

# Multifaceted Perspectives on Water Risks and Policies: A Cultural Domains Approach in a Southwestern City

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## *Abstract*

*Considering an array of perspectives on human-ecological problems and possible solutions is essential for developing strategies that are socially accepted, culturally appropriate, and ultimately supported by residents, whose views and behaviors significantly affect environmental conditions. Following a tripartite model of affective, cognitive, and conative judgments, this paper examines: 1) local concerns about municipal water consumption, 2) the perceived role residents' landscaping choices play in contributing to resource scarcity, and 3) attitudes about regulatory policies aimed at conservation. The analysis assesses how people's multifaceted perspectives are influenced by various cultural domains — specifically, ecological worldviews, political orientations, and ethnicity, which were more significant than social attributes controlled for in regression models. Advancing a robust conceptual approach to understanding the sociocultural basis of environmental judgments, we found a dominant influence for ecological worldviews across perspectives, with otherwise complex relationships between people's views and distinctive spheres of culture.*

*Keywords:* risk perceptions; tripartite judgments; cultural domains; water scarcity; environmental governance

## **Introduction**

Providing an adequate supply of water for communities and ecosystems is among the most pressing sustainability concerns worldwide, especially in arid cities that face rapid population growth, degraded water quality, and expected climate changes (Gober and Kirkwood, 2010). Beyond problems with the physical availability and quality of water, consumption patterns and conflicting views about how best to use, manage, and sustain resources pose challenges to sustainable development. In this paper, we focus on residents' perspectives on water resource problems, causes, and solutions in the burgeoning semi-arid metropolis of Phoenix, Arizona, where the overdraft of non-renewable aquifers is a serious problem and where rising demands for water threaten the sustainability of an essential but limited resource. Our specific attention to the role of residential demand in determining water resource sustainability is justified for two reasons. First, Phoenix illustrates the current and growing im-

portance of municipal water uses in urbanizing regions. Second, by considering how residents' views might spur or thwart action, this case informs critical "soft path" conservation strategies aimed at reducing water demand by altering consumptive behaviors (Gleick, 2002).

A number of scholars have recently called for research to assess how sociocultural attributes and processes shape people's understanding of and attitudinal judgments about human-ecological problems (Adeola, 2007; Dietz et al., 2005; Schultz et al., 2000). To address this need, we examine the extent to which cultural domains and social characteristics affect residents' judgments about water scarcity risks and mitigation strategies in Phoenix. Interdisciplinary scholars have defined and measured "environmental concern," "risk perceptions," or other constructs in varying ways, while commonly employing ambiguous approaches that are not well-grounded in theory (Dunlap et al., 2000; Dunlap and Jones, 2002). Inconsistent use of particular constructs and measures has subsequently led to difficulties in interpreting findings across studies (Larson, 2010; Larson et al., 2010). In this study, we clearly conceptualize and examine tripartite perspectives about water scarcity and resource governance in relation to varying cultural domains in Phoenix where Latinos represent a sizable portion of the population (U.S. Census Bureau, 2005).

Throughout the United States and around the globe, cultural minorities face greater environmental risks compared to white Anglos (Bullard, 2000; Evans and Kantrowitz, 2002), including Latinos in agricultural and industrial settings of the Southwest (Vaughn and Nordenstam, 1991). Much of this risk research has focused on toxic and hazardous waste or pollution, while less research has focused on risks and related judgments about other environmental issues, especially among Latino communities in urban settings (Whittaker et al., 2005). Due to increased exposure and sensitivity as well as decreased coping ability (Cutter et al., 2003), heightened vulnerability to risks among minority groups demands a closer look at how varying cultural groups view human-ecological problems and their alleviation (Peña, 2003; Taylor, 1989). With this intent, our research employs a tripartite model of environmental perspectives and a multifaceted view of cultural domains, as theorized below.

