Article

Green Colored Lenses: Worldviews and Motivated Reasoning in the Case of Local Water Scarcity

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David Switzer[1] and Arnold Vedlitz[1]

Abstract

Studies linking local issue severity to public opinion often treat the effect as homogeneous, suggesting a straightforward relationship between issue exposure and policy opinions. It is more likely that individuals perceive local issues in conditional ways. We advance a theory of motivated reasoning whereby worldviews act as a lens through which individuals interpret the world around them. When the observed environment conforms to individuals' prior beliefs, they will be even more likely to perceive risk and call for policy action. When the information presented to them is incongruent with their worldview, increasing issue severity will have a minimal effect. We test our theory by combining an indicator of water scarcity with data from two nationally representative, probability-based panel surveys about water issues in the United States. Analyzing interactive models predicting risk perception and policy preferences, we find that water scarcity drives individuals with opposing environmental worldviews even further apart.

Keywords

issue severity, policy preferences, ideological worldviews, water scarcity, public opinion

[1]Texas A&M University, College Station, TX, USA

Corresponding Author:
David Switzer, Texas A&M University, 2010 Allen Building, 4348 TAMU, College Station, TX 77843, USA.
Email: dswitzer@pols.tamu.edu

Calls for political action on divisive issues often originate among those who are directly affected. It is therefore unsurprising that a number of studies in public opinion have linked local conditions and problems to public opinion (Bishop, 2013; Branton, Martinez-Ebers, Carey, & Matsubayashi, 2015; Brody, Zahran, Vedlitz, & Grover, 2008; Egan & Mullin, 2012). Where an issue is most severe, individuals are more likely to be cognizant of it and are more likely to call for government action to mitigate any negative effects. However, few studies linking local conditions and issue severity to public opinion have considered whether individuals process information about their local environments in heterogeneous ways, and none has addressed the possibility that core beliefs and worldviews provide a lens through which individuals perceive their local environment. Studies have long found that ideological worldviews and values play a pivotal role in opinion formation (Feldman, 1988; Lynch & Gollust, 2010). Core beliefs in individualism, equality, human–nature balance, among others, have been found to influence public opinion across many policy areas. Given that worldviews influence the formation of policy opinions, it is likely that they shape the way individuals process information about their local environment as well.

In this study, we advance a conditional theory of issue severity that suggests individuals use motivated reasoning when evaluating their environment and that their ideological worldview influences how they process information about problems in their area. Literature on motivated reasoning suggests that individuals are biased information processors who will accept or reject information based on their prior biases (Fischle, 2000; Hartman & Newmark, 2012; Lebo & Cassino, 2007; Taber, Cann, & Kucsova, 2009; Taber & Lodge, 2006). We argue that individuals use worldviews as an interpretive lens through which they gain an understanding of their localities and that individuals' interpretations of the information presented to them by local conditions will depend on whether the information conforms with or contradicts prior beliefs derived from worldviews. When an environmental issue is severe in an individual's area, leaving her especially vulnerable to its negative impacts, whether the presence of the issue conforms to her prior beliefs about the world will determine how she reacts to the problem. When an individual is predisposed toward viewing an issue as a problem and potentially in need of policy action, the presence of the problem in her locality will only enhance her prior held beliefs. If she is ideologically predisposed toward not perceiving the issue as severe and needing policy action, the presence of the problem in her area will not greatly increase her concern about the policy issue or her desire for policy action. In this way, issue severity drives those with disparate ideological worldviews further apart. Because individuals interpret information differently based on their prior biases, including

worldviews, the presence of problems in a locality creates polarization among those with different beliefs.

We test our theory using the case of water scarcity in the United States. With the combination of aging infrastructure, growing populations in water scarce areas, and the possibility of climate change affecting weather patterns, policies that deal with the management of water will be of increasing importance for years to come. Public opinion about water issues will be an important factor in how governments make decisions about which, if any, policies to adopt. Water scarcity is an excellent case to test our theory because of the great amount of heterogeneity of access to water supplies in the United States. For example, while the Northeastern United States has little issue with water quantity, the Southwest is perpetually struggling with its water supplies. We utilize a measure of local moisture levels that combines simple climatic measures like temperature, precipitation, and sunlight with the land's water retention capacity and potential evapotranspiration to capture this heterogeneity (Willmott & Feddema, 1992). Using an abbreviated New Ecological Paradigm (NEP) measure, we find that local water scarcity has a larger effect on the risk perceptions and policy preferences of individuals with pro-environmental worldviews than those without such views, meaning that in areas struggling with water issues, individuals with opposing worldviews are being driven further apart. In the presence of issue severity, individuals of different ideological predispositions become more polarized in their policy views.

Ideological Worldviews and Opinion Formation

Individuals' ideology and worldview help shape their perceptions of policy issues. Literature on public opinion has long found that political ideology and partisanship are among the most important factors in the formation of public opinion across a wide variety of issues. However, left–right political orientations do not fully encapsulate individual values, and so analysis that does not extend beyond political ideology alone may not wholly represent how values affect public opinion (Hochschild, 2001). Studies of public opinion have also consistently found that ideological worldview and individual attitudes generally have a strong influence on policy preferences and risk perception (Dake, 1991; Douglas & Wildavsky, 1982; Feldman, 1988). Beliefs in egalitarianism, individualism, and fairness, among other values, may influence individual political opinions. Studies have applied many measures of worldview across a number of policy areas and found that values greatly predict risk perceptions, political evaluations, and policy preferences (Lynch & Gollust, 2010; Poortinga, Spence, Whitmarsh, Capstick, & Pidgeon, 2011).

While the public opinion literature in general has focused on how beliefs and worldviews influence individual opinion formation across a number of policy areas, the effect of values and worldviews on public opinion is especially well established in the literature on environmental policy, where many measures of values and worldviews have been used to explain environmental beliefs and behaviors. Altruistic and traditional values have been linked to opinions about the use of nuclear power (Whitfield, Rosa, Dan, & Dietz, 2009), risk perception about the environment in general, and opinions about climate change policy, with more altruistic individuals being more concerned with environmental issues and traditional individuals being less concerned (Slimak & Dietz, 2006). The cultural theory of risk, developed by Douglas and Wildavsky (1982), has also been linked to environmental concerns across many areas. Egalitarianism has been linked with concern for environmental pollution generally (Dake, 1991), concern over energy policy (Carlisle & Smith, 2005), and climate change policy support (Leiserowitz, 2006), while individualism has been shown to have the opposite effect.

