share evidence-based scientific agreement on climate change and related issues. Both approaches can facilitate progress on building resilience in local landscapes and communities without using climate change adaptation as the motivation. The recent emergence of forest collaboratives, which are working partnerships between public and private organizations, is an optimistic sign that individuals committed to working together are bridging logistical and cultural divides to improve resource management, regardless of climate change beliefs.

1. Introduction

Evidence for changing climate, associated with increases in atmospheric greenhouse gas concentrations, continues to increase. The year 2012 marked a milestone for the United States when it eclipsed 1998 by 0.6 °C to become the hottest year on record (NCDC, 2016). Then, 2014 became the warmest ever recorded, and 2015 was warmer still (NCDC, 2016). February 2016 broke the record for the largest monthly temperature anomaly (NASA, 2016). Furthermore, 2015 reached a new record high of global carbon dioxide levels for the 31st consecutive year (ESRL, 2016) and was accompanied by an increase of 0.23 °C over 2014, an increase of 1.8 °C since the late 1800s (ESRL, 2016).

Human activities have increased atmospheric carbon dioxide (CO_2) concentrations past 400 ppm, levels unseen for millions of years (Biello, 2015). Barring significant reductions in fossil fuel use and deforestation, a doubling of pre-industrial CO_2 levels (from about 280 to over 560 ppm) will occur in the first half of the 21st century. Analysis of climate data from the contiguous United States since 1895 shows the mean temperature rising at an average rate of 0.14 °C per decade (NOAA, 2016b). Warming accelerated in recent decades, with the U.S. trend becoming 0.50 °C per decade for 1975–2015. Under conservative scenarios, future climate changes are likely to include further increases in mean temperature (about 2–4 °C globally in this century), with significant drying in some regions, as well as increases in the frequency and severity of droughts, temperature extremes, and heat waves (IPCC, 2007).

Forest systems and changes in their complexity and structure are examples of complex feedbacks between changes in climate, resource availability, disturbance, and management in space and time (see Kerns et al., this issue). With U.S. forests occupying 300 million hectares, a changing climate affects the health, growth and productivity of these forests and exacerbates threats such as drought, wildfires, and insect outbreaks (Kurz et al., 2008; Allen et al., 2010; Waring et al., 2011). Climate change alters the distribution, extent, frequency, and intensity of these disturbances, and large impacts (e.g., loss of species regeneration) can be expected (Anderson-Teixeira et al., 2013). The effects on species and ecological communities at the margin of their range may be particularly severe (Dale et al., 2001; Turner, 2010).

The effects of climate change on wildfire, the most influential natural disturbance in temperate forest ecosystems (Bond and van Wilgen, 1996; Barnes and Spurr, 1998), is critically important socially and ecologically. In 2015, over 68,000 wildland fires covering 4 million hectares burned across the western United States. Suppression costs for the federal government were $2.1B (NIFC, 2016a,b). This cost is on the rise as fire seasons have grown longer in combination with increased settlement in the wildland-urban interface (Dale, 2006; Westerling et al., 2006). July 2012, the peak of that fire season, became the hottest month ever recorded in the contiguous US (NOAA, 2013). Much of the Intermountain West, including eastern Oregon, contains large areas of dense stands with fire resilient species (ponderosa pine [*Pinus ponderosa*], western larch [*Larix occidentalis*], and Douglas fir [*Pseudotsuga menziesii*]) in the overstory and fire susceptible species (e.g., grand fir [*Abies grandis*]) in the understory. In addition, mountain pine beetle (*Dendroctonus ponderosae*) has caused mortality in 20 million hectares of western North America (Kurz et al., 2008; Cain and Hayes, 2009). Together, the effects of changing fire regimes, increased fuel loads, and stressed forests, coupled with increasing impacts of fires on populated areas and demands for more fire suppression, has created a pathology of declining forest conditions, much of which is exacerbated by climate change (Fischer et al., 2016).

Duration of drought is expected to increase as snowpack decreases in the future, especially in the Pacific West (Clifton et al., this issue). The maximum number of consecutive dry days (precipitation < 1 mm) per year is projected to increase 5–10 days in the American southwest and Pacific Northwest (Vose et al., 2016). Since 1948, there was a significant decrease in the 25th percentile flow of rivers and streams in the Pacific Northwest, indicating that dry years are becoming drier. Winter streamflows will peak earlier and higher, and summer streamflows will be lower.

These past and projected changes impact human communities in the West, especially where livelihoods depend on natural resources. Ranchers may benefit as shifts in vegetation distributions favor expansion of grassland at the expense of forests. However, longer, drier summers and reduction in water availability from mountain streams (see Clifton et al., this issue) may pose additional challenges. Forests becoming denser and more uniform in species and age increases stress and facilitates insect outbreaks and crown fires. Frequent wildfire will also impact livestock producers if they lose forage and are forced to find alternative feed or reduce their herd size. In addition, increased forest fire severity may combine with hot summers and unsightly views of dead trees to deter tourists and amenity homeowners (those who buy second homes or live in the area for the visual and social opportunities of a rural community).

The scientific consensus about human-caused climate change has been extensively documented in reviews (IPCC, 2013; Melillo et al., 2014), statements by leading science organizations (e.g., Finn, 2013), surveys of scientists (Doran and Zimmerman, 2009), and published scientific reports (Oreskes, 2004; Cook et al., 2013). However, the issue of climate change remains divisive among U.S. politicians and the public. Politicians, ideological media, and some citizens line up with politically-framed views about this science-heavy topic. Core points of disagreement include whether climate change is happening now, and if so what the primary cause may be. A recent poll found that 63% of Americans are represented by a member of Congress who questions the science behind human-caused climate change (Ellingboe, 2016). The cause obviously matters for mitigation policies, but also for adaptation planning that anticipates continued warming.

Within this context of climate change and politics, we tested whether the issue of climate change was a salient one among the general public in eastern Oregon. The region has experienced frequent large wildfires along with an economic downturn in part caused by a decline in the forest products industry. Other studies have demonstrated a link