## **Cultural Domains and Environmental Perspectives**

Culture, defined as shared systems of values, meanings, and beliefs (Rohner, 1984), mediates how people conceptualize the environment in which they live. Following D'Andrade (1995), Handwerker (2002) and others, we envision culture as a multidimensional construct composed of various

"cultural domains" encompassing knowledge, values, and beliefs in specific content areas. The cultural domain approach is powerful because it assumes that people may share values in one domain, such as the environment, but hold distinct values in another domain, such as politics. Kempton and colleagues (1999) successfully used a "cultural models" approach to explore environmental perspectives, explaining that judgments are not isolated cognitive phenomena. Instead, environmental views are closely linked to various aspects of culture, such as beliefs about nature, the government, and social norms. In this study, the relative impacts of three cultural domains — ecological worldviews, political orientations, and ethnicity — on residents' views about water scarcity are examined, controlling for social attributes such as age and income. While environmental and political views represent specific content areas relevant for understanding risk perceptions, ethnicity captures information about peoples' cultural background, broadly construed.

As basic environmental beliefs that are widely shared among society, ecological worldviews are often characterized by general ideas about physical characteristics of the environment and people's relationship to nature (Thompson and Barton, 1994; Vaske and Donnelly, 1999). To date, much of the research on worldviews has employed a multi-item survey scale known as the New Ecological Paradigm, or NEP (Dunlap et al., 2000). The NEP evaluates general beliefs about the balance of nature, limits to growth, and human impacts on the natural environment. In this conceptualization, the New Ecological Paradigm is contrasted with the Dominant Social Paradigm, which represents beliefs in unlimited resources, technological solutions, and human control over nature. In some studies, NEP has been used to measure ecological 'concern,' 'attitudes' or other constructs (for example, Noe and Snow, 1990; Schultz and Zelezny, 1999). Following prominent scholars (Dietz et al., 1995; Dunlap et al., 2000), we conceptualize the NEP as basic environmental worldviews, or value orientations. As such, the New Ecological Paradigm of thought represents one domain of culture that influences relatively concrete judgments (including concerns and attitudes) about specific risks and mitigation strategies (Larson, 2010). Analyzing a primarily Anglo sample in the U.S., Slimak and Dietz (2006) recently reported that ecological worldviews predict people's concerns about a variety of risks. Focusing on water issues in the Southwest, we employ a similar approach by examining NEP as one of multiple cultural domains impacting environmental perspectives, along with political orientation and ethnicity.

Political ideology is another facet of culture closely linked to environmental views (Hodgkinson and Innes, 2000; Johnson et al., 2004; Schaaf et al., 2006). Political orientation in the U.S. is typically understood as a bi-directional

continuum from liberal to conservative (Ellis and Thompson, 1997). People with liberal political views tend to place value on equality and humanitarianism, while people with conservative views tend to place significant importance on security and order (Braithwaite, 1998; Feather, 1979). A large body of evidence indicates that people with relatively liberal political orientations exhibit pro-ecological worldviews (as measured by NEP) compared to others (Johnson et al., 2004; Van Liere and Dunlap, 1980). Yet this general principal does not always hold for risk-specific measures of concern, as with toxic nuclear waste (Kowalewski and Porter, 1993). In another study, political ideology explained ecological worldviews but not perceptions of specific risks (Slimak and Dietz, 2006). Such findings underscore the importance of studying diverse cultural domains in relation to various types of environmental perspectives, including but not limited to risk perceptions and ecological concerns.

Finally, environmental views may be shaped by ethnicity, as defined by discrete groups of people who share cultural attributes (Barth, 1969). In a comprehensive literature review, Vaughn and Nordenstam (1991) found that the effect of ethnicity on risk perceptions may be due to shared prior experiences or generalized beliefs. To capture different mechanisms that cause ethnic groups to share experiences and beliefs, we used a measure of ethnicity that encompasses both ethnic identity and acculturation. Ethnic identity refers to an individual's own feelings of membership and belonging to an ethnic group (Phinney, 1990). Acculturation captures the degree to which migrants have adopted the knowledge or beliefs typical of their new cultural context (Berry, 1997). In our analysis, we are particularly interested in understanding how ethnic identification — specifically as Latino or Hispanic relative to Anglos — shapes environmental views, along with linguistic acculturation and other factors.