While scholars have found relationships between many measures of values and worldviews and environmental concern, the most consistently used measure is the NEP index, developed by Dunlap and Van Liere (1978), and revised since (Dunlap, Van Liere, Mertig, & Jones, 2000). Dunlap and Van Liere argued that the dominant economic view emphasizes beliefs in the development of science and technology, the dominance of humans over nature, and the idea of unlimited economic growth. In contrast, those who endorse the NEP believe in the balance of nature, more limited growth, and that humans are dependent on other species for survival. Essentially, those who endorse NEP recognize biophysical constraints on human behavior and have a "primitive belief" in the balance of human–nature relationships, but those who do not continue to subscribe to the prevailing worldview of human development and dominance (Catton & Dunlap, 1980; Dunlap et al., 2000). The NEP, in both its full and abbreviated form, has been found to be a major explanatory variable across a number of environmental policy areas. Liu, Vedlitz, and Shi (2014), in an investigation of the determinants of concern for the environment generally, climate change, and pollution, found that across different surveys from different years an abbreviated NEP measure was consistently among the strongest predictors of environmental concern. This mirrors a myriad of other studies, which found NEP to explain environmental support across numerous contexts (see Pierce, Dalton, & Zaitsev, 1999; Slimak & Dietz, 2006; Stern, Kalof, Dietz, & Guagnano, 1995; Whitfield et al., 2009; Zahran, Brody, Grover, & Vedlitz, 2006).

The Effect of Local Conditions on Issue Perception

In addition to ideology and worldview, local issue exposure influences public opinion across a number of policy areas. Localized issue severity may influence political evaluations and opinions on different policies. Individuals who are exposed to an issue directly through their local environment will perceive the issue as more salient than individuals who are not exposed to the issue, and this likely affects their political beliefs. The environmental public opinion literature has recently given a great deal of attention to the effect of local conditions on environmental opinions. Brody et al. (2008) and Zahran et al. (2006) found that physical vulnerability links to both risk perception of climate change and policy support for climate change. Distance to coast and elevation were found to be negatively correlated with risk perception of climate change, meaning individuals in coastal regions were more likely to view the threat of climate change as great (Brody et al., 2008). Casualties from floods, hurricanes, and drought were linked to greater support for climate policy, although surprisingly, risk of sea level rise was negatively related to policy support (Zahran et al., 2006). Personal experience with flooding has also been linked to concern over the consequences of climate change (Spence, Poortinga, Butler, & Pidgeon, 2011). Similarly, Bishop (2013) linked local drought conditions to concern over water supplies and support for government regulation of water resources. Rising temperature has been the most commonly used measure of local exposure, with a number of studies linking rising area temperatures and deviations from temperature norms to concern over climate change and desire for climate policy (Brooks, Oxley, Vedlitz, Zahran, & Lindsey, 2014; Egan & Mullin, 2012; Goebbert, Jenkins-Smith, Klockow, Nowlin, & Silva, 2012; Joireman, Truelove, & Duell, 2010; Li, Johnson, & Zaval, 2011; Shao, Keim, Garand, & Hamilton, 2014; Zahran et al., 2006).

A Motivated Reasoning Theory of Issue Severity and Ideological Worldview

While most of the research on the way local conditions affect public opinion treats the effect in a homogeneous way, a few studies have noted that predispositions may condition the effect of local contextual variables. Outside of the environmental realm, Branton et al. (2015) found that generational status conditioned how Hispanics reacted to immigration protests, and Johnston, Newman, and Velez (2015) found that personality conditioned how changing local demographics affected individual views of immigration. Perhaps most relevant to the argument here, Egan and Mullin (2012) found that the effect

of temperature on climate change belief is conditional on education and political party, although they test the heterogeneity of the effect in a relatively atheoretical way. Understanding that predispositions may condition the effect of local issues, we argue that worldviews may play a key role in how local environmental conditions affect individual opinions. Goebbert et al. (2012) found that worldviews affect individual opinions about changing local weather patterns, and it follows that if the perception of local conditions is dependent on an individual's worldview, then the effect of local conditions on risk perception and policy preferences may be dependent on worldview as well. In this article, we advance a conditional theory of issue severity that argues that individuals use motivated reasoning when they are exposed to an issue in their locality. We argue that an individual's ideological worldview affects the ways in which she processes information about her local environment and that this will influence her policy opinions. Individual interpretation of the information presented by the environment will depend on whether the information conforms with or contradicts prior beliefs derived from worldviews. Indeed, Dunlap and Van Liere (1978), in their original article outlining the NEP, argued that worldviews are the lens through which "individuals . . . interpret the meaning of the external world" (p. 10). Whether someone sees an issue as severe or not depends on the lens through which he interprets the world around him.

This argument fits well with theories of motivated reasoning that suggest that individuals use prior beliefs and attitudes when they evaluate information. When an individual is presented with information about the world, how she processes it can depend on her preexisting biases (Taber & Lodge, 2006). Focusing on the national level, Jones and Baumgartner (2005; Baumgartner & Jones, 2015) have provided a general motivated reasoning theory of the way information and attention relate to problem identification in the policy process. They suggest that individuals interpret their information environment using their predispositions as a filter. Because of this, policy will remain stable, because individuals will simply interpret new information according to prior biases (Jones & Baumgartner, 2005). While they posit complex motivational links, they did not test specific individual-level links between ideological characteristics and risk identification. Other researchers, however, have built on this theory and have begun to explore these links. The effect of motivated reasoning has been seen across numerous studies, showing how prior beliefs affect evaluations of climate change (Hart & Nisbet, 2012), presidents (Fischle, 2000; Hartman & Newmark, 2012; Lebo & Cassino, 2007), risk perception (Kahan, Braman, Gastil, Slovic, & Mertz, 2007), affirmative action, and gun control (Taber & Lodge, 2006). A number of studies (McCright & Dunlap, 2011; Weber & Stern, 2011; Wood & Vedlitz, 2007)

have shown that individual-level attitudes, beliefs, and values, particularly partisanship and ideology, greatly influence risk assessments and policy preferences on climate change issues.

One of the major implications of the motivated reasoning literature is that individuals are more easily persuaded by information that is congruent with their prior attitudes, and they are dismissive of information that does not support their preexisting beliefs. As biased information processors, individuals do not uniformly react when presented with information (Taber et al., 2009). Rather, they accept information that promotes their interests and dismiss information that does not. Importantly, the willingness to accept information that conforms to preexisting beliefs and to reject contradictory information leads to polarization among those with different ideological predispositions (Taber & Lodge, 2006). Exposure to information actually drives already ideologically disparate people further apart. While the majority of motivated reasoning studies have focused on the conditioning effect of political ideology, worldviews have also been found to affect individual information processing (Kahan et al., 2007).

Motivated reasoning should apply to the ways in which individuals process information about their local environments as well. Individuals whose worldviews predispose them to view an issue as severe and needing policy action will have those views reinforced by exposure to the issue within their area, while those whose attitudes do not naturally lead to concern over the issue may be reluctant to accept the severity of the issue and the idea that policy action must be taken. The use of motivated reasoning in processing this information means that local issue severity will amplify the differences between those with opposing worldviews. Essentially, the theory suggests that because individuals are biased information processors, the presence of a local divisive issue will cause a greater gap in issue perceptions among those with different worldviews. Individuals who are predisposed to risk aversion and mitigation will only have those views confirmed when exposed to an issue in their locality. Conversely, those whose ideological predilections are not in line with high levels of risk perception and support for policy action to mitigate risk will be less affected by the incongruent information presented to them by issue severity in their locality.

We test this theory in the context of water scarcity, looking at how environmental worldview conditions the effect of local water scarcity on individuals' risk perceptions and policy preferences. The case of water scarcity is useful for evaluating our theory for a number of reasons. First, the issue of water scarcity is of growing importance in the United States. Stoutenborough and Vedlitz (2014) found that concern for water quantity and quality ranked higher than concern over immigration, climate change, and the environment

generally. Second, the issue of water scarcity varies greatly based on location. While the Pacific Northwest has ample water and is unlikely to face any issues with water scarcity, the Southwest consistently faces issues with a lack of available water, as the issues with drought in California make abundantly clear. Third, water policy, like environmental policy generally, is a divisive and contentious issue. Mitigating drought and water scarcity requires policy prescriptions that would greatly affect industry, agriculture, and domestic life.

Applying motivated reasoning theory to the specific case of water scarcity and policy, we expect that exposure to local water scarcity will increase the differences between those with opposing ideological worldviews. In this case, we use an abbreviated measure of the NEP to measure environmental worldview. Regardless of exposure to the issue, pro-environmental individuals are more likely to be concerned about water scarcity and more likely to want policy action on water. We argue that those who hold pro-environmental attitudes will also process information about their local water issues differently than those who do not. When exposed to water scarcity, a person with pro-environmental values will have increased risk perception of water issues and will have greater support for mitigation policy. Pro-environmental individuals are willing to accept information that conforms to their view that the environment is necessary to protect and that humans are overusing it. Individuals who do not share these environmental beliefs, however, will not process the information about their local environment in the same way, and local water scarcity will not have as large an effect on their opinions. In this way, local water scarcity will drive polarization between individuals with different ideological worldviews.

We generate a number of testable hypotheses from this theory:

Hypothesis 1 (H1): All else being equal, individuals in areas with higher water scarcity will have higher risk perception and greater preference for policy action on water issues.

This directional hypothesis simply follows the rest of the literature on locational effects, and it suggests that individuals in areas with high levels of issue severity will be more likely to perceive high levels of risk and will be more likely to want policy action. While we expect the relationship between local severity and individual opinion to be conditional, it is still likely that the effect will be positive, even if the size of the effect is heterogeneous across worldview.

Hypothesis 2 (H2): All else being equal, individuals who hold pro-environmental worldviews will have higher risk perception and greater preference for policy action on water issues.

Once again, regardless of the heterogeneous nature of the effect, we expect that those with worldviews congruent with concern over an issue will have greater risk perception and preference for policy than those who do not. This means that those with pro-environmental worldviews will have greater risk perception and policy preferences about water scarcity. We expect that the size of the effect will be conditional on exposure to local issue severity, but it should be positive in general.

Hypothesis 3 (H3): The effect of water scarcity on risk perception and policy preferences will be greater for those who have pro-environmental worldviews than those who do not.

This is our conditional hypothesis that suggests that ideological worldview will condition the way in which local issue severity influences opinion about an issue. Put differently, within a locality, increases in problem severity will increase the differences in risk perception and policy preferences between those with opposing worldviews. With respect to our analysis here, this hypothesis predicts that the effect of local water scarcity will be greater for those who hold pro-environmental worldviews than those who do not.

Method

Participants

The data we used in our analysis relied primarily on two national public opinion surveys of adults 18 years and older. We obtained regional weather data from the University of Delaware Geography archive of the Willmott–Feddema climatic moisture index data. The measure is explained in greater detail below. GfK Custom Research, LLC, administered the surveys. The first survey was in the field February 21, 2013 to March 12, 2013 and resulted in 1,616 completed surveys at a 56% completion rate. The second survey, which asked identical questions, was in the field from April 2, 2013 through April 16, 2013 and resulted in 1,650 completed surveys at a 55.5% completion rate. The median survey completion time was about 28 min for each survey. GfK drew the two unique samples from their web-enabled KnowledgePanel®, a probability-based panel designed to be representative of the U.S. population.