Past studies indicate that shared ethnic characteristics — beyond particular ecological or political beliefs — might influence environmental perspectives among Latinos and Anglos. For instance, Latin American scholars describe a distinct environmental ethic among Latinos, with emphasis on the perceived interdependencies between people and nature as well as resistance to the social injustices of environmental degradation (Heyd, 2004; Lynch, 1993). Because Latinos tend to view themselves as intertwined with nature, they may feel more vulnerable to and concerned about risks compared to Anglos. A few studies have found that Latinos do express more concern about environmental risks than Anglos. For example, a longitudinal study in California found increasing environmental concern for various generalized risks (e.g., air and water pollution) among Latinos over time (Whittaker et al., 2005). A study in Tucson, Arizona also indicated heightened concern about drinking water quality among Latinos

compared to Anglos, especially those in close proximity to contaminated groundwater (Williams and Florez, 2002). Our study contributes to this vein of research by examining the relationship between ethnicity and affective, cognitive, and conative judgments around water.

## Controlling for Demographic Attributes

Scholars have long recognized the importance of statistically controlling for social attributes in studies of risk perceptions (Slimak and Dietz, 2006), particularly because ethnicity often covaries with socioeconomic status (Vaughn and Nordenstam, 1991). We therefore examine five demographic factors — age, length of residency, income, education, and gender — that could explain people's judgments about water scarcity and resource governance. Overall, these factors are hypothesized to influence human-ecological judgments because they affect personal experiences with risks, knowledge of and familiarity with associated problems, and the material and intellectual resources people have to mitigate losses (Cutter et al., 2003; Evans and Kantrowitz, 2002; Gee and Payne-Sturges, 2004).

First, we incorporate length of residence in the study area as a control variable since the familiarity thesis posits that experience with area-specific problems may actually minimize environmental concerns or perceived risks (Lima and Castro, 2005; Slovic, 1987). This expectation is consistent with literature that suggests long-time connections with specific places tend to moderate ecological views (Brandenburg and Carroll, 1995). For instance, newcomers to the western U.S. sometimes exhibit heightened concerns because of the environmental amenities that attract them to the region (Jones et al., 2003; Starrs and Wright, 1995). Socialization to regional customs further explains environmental perceptions and preferences, as with the 'oasis' tradition in Phoenix, AZ, where long-term residents tend to prefer the lush, well-watered landscapes to which they have become accustomed — relative to newcomers — in spite of the dry, native desert ecosystem (Larson et al., 2009a; Yabiku et al., 2008). Thus, residents who have lived longer in the study region may minimize concerns about water consumption while negating the need to address resource scarcity through policy mechanisms.

Yet other studies show that age is often negatively associated with ecological worldviews (as measured by NEP; Johnson et al. 2004) or other environmental attitudes, with the rationale that younger people exhibit the New Ecological Paradigm of thought more so than older people, who are relatively entrenched in the Dominant Social Paradigm (Dunlap et al. 2000). Whitaker et al. (2005), for instance, found that young adults (18-29) expressed greater support for environmental spending and greater opposition to offshore drilling

compared to older people, who were also found to be less concerned about toxic waste in California. Meanwhile, Slimak and Dietz (2006) found that older people rated biological risks, as well as ecological and chemical risks, as more troublesome than younger people. Perhaps greater sensitivity to certain risks among the elderly population elevates some of their environmental concerns, at least in some contexts, even though they tend to exhibit weaker pro-environmental attitudes than younger people.

With respect to socioeconomic status, economically disadvantaged residents may exhibit greater concern about environmental risks than well-off residents, because they have fewer financial resources to cope with risks (Cutter et al., 2003; Evans and Kantrowitz, 2002). The theory of environmental deprivation supports this view, suggesting that degraded conditions result in heightened concerns among underprivileged people (Whitaker et al., 2005). Slimak and Dietz (2006) also found that wealthier people exhibit diminished risk perceptions, although ecological worldviews and altruistic values significantly increased concerns more so than social-structural factors in their study. Overall, we anticipated that people with lower incomes would exhibit comparatively high levels of concern. People with lower incomes may not be as supportive of economic policies involving cost increases, however, because of the disproportionate impacts on them relative to wealthier residents with more disposable income.