Measures

We utilize two different dependent variables in our analysis. Opinions about water scarcity involve not only the perception of risk but also the preferences

toward policy action. For this reason, we include dependent variables that measure both of these factors. The first of the dependent variables is an index of water quantity and drought risk perception. Respondents were asked a number of questions about the amount of water available in their community as well as the likelihood of drought causing different types of disruptions in their region. The index achieved a Cronbach's alpha of .87. Questions, item-test correlation, and factor analysis for this index and all others can be seen in the online appendix (Tables A1-A6). For ease of interpretability, we standardized the index, so it has a mean of 0 and a standard deviation of 1. The index ranges from −3.16 to 3.02, with negative values representing low-risk perception and positive numbers representing high-risk perception. Table 1 lists descriptive statistics for all variables included in the analysis.

The second dependent variable is a measure of policy preferences. Respondents were asked a series of questions about their support for policies that could be adopted in their city to mitigate future water issues as well as a series of questions about different policy options for managing water resources. The index includes 18 such questions and has a Cronbach's alpha of .84.[1] Once again, we standardized the index for ease of interpretability. Negative values represent low levels of favorability toward government policy to mitigate water scarcity, while positive values represent higher levels of favorability. The index ranges from −5.16 to 2.94.

Because we are concerned with the ways that worldviews condition the effect of risk exposure on risk perception and policy preferences, we need adequate measures of both attitudes and risk exposure. As mentioned above, researchers have frequently used the NEP measure to gauge individuals' attitudes about their relationship to the environment. The surveys utilized here included a series of eight questions that allows us to create an abbreviated NEP scale (Dunlap et al., 2000). The eight-item index yields a Cronbach's alpha of .85, and factor analysis further confirms the reliability of the index. The NEP sometimes presents as multidimensional (Cordano, Welcomer, & Scherer, 2003; Dunlap et al., 2000). In this case, however, because all of the items load strongly onto the first unrotated factor, and because no other retained factor shows evidence of any of the commonly identified other dimensions, we follow the advice of Dunlap et al. (2000) in treating the scale as unidimensional. Like the full NEP scale, our index ranges from 1 to 5, with higher numbers representing stronger environmental preferences. Though it would be desirable to have a full 15 question revised NEP measure included in the analysis, the survey only included the eight questions due to space constraints, and it is therefore not possible to construct the full measure here. Given the strength of the results below and that our hypotheses focus more on the moderating effect of worldview than the direct effect, we do not consider

Table 1. Descriptive Statistics.

	M	*SD*	Minimum	Maximum	%
Continuous variables					
Risk index	−0.00	1.00	−3.16	3.02	
Policy preference index	−0.00	1.00	−5.16	2.94	
Water scarcity index	−0.09	0.36	−0.82	0.91	
New Ecological Values	3.47	0.71	1	5	
Age	50.15	16.86	18	93	
Partisanship	3.88	2.23	1	7	
Ideology	4.31	1.56	1	7	
Household income	11.93	4.38	1	19	
Education	10.28	1.98	1	14	
Religiosity	2.85	1.55	1	5	
Binary variables					
Female					50.00
Black					8.24
Hispanic					13.66

the full scale necessary for the analysis here. In addition, Cordano et al. (2003) showed that abbreviated NEP scales can explain variance in environmental concern as well as the full NEP measures. To distinguish our measure from the full NEP scale, we refer to the index used here as New Ecological Values (NEV). We should note that NEV is not simply a representation of political ideology. Our measure of NEV and a Likert-type scale measure of political ideology (from liberal to conservative) only resulted in a pairwise correlation of −0.35. In addition, including political ideology rather than NEV in the interaction with water scarcity did not result in a significant interaction. These results can be seen in the supplementary appendix (Tables A7-A8).

To measure exposure to water scarcity, we utilize the climatic moisture index (I_m) developed by Willmott and Feddema (1992).[2] As a measure of water scarcity, the I_m has a number of advantages over commonly used measures like temperature or precipitation. The index integrates simple climatic measures like temperature, precipitation, and sunlight with the land's water retention capacity and potential evapotranspiration. In this way, it is a fuller measure of water scarcity than simple climatic measures. Another virtue of the I_m is the mathematical nature of the index. It is bound between −1 and 1, with negative values representing areas in which the atmospheric demand is greater than the moisture supply, and positive numbers representing areas in

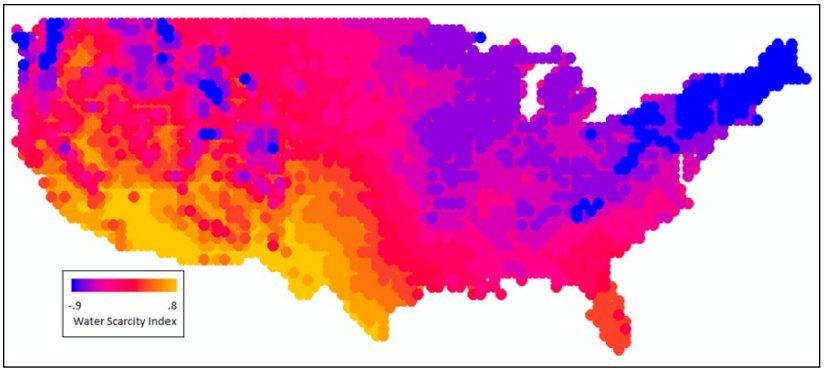

Figure 1. Map of water scarcity index across continental United States (5-year average from April 2008 to March 2013).

which the moisture supply is greater than the demand. A value of zero indicates that demand and supply are equal. In addition, the index is linear and symmetric. For interpretation purposes, to show increasing issue severity, we change the direction of index to create a "water scarcity" index, where higher values represent dryer regions and the lower values represent wetter regions. Matching zip code centroid coordinates with the climate data, we used the average water scarcity over the 5 years preceding the survey as the measure of risk exposure in this study. Willmott and Feddema provide their moisture index on a 0.5 × 0.5 degree spatial grid that covers the entire globe. The distance from respondent zip code centroid to the nearest Willmott and Feddema index averages about 12 miles and does not exceed 25 miles for any respondent. To provide some context for the variable, El Paso, Texas, has a scarcity value of 0.73 over the 5-year period, while Boston, Massachusetts, has a value of −0.49. The average water scarcity of the areas surrounding the survey respondents over the 5-year period preceding the survey is −0.09.[3] Figure 1 shows a map of the values of the water scarcity index across the continental United States for the 5-year period from April 2008 to March 2013.