In addition, education has often been linked to ecological worldviews (Dunlap et al. 2000), although Johnson et al. (2004) found no relationship with the NEP scale. In Whitaker et al. (2005), educated residents of California were more likely to self-identify as environmentalists and to oppose offshore drilling than less educated residents, who actually exhibited heightened concerns about pollution and toxic wastes compared to people with higher levels of education. Similarly, Slimak and Dietz (2006) reported that people with fewer years of education perceived several types of environmental risks as more threatening than more educated people. As a whole, while education may lead to stronger pro-environmental worldviews or attitudes, concerns about risks may be heightened among less educated people.

Finally, gender socialization sometimes leads to divergent environmental concerns and perspectives among men and women. In a review and synthesis of the literature, Davidson and Freudenberg (1996) examined five explanations for gendered environmental concern, concluding that heightened worries about the safety of their families contributes to greater concern among women compared to men, especially for localized risks. Yet findings for the explicit parental role explanation have been mixed. Moreover, the economic salience and knowledge arguments, which predict

that men's views about environmental matters vary according to their relative financial and educated status in society, have been weakly supported by empirical studies. Second only to the safety concern thesis, men's institutional trust diminishes their concerns about some environmental risks. A recent study supported similar findings, specifically in showing that women are more affectively concerned about the safety of local drinking water (Larson, Ibes, and White, 2010). On the other hand, women and men in that study were largely similar in their perceived causes of scarcity risks as well as their attitudinal support for water policy actions. Additional studies of multifaceted environmental perspectives are needed to help clarify their relationship with a variety of cultural and other factors.

### Conceptualizing Tripartite Environmental Perspectives

Building upon the tripartite model, we conceptualize human-ecological judgments as a multidimensional construct encompassing affective, cognitive, and conative views about environmental matters (Dunlap and Jones, 2002). With respect to water, we consider: 1) *affective concern* about water consumption rates at local and regional levels, 2) *cognitive perceptions* regarding the degree to which residential uses — that is, for watering yards and maintaining pools — contribute to potential problems, and 3) *conative attitudes* that reflect policy support for stringent resource governance strategies, including regulatory bans on water use and increasing the price of water to reduce consumption.

#### *Affective Concern about Water Consumption*

We define affective concern as emotional judgments that indicate the degree of worry or troublesome feelings people have about some matter (Dunlap and Jones, 2002). Such concerns are explicitly emotive in expressing care about an issue, as opposed to remiss or neutral feelings. While affective concerns about the environment might spur conservation behaviors, this is not always the case. An Australian study showed, for example, that people who express concern about water consumption actually use more of it, while residents also distanced water scarcity away from themselves by invoking concerns about nation-wide drought (Askew and McGuirk, 2004). In our research, we specifically examine concern about water consumption at two geographic scales, one proximate and one distant.

We examine concern at the local neighborhood and broader regional scales due to the hyperopia effect, which indicates that people tend to be more concerned about relatively distal, larger scale environmental problems (Garcia-Mira

et al., 2005; Uzzell, 2000). We focus on two local scales of water consumption, because smaller areas represent the everyday scales of human-environment interactions compared to broader geographic areas. Since residential areas or subdivisions tend to share characteristics that determine water use, such as affluence and landscaping features, neighborhoods are a critical unit of analysis for studies of municipal demand (Aitken, Duncan, and McMahon, 1991).

The degree to which people express diminished concern about consumption in their neighborhood has potential implications for reducing residential demands through emotional appeals to conserve water. If residents distance water consumption and associated risks away from their local environment — that is, with little concern about proximate issues or by attributing problems to other areas or other people — they may not be willing to change their own behaviors. As such, collective actions to ameliorate risks may be thwarted by a lack of concern about local issues (Garcia-Mira et al., 2005; Uzzell, 2000).

#### *Cognitive Causes of Water Shortages*

Cognitive judgments about human-ecological matters involve beliefs that represent knowledge and subjective understanding of how nature works, as well as how people interact with and impact the environment (Dunlap and Jones, 2002). We analyze cognitive beliefs, or perceptions, about the factors that contribute to, or cause, potential water shortages, while focusing on the degree to which residents see household consumption activities as anthropogenic sources of water scarcity. Since people tend to shift blame for environmental problems away from themselves and toward other people and nature (Faulkner et al., 2001; Larson et al., 2009b; Leiserowitz, 2005), cognitive beliefs about who contributes to risks potentially influence individuals' actions to help alleviate them.

Previous research has examined anthropocentric versus biocentric value orientations, which are defined as basic belief patterns (or worldviews) emphasizing human- or nature-centered rights and interests (Dunlap et al., 2000; Whittaker et al., 2006). Scholars have also examined selfish and altruistic values as predictors of pro-environmental behaviors, finding that biocentric orientations often combine with altruism to encourage conservation (Stern, 2000). In our analysis, we examine specific beliefs about self-oriented, anthropogenic causes of water scarcity because of their potential to negatively affect conservation by reducing feelings of personal responsibility and efficacy for mitigating environmental problems (Corral-Vedugo and Frias-Armenta, 2006; Oreg and Katz-Gerro, 2006).

Consideration of specific beliefs about how residential uses of water contribute to resource scarcity in the Phoenix

area is warranted by at least two facts: first, approximately two-thirds of municipal water is consumed for household activities region-wide; and second, municipal demands are quickly surpassing the long-dominant role of agriculture as the top water-use sector in the greater metropolitan area (Jacobs and Megdal, 2005). Additionally, the vast majority of residential water use occurs outdoors, primarily to irrigate yards or maintain pools. In a Phoenix study, for example, swimming pools, green lawns, and lot size were three of the most significant factors determining neighborhood water demand (the fourth was household size; see Wentz and Gober, 2007). We therefore assess residents' cognitive beliefs about the role they think outdoor water-use activities play in contributing to water scarcity risks in the region.

#### *Conative Attitudes toward Regulatory Policies*

Conative attitudes represent evaluative, positive or negative judgments about an action, thereby reflecting people's intentions to act in particular ways (Dunlap and Jones, 2002). As behavioral dispositions, conative attitudes are strongly linked to personal action and may mediate between broader values or general attitudes and actual conservation behaviors or environmental actions (see Ajzen's extensive work on the theory of planned behavior at <http://people.umass.edu/ajzen/>). For our study, we conceptualize conative attitudes as support for specific types of water policies, which are essentially akin to voting behavior. Given opposition to regulations, especially in the western U.S. (Larson, 2009; Roberts and Emel, 1992), we assess attitudinal judgments toward water-use restrictions and pricing mechanisms in particular.

Largely due to personal ideologies and utilitarian self-interests, people often oppose restrictive environment policies (Larson, 2009; Roberts and Emel, 1992). Individualistic values diminish support for policies that negatively impact people, for instance, by constraining their activities or by imposing costs on them. Conservative political leanings, which uphold individualism and oppose government interference in the economy, particularly sway negative attitudes toward regulatory policies (Carman, 1998; Van Liere and Dunlap, 1980). Anthropocentric values also result in opposition to environmental regulation, as people place more importance on how policies affect people, rather than how people impact the environment or natural resources (Stern, 2000).

Despite public opposition, it is sometimes necessary to implement stringent strategies, such as increasing the price of water (Corbella and Pujol, 2009) or requiring changes in consumption (Gleick, 2002), to enhance water-use efficiency and reduce demands on resources. Regulatory bans have been imposed in some places to manage residential water demand; while the Las Vegas region has limited turfgrass to conserve water, for example, local governments in Massa-

achusetts have implemented bans on irrigating lawns. In the study region of Phoenix, restrictions on residential water use have so far been minimal, and the price of water remains low. Even in the context of a decade-long drought, local government entities have not restricted the irrigation of yards or other high-volume water uses among residents, instead preferring to pump non-renewable groundwater in times of shortage (Kunzig, 2008).