The surveys also included items for a number of questions that we use as controls in the analysis here. The "White Male Effect" suggests that White men are less likely than women and minorities to have concern for the environment (Kahan et al., 2007). For this reason, we include dichotomous variables indicating whether the respondent was female, Black, or Hispanic. We also include a variable for the age of respondents, measured in years. Political ideology and party identification have also been found to play a role in the formation of opinions about environmental risk and policy action (Liu et al., 2014), so we include variables accounting for this possibility. Political

ideology is measured on a 7-point scale from 1 = *strongly liberal* to 7 = *strongly conservative*. Similarly, partisanship is measured from 1 = *strong democrat* to 7 = *strong republican*. Income and education have also been found to affect individual opinions of risk and policy (Van Liere & Dunlap, 1980), so we include a 19-point scale of household income with options ranging between *less than $5,000* to *175,000 or more*, and a 14-point scale of educational attainment ranging from *no formal education* to *professional or doctorate degree*. Finally, the literature shows that religiosity can play an import role in the formation of environmental opinions (Shaiko, 1987), so we include a 5-point religiosity variable that asks respondents how often they attend religious services. The variable goes from *never* to *at least once a week*.

Procedure

Because the dependent variables are continuous indices that follow standardized distributions, ordinary least squares (OLS) regression is an appropriate modeling strategy. Because water scarcity data were observed at the Willmott and Feddema point, we use clustered standard errors at those points to correct for any heteroscedasticity that may result. Since our hypotheses imply conditional relationships, we use interactive models, including both interactive terms and constitutive terms, as is appropriate when using interactive models of this type. Eight models total were estimated, four for each of our dependent variables. For each dependent variable, we estimated a model with just our two main variables of interest, but no controls, an interactive model without controls, a noninteractive model with controls, and an interactive model with controls.[4]

Results

Tables 2 and 3 represent the results of our regressions predicting risk perceptions and policy preferences, respectively. First, considering our models predicting risk perception in Table 2, we find strong support for all three of our hypotheses. Looking at the effect of water scarcity on risk perception in the noninteractive model (1), we see a strong and highly significant relationship between regional water scarcity and risk perception. A one-unit increase in the region's water scarcity (approximately the difference in moisture between central Massachusetts and the San Francisco Bay Area over this period) results in a .90 increase in the risk perception variable, or nearly a standard deviation increase. As expected, it appears that the dryness of the region a person lives in largely determines her perception of water risk. We find similar support for the effect of our NEV index on risk perception, with a

Table 2. OLS Regression Predicting Risk Perception.

	(1)		(2)		(3)		(4)	
Variable	Coefficient	*p* value	Coefficient	*p* value	Coefficient	*p* value	Coefficient	*p* value
Water scarcity	0.90 (0.07)	<.01	0.38 (0.25)	.13	0.91 (0.07)	<.01	0.48 (0.25)	.05
New Ecological Values	0.37 (0.03)	<.01	0.38 (0.03)	<.01	0.42 (0.03)	<.01	0.43 (0.03)	<.01
Water Scarcity × NEV			0.15 (0.07)	.04			0.13 (0.07)	.08
Female					0.08 (0.04)	.03	0.08 (0.04)	.03
Black					−0.06 (0.06)	.34	−0.06 (0.06)	.32
Hispanic					−0.07 (0.06)	.22	−0.07 (0.06)	.19
Age					0.00 (0.00)	<.01	0.00 (0.00)	<.01
Partisanship (Republican)					−0.01 (0.01)	.46	−0.01 (0.01)	.45
Ideology (Conservative)					0.05 (0.02)	<.01	0.05 (0.02)	<.01
Household income					−0.00 (0.00)	.49	−0.00 (0.00)	.48
Education					−0.00 (0.01)	.65	−0.00 (0.01)	.65
Religiosity					0.05 (0.01)	<.01	0.05 (0.01)	<.01
Constant	−1.22 (0.09)	<.01	−1.25 (0.09)	<.01	−1.91 (0.16)	<.01	−1.93 (0.16)	<.01
R^2	.17		.17		.19		.19	
n	2,925		2,925		2,802		2,802	

Note. Clustered standard errors are in parentheses. *p* value is the result of two-tailed hypotheses tests, despite directional hypotheses. NEV = New Ecological Values.

Table 3. OLS Regression Predicting Policy Preferences.

	(5)		(6)		(7)		(8)	
Variable	Coefficient	*p* value	Coefficient	*p* value	Coefficient	*p* value	Coefficient	*p* value
Dryness	0.20 (0.05)	<.01	–0.58 (0.32)	.05	0.19 (0.05)	<.01	–0.48 (0.28)	.09
New Ecological Values	0.74 (0.03)	<.01	0.75 (0.03)	<.01	0.74 (0.03)	<.01	0.75 (0.03)	<.01
Water Scarcity × NEV			0.22 (0.08)	.01			0.19 (0.08)	.01
Female					–0.07 (0.03)	.02	–0.07 (0.03)	.02
Black					–0.03 (0.06)	.61	–0.04 (0.06)	.57
Hispanic					0.02 (0.05)	.65	0.01 (0.05)	.78
Age					0.00 (0.00)	<.01	0.00 (0.00)	<.01
Partisanship (Republican)					–0.03 (0.01)	.02	–0.03 (0.01)	.02
Ideology (Conservative)					–0.01 (0.02)	.54	–0.01 (0.02)	.52
Household income					0.02 (0.00)	<.01	0.02 (0.00)	<.01
Education					0.05 (0.01)	<.01	0.05 (0.01)	<.01
Religiosity					0.08 (0.01)	<.01	0.08 (0.01)	<.01
Constant	–2.55 (0.11)	<.01	–2.60 (0.11)	<.01	–3.49 (0.17)	<.01	–3.53 (0.17)	<.01
R^2	.27		.27		.31		.31	
n	2,922		2,922		2,800		2,800	

Note. Clustered standard errors are in parentheses. *p* value is the result of two-tailed hypotheses tests, despite directional hypotheses. NEV = New Ecological Values.

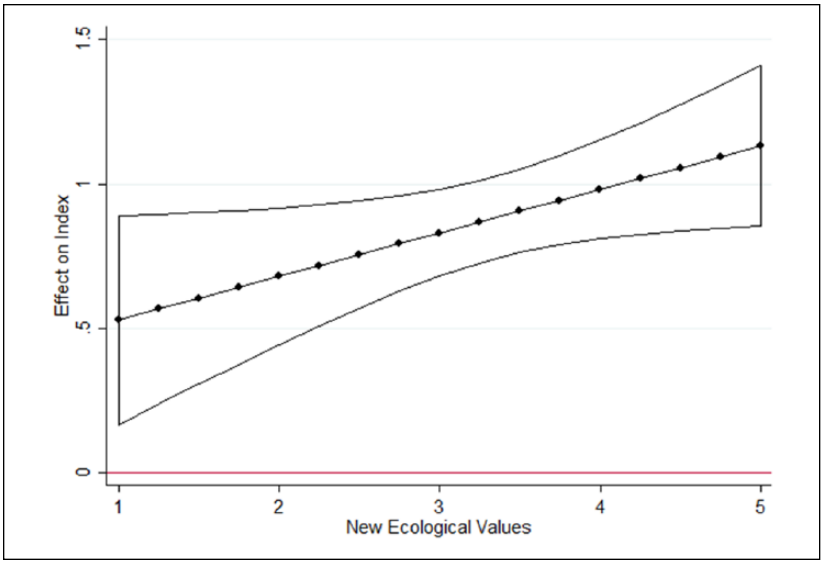

Figure 2. Marginal effect of water scarcity index on risk perception index (95% confidence intervals presented).

substantively and significantly positive relationship between NEV and risk perception. A one-unit increase in NEV results in about a third of a standard deviation increase in risk perception. Those individuals who have pro-environmental worldviews are more likely to perceive a high risk of water scarcity than those who do not. Looking at model (3), which is the same except for the inclusion of our control variables, the results do not substantively change. We still find strong support for our first two hypotheses.

We test H3 for risk perception in models (2) and (4). Coefficients in interactive models with continuous variables are not easily interpretable on their own, so we use marginal effect plots and prediction plots to interpret our results. Figure 2 shows the marginal effects plot depicting the effect of a one-unit increase in scarcity across values of NEV. This shows how attitudes may moderate the effect of water scarcity. We can see that the effect of scarcity on risk perception is higher for those with pro-environmental worldviews than for those who are less favorable toward the environment. For someone with an NEV of one, the effect of a one-unit increase in scarcity on risk perception is approximately 0.53, whereas the effect of a one-unit increase for someone with an NEV of five is over double that at 1.11. The relationship between risk exposure and risk perception appears to be more positive for those who hold pro-environmental attitudes than those who do not. For those with high

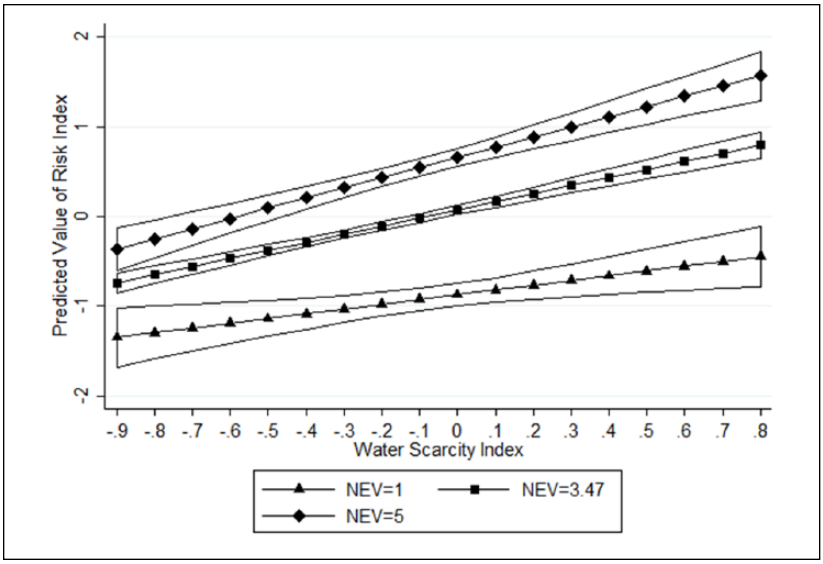

Figure 3. Effect of water scarcity index on risk perception index, conditional on NEV (95% confidence intervals presented).
Note. NEV = New Ecological Values.

values of NEV, a one-unit increase in water scarcity leads to over a standard deviation increase in risk perception. This relationship is both substantively and statistically significant in model (2). Although the interaction term is not quite significant at conventional levels in model (4), which includes the controls, the two-tailed nature of the test given means we are understating our confidence. H3 is a directional hypothesis that predicts that the effect of water scarcity will increase in values of NEV, meaning a one-tailed test is appropriate, and the correct *p* value is .04. There seems to be evidence in support of H3: The effect of local issue severity on risk perception is moderated by attitudes. It appears that individuals process information about their environment differentially depending on their ideological worldviews. If we were just to consider the noninteractive model, and not apply a conditional theory, we would be misrepresenting the ways that individuals perceive the environment around them.

Presented in a different way, Figure 3 shows the predicted values of the risk perception index for individuals with minimum, maximum, and mean values arrayed across the range of the water scarcity variable. We can see that regardless of the level of NEV, the severity of local water issues has a positive effect on risk perception. The slope of the line remains positive regardless of

whether the individual holds pro-environmental attitudes or not, but the magnitude of the relationship varies greatly. The effect of increasing water scarcity on someone with low NEV is relatively small, with the risk index only increasing by 0.90, or just under a single standard deviation, moving from the lowest value of water scarcity to the highest for an individual with an NEV of one. For someone with a NEV of 5, however, moving from the lowest value of scarcity to the highest value, results in an increase in risk perception of 1.92, or nearly two standard deviations. Put another way, the predicted difference in risk perception between the highest and lowest NEV individuals doubles moving from the moistest regions to the driest. In terms of risk perception of water issues, increasing regional water scarcity widens the gulf between those with opposing attitudes toward the environment. This fits with the previous literature on motivated reasoning that suggests that the processing of information by individuals with different beliefs leads to polarization in terms of issue positions. Again, inclusion of the controls in model (4) does not substantively change our results.