## Research Design

According to the 2010 Census, the study region of metropolitan Phoenix, Arizona is home to approximately four million residents. Situated in the Sonoran Desert, the area receives less than eight inches of rainfall annually (Gober, 2006). Yet the grass lawns, green golf courses, and numerous artificial lakes throughout the region conjure up notions of a water-rich oasis, as distinct from the dry desert ecosystem in which the metropolitan area is located. Lush, well-watered landscapes in this arid city indeed lend to high water-use rates, which are substantially higher than nearby areas such as Tucson, AZ and Albuquerque, NM. Although the Phoenix area has access to large amounts of groundwater and surface water, with both aquifers and rivers providing vital resources to the region, droughts are a common occurrence and climate predictions forecast a warmer, drier future (Ellis et al., 2008). As Gober and Kirkwood (2010) report, under any climate scenario, groundwater sustainability will not be achieved given projected growth and unconstrained water usage. One potential solution is to alter consumptive lifestyle patterns, which justifies our focus on residential water use.

### *The Phoenix Area Social Survey (PASS)*

Data analyzed in this study were collected in 2006 in the second wave of the Phoenix Area Social Survey (PASS), a longitudinal survey that is administered every five years to monitor community dynamics and environmental attitudes and behaviors in the Phoenix region.<sup>1</sup> PASS employs a two-stage research design in which a systematic sample of neighborhoods and a random sample of households within each neighborhood are targeted for the survey. PASS 2006 neighborhoods were selected from 204 randomly sampled sites that are monitored for ecological change by the Central Arizona – Phoenix Long-Term Ecological Research (CAP LTER) project. CAP LTER's Survey 200 measures vegetation and soil properties as well as other ecological variables on 30x30 meter sample plots distributed over all types of land uses in the metropolitan area (Grimm and Redman 2004). Visual inspection of the 204 plots determined that 94 were located in residential areas; other plots were in the desert, agricultural fields, golf course, interstate highway, and other non-

residential areas. The residential plots (n=94) were joined with 2000 population data for Census block groups (BGs), which defined the neighborhood boundaries.

The neighborhoods (BGs) were cross-classified by location (core, suburban, fringe) and median household income (high, middle, low) to form sampling groups.<sup>2</sup> Another category of retirement communities (median age of population over 55 years) was added to reflect local population characteristics. To create a balanced sample of neighborhoods among these groups, PASS researchers then selected 40 BGs that represent variation in ethnic/racial composition, homeowners and renters, and municipalities across the region. Nationally, the population size of most BGs is between 600 and 3000, and most of the PASS BGs were in this range; five BGs had less than 600 and six had more than 3000 residents. In a few urban fringe locations, where the BGs were several times the average area 0.25 mi<sup>2</sup>, a smaller group of homes near the CAP LTER survey plot was selected for sampling households.

For the second stage of sampling residences, a list of home addresses for each BG was created from GIS-generated maps, which were verified by canvassing. We sampled the same number of households in each neighborhood, rather than sampling proportionate to population size, to ensure a minimum number of respondents in each neighborhood for comparative analysis. Forty randomly selected addresses (including single- and multi-family dwellings) in each neighborhood received advance notice of the survey through hand-delivered flyers and mailed recruitment letters that offered a financial incentive for completed surveys. Recruitment materials were printed in English and Spanish, and the adult in the household with the most recent birthday was asked to participate. From April to September 2006, households were offered three response options: an online survey (59%), a scheduled phone interview (34%), or in-person (7%). All survey modes asked identical questions.