Looking now to Table 3, we can consider the results of the models predicting our policy preference index. We once again find support for hypotheses H1 and H2, although the support for H1 is not as strong as for the risk perception models. What is clearer in these models, however, is the conditional relationship between attitudes and risk exposure, as we find great support for H3. It appears that with respect to individual preference toward government policy dealing with water shortages, worldview heavily moderates the effect of scarcity. Looking first at the noninteractive model (5), we can see the unmoderated effects of water scarcity and NEV. NEV once again has a substantively and significantly positive effect on our index, as expected. While the effect of scarcity is still positive and significant, it is not nearly as strong as it was in the risk perception index. A one-unit increase in water scarcity only nets a .19 increase in policy preference, or the equivalent of about one fifth of a standard deviation increase. As we will see, this small effect is likely because the effect of water scarcity is highly moderated by attitudes. The inclusion of controls in model (7) again does not greatly change the results.

It is in the results of the interactive model (6) that we can see how the effect of regional water scarcity on an individual's policy preference is highly conditioned by environmental worldview. Once again, because interactive coefficients are difficult to interpret directly, we use marginal effect and predicted value plots for a simpler interpretation. Figure 4 displays the marginal effect of a one-unit increase in regional water scarcity across values of NEV. As we can see, not only does the effect of scarcity grow as NEV gets higher, but the marginal effect actually goes from negative to positive across the entire range. This means that for individuals with very low values of NEV, an increase in regional water scarcity actually leads to less support for policy

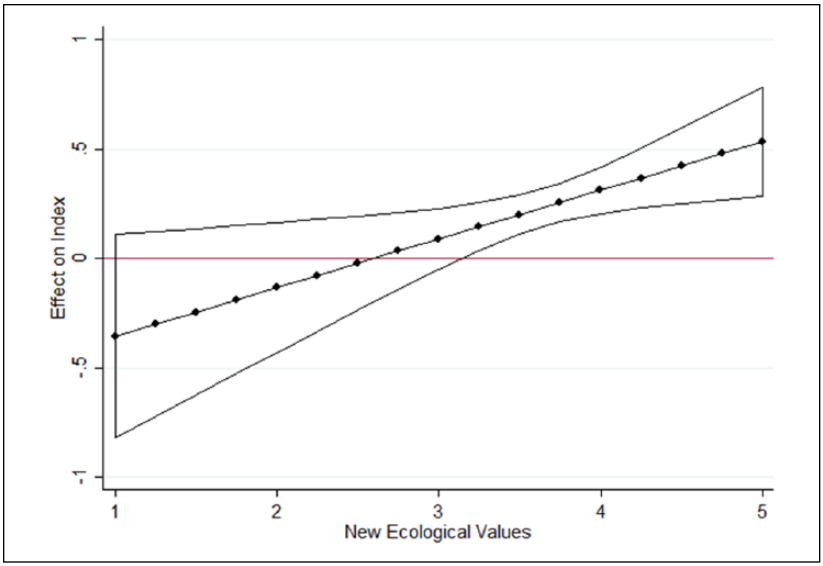

Figure 4. Marginal effect of water scarcity index on policy preferences index (95% confidence intervals presented).

action on water issues, although this effect is not quite significant at conventional levels, yet for those with high NEV, an increase in risk exposure leads to a sizable increase in policy support. The minimal effect of scarcity in the noninteractive model can be largely explained by this difference in effect for those who hold pro-environmental attitudes and those who do not. Increasing risk exposure only increases support for policy action for those who already hold pro-environmental worldviews.

Once again, a different presentation of these results can be seen in Figure 5, which depicts predicted values of our policy index for different levels of NEV across the range of water scarcity. The conditioning effect of attitudes on water scarcity is especially evident in this plot. While those with high NEV experience a strong and positive increase in preference for policy action as we move from high moisture to low moisture regions, those with low NEV actually decrease in support as the region gets drier. The difference between an individual with an NEV of one in the moistest region and driest region is −0.60, while the difference from moving from the moistest to driest for an individual with an NEV of five is 0.90. This is different from the risk perception case, because even those with low NEV experienced a positive impact of scarcity on risk perception, even if it was a smaller effect than those with high pro-environmental attitudes. Still, the outcome is similar. Greater exposure

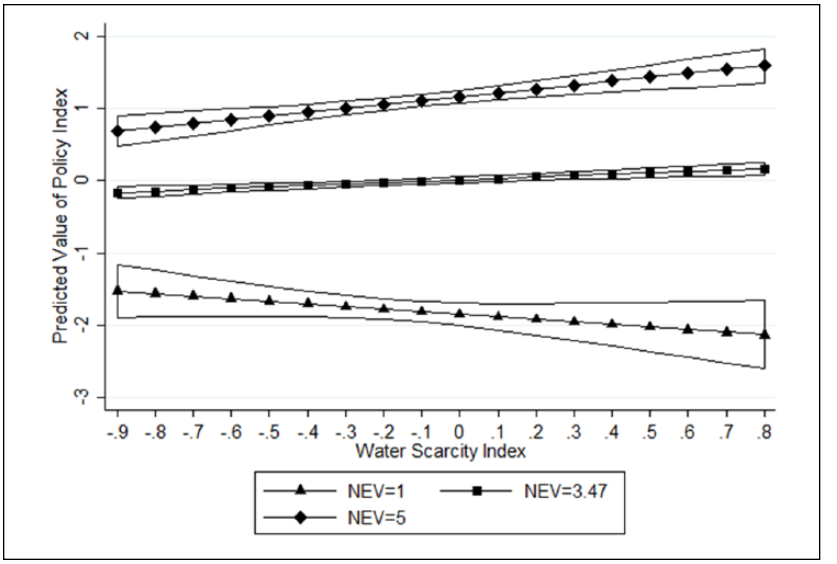

Figure 5. Effect of water scarcity index on policy preferences index, conditional on NEV (95% confidence intervals presented).
Note. NEV = New Ecological Values.

to water scarcity increases the cleavage between those with pro- and anti-environmental worldviews. The effect of the information presented to them by their local environments is moderated by their prior beliefs, and this leads to polarization in policy positions. Indeed, in the wettest region during the period examined here, the predicted difference in our policy preference index between an individual with an NEV of one and an NEV of five is 2.22, while the difference is significantly higher in the driest region at 3.73, a one and a half standard deviation increase.