After repeated contacts, the overall response rate was fifty-one percent (n=808). A minimum response rate of fifty percent (n=20) was obtained in every neighborhood. By current standards (Keeter et al., 2006), PASS is a rigorously designed survey with a high response rate. Similar to many surveys, respondents were more often female, white, and older and more highly educated than the general population. Using the 2000 Census block group data as a benchmark, thirty-five percent of both the neighborhood populations and the survey sample had a high school education or less, and twenty-one percent were over 65 years old. The median household income for the sample (in the \$60,000 range) was also equivalent to the study neighborhoods. Nearly one in five respondents self-identified as Latino/Hispanic, and ten percent of the surveys were completed in Spanish. Only respondents

who self-identified as “Hispanic, Latino, Mexican, Mexican-American or of Spanish background” (n=152) or “White/Anglo” (n=576) were included in the analysis for this article.

### The Variables and Data Analysis

Following the tripartite conceptualization, we examine multiple measures of human-ecological perspectives in our analysis. For *affective* judgments, the PASS survey measured residents’ “concern” about “the amount of water being used” by people in: 1) “the Valley,” a common moniker for the greater Phoenix region, and 2) their local area, or neighborhood. Response options ranged from “not concerned” (1) to “very concerned” (4). In measuring *cognitive* perceptions, we asked how much residents think the following “contribute to a future water shortage in the Valley:” 1) watering grass and plants in people’s yards and 2) swimming pools. For these two survey question items, responses spanned from “not at all” (1) to “a great deal” (10). Also measured on a ten-point scale, the *conative* realm of judgment evaluated respondents’ views on policies “to ensure the Valley has enough water in the future,” specifically: 1) increasing the price of water and 2) restricting water used for residential outdoor purposes, such as lawns. These two variables ranged from “strongly oppose” (1) to “strongly support” (10). For all survey questions, ‘don’t know’ and refusal options were also offered to PASS respondents; these responses were treated as missing values in the subsequent analysis.

For the cultural domains, we used four NEP statements included in PASS to gauge individuals’ orientation toward a pro-environmental worldview (see Appendix). Measured with a four-point disagree-agree scale on which higher numbers equate to a pro-ecological worldview (Table 1), the reliability test (Cronbach’s alpha = 0.6) was lower than the ideal 0.7 criterion. We nonetheless deemed the NEP index acceptable since it falls within a tolerable range and given the long-time use and proven dependability of the scale (Dunlap et al., 2000). To evaluate the political domain, we reclassified a standard, seven-point liberal-to-conservative scale into three groups that represent the polar viewpoints relative to the middle, moderate point on the scale.

Lastly, we operationalized ethnicity using a measure that encompasses ethnic identification and linguistic acculturation. Following the format used in the U.S. Census, ethnic identification is based on a standard self-reported measure for Anglo/white and Hispanic/Latino of any race or origin. Acculturation was based on the primary language spoken, or for our purposes, whether respondents took the survey in English or Spanish. Language is generally recognized as one of the primary determinants of acculturation (Montgomery, 1992), along with being the most common proxy for it (Valencia and Johnson, 2008). Based on this classification, our study in-

Table 1. Descriptive Statistics for Dependent and Independent Variables

Variables	Mean <sup>2</sup>	Standard Deviation	N
<b>Dependent Variables</b>			
<i>Affective Concern (1-4): Water Use</i>	3.14	.684	787
Regional Valley-Wide	3.56	.610	784
Local Neighborhood	2.77	.904	772
<i>Cognitive Causes (1-10): Scarcity</i>	6.78	2.39	776
Owning pools	6.78	2.48	770
Irrigating yards	6.78	2.39	773
<i>Conative Attitudes (1-10): Policies<sup>1</sup></i>	5.71	2.42	777
Restricting residential uses	6.52	2.81	770
Increasing price of water	4.92	3.04	772
<b>Explanatory Variables</b>			
Ecological Worldviews (NEP scale)	3.23	.601	788
Political Orientations <sup>2</sup>			743
Conservative	304 (40.9%)		
Moderate	257 (34.6%)		
Liberal	192 (24.5%)		
Anglo-Latino Ethnicity <sup>2</sup>			724
English-speaking Anglos	573 (78.9%)		
English-speaking Latinos	77 (10.6%)		
Spanish-speaking Latinos	76 (10.5%)		
Education			808
Less than high school	54 (6.5%)		
High school graduate	208 (25.7%)		
Some college	189 (23.6%)		
Bachelor’s degree or higher	349 (34.6%)		
Income <sup>3</sup>	4.13	2.780	709
Age	48.21	16.42	797
Years residency in Phoenix area	21.39	16.17	762
Gender: female <sup>2</sup>	446 (56.5%)		786