Discussion

Our purpose in this analysis was to advance a conditional theory of motivated reasoning in the context of local issue severity. We explored whether individuals use worldviews as a filter through which they evaluate the risk of local environmental threats, such as water scarcity. The results of the study provide evidence that worldview moderates the effect of local issue severity on perceptions of risk and preferences for policy action. Those with pro-environmental ideologies interpreted information about their local environment differently than others, leading to polarization in risk perception and

policy preferences in water scarce areas among those with disparate ideological worldviews. This study fits well within the broader theory of motivated reasoning surrounding attention, information, and problem identification suggested at the macro level by Jones and Baumgartner (2005; Baumgartner & Jones, 2015) and supported at the micro level by a number of studies (McCright & Dunlap, 2011; Wood & Vedlitz, 2007; among others).

This study extends motivated reasoning theory by looking at how individuals interpret information about the environmental conditions in their area. Because individuals are biased information processors who use their preexisting biases to interpret information, including information about their local environments, this leads to polarization in the face of water scarcity. When the presence of a problem, such as water scarcity, in an individual's locality conforms to her prior held beliefs, she will be even more likely to express concern about the issue. On the contrary, when an individual is predisposed toward not having concern about an issue, its presence in his locality will not have as great an effect on his policy beliefs. In this way, worldviews do not only directly affect risk perception and policy preferences but also magnify or reduce the effect of localized conditions. By bringing together theories of motivated reasoning and ideological worldviews, we have gained further understanding into the ways in which individuals interpret information about their local environment, advancing beyond the idea that individuals react homogeneously to the presence of issues in their proximity.

These findings also have important policy implications. In the context of water scarcity, the results suggest that as population growth and climate change exacerbate issues in water scarce regions, policy consensus to mitigate the economic, social, and environmental costs may not come easily. Because individuals filter information about water scarcity through their worldviews, growing water scarcity may actually increase the ideological divide between those with disparate worldviews, meaning that already sharp divisions over water policy may become more severe. This type of policy stalemate is what Jones and Baumgartner (2005) suggested in their discussion of information processing at the macro level. They argue that because individuals are biased information processors, policy changes may be difficult to achieve. Because individuals do not respond to their information environment in uniform ways, instead defining issues in ways that conform to their predispositions, policy stability persists. It is only when a significant enough informational change occurs that large policy change is possible. Future work should aim at testing whether increasing water scarcity actually makes policy at the local level more difficult, and whether this is influenced by the ideological makeup of the locality.

We believe that this theory can be extended beyond the case of water scarcity. There are implications for other environmental contexts. It is easy to imagine applications to nuclear energy, pollution, or species conservation.

The clearest application, however, is to the formation of opinions on climate change. This theory suggests that the effect of local exposure to rising temperatures and physical risk in terms of elevation and coastal proximity could be moderated by worldviews. We would expect that those who are predisposed toward concern over climate change would be further convinced by their proximity to the issue, while those who are predisposed toward not caring about climate change would be unaffected by temperature changes or increased risk. Egan and Mullin (2016) have recently argued that as the weather experienced by Americans worsens due to climate change, calls for climate policy will increase. If individuals do not react to weather uniformly, however, and instead rely on their worldviews as filters through which they interpret their environment, as we found to be the case with water scarcity, bad weather alone may not be enough to deliver cries for policy change from the American public. The findings here suggest that because information is filtered through worldview, increased risk exposure may not guarantee policy consensus.

Authors' Note

The statements, findings, conclusions, and recommendations are solely those of the authors and do not necessarily reflect the views of the Texas Sea Grant, the National Oceanic and Atmospheric Administration, or the Department of Commerce.

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Notes

1. Two of the items loaded below .3 in the factor analysis, but in the correct direction. We have included them in the analysis here. Dropping them from the index does not change the results. The analysis without the two items can be seen in the online appendix (Table A17).

2. The Willmott and Feddema moisture index has previously been used in political science by Teodoro (2010) in the context of government adoption of water conservation rates.
3. The Palmer Drought Severity Index (Palmer, 1965) is another commonly used measure of water scarcity. As a robustness check, we performed the same analysis using the Palmer Drought Severity Index and found nearly identical results. The results can be seen in the online supplementary appendix (Tables A13-A16).
4. To ensure that other variables correlated with geography were not biasing our results, we also conducted a number of robustness checks. First, we estimated the models as hierarchical linear models, which controlled for other contextual variables. The results were not substantively different from those reported here, and so they are reported in the supplementary appendix (Tables A9-A12). We also estimated a fixed effects model that allowed us to control for the local mean attitudes (Table A18). The results were once again not substantively different from those reported here.

Supplementary material

The supplementary material for this article is available online.

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Author Biographies

David Switzer is a PhD candidate in political science and a predoctoral research associate in the Institute for Science, Technology, and Public Policy at Texas A&M University. His work focuses on environmental policy, primarily water policy, exploring on how citizen preferences and participation affect government decision making and performance.

Arnold Vedlitz is a professor and holder of the Bob Bullock Chair in Government and Public Policy in The Bush School of Government and Public Service at Texas A&M University. He works at the intersection of science-technology and public policy, seeking to understand the processes through which scientific and technical data and discoveries are understood and acted on by decision makers and the public.