Notes: <sup>1</sup>The conative attitudes were analyzed separately in the regression models due to the relatively low correlation between the judgments examined (see Table 2). <sup>2</sup>For the categorical variables, frequencies (and percentages) are presented for each category. <sup>3</sup>Household income was measured on a ten-point scale ranging from \$20,000 and under (1) to more than \$200,000 (10).

cluded three groups: English-speaking Anglos (about 80%) and English-speaking and Spanish-speaking Latinos (10.5% each).

The remaining explanatory factors, which serve as statistical controls in our analysis, included: residents’ age, the number of years they have lived in the Phoenix area, a four-point variable for the highest educational level achieved, a ten-point household income scale, and a binominal gender variable (see Table 1 for details).

In the first stages of analysis, descriptive statistics (Table 1) were calculated for all variables, and a correlation matrix (Table 2) was calculated to examine bivariate correlations among the dependent variables representing human-ecological judgments. To examine how the various cultural domains and other explanatory factors affect multifaceted perspec-

Table 2. Bivariate Correlations among Judgments Comprising Dependent Variables

(All Pearson's rho values are significant at  $p < 0.001$  level.)

	Affective Concerns about Water: Resource Consumption			Cognitive Causes of Scarcity: Outdoor Residential Uses			Conative Policy Attitudes: Regulatory Strategies		
	Overall Concern	Regional: Valley	Local: Neighborhood	Overall Perception	Yard Irrigation	Swimming Pools	Overall Attitudes	Increasing Prices	Restricting Uses
Concern:	1								
Regional		.817		.306	.262	.271	.331	.209	.354
Local		1	.492	.292	.271	.236	.310	.207	.314
Perception:			1	.241	.190	.232	.276	.165	.306
Irrigation				1	.867	.877	.409	.246	.437
Pools					1	.516	.371	.215	.397
Attitudes:						1	.343	.212	.367
Pricing							1	.837	.805
Restricting								1	.342
									1

tives, four multiple regression models were run. Based on bivariate correlations, concern about water consumption (at both scales,  $\rho = 0.49$ ,  $p < 0.01$ ) and perceptions about residential uses (for both yards and pools,  $\rho = 0.52$ ,  $p < 0.01$ ) were treated as composite variables. Attitudinal support for pricing policies and watering restrictions were analyzed separately due to the relatively low correlation ( $\rho = 0.34$ ,  $p < 0.01$ ) between these items (Table 2).

In each model, the dependent variable was regressed on the cultural domains — 1) ecological worldviews, 2) political orientation, and 3) ethnicity, along with the five control variables: 4) age, 5) years of residency in the Phoenix area, 6) income, 7) education, and 8) gender. Dummy codes were used for political orientation, ethnicity, and gender, with the referent groups being conservative, English-speaking Anglo, and female, respectively (Tables 1 and 3).

### Research Findings

Across the four models, the cultural domains and control variables best explained affective concern about water consumption rates ( $R^2 = 0.19$ ,  $F = 11.61$ ,  $p < 0.01$ ), followed by conative attitudes toward water pricing and regulations ( $R^2 = 0.09$  for both; see Table 3). Although all models were statically significant, the  $R^2$  values were low, especially for the conative and cognitive models ( $R^2 = 0.06$  for perceptions about anthropogenic causes of water scarcity).

Regarding the cultural domains, ecological worldviews strongly influenced affective and cognitive judgments as well as conative attitudes toward regulations (Table 3). However, environmental orientations were not at all related to support for increasing the price of water. In contrast, conservative political orientations increased opposition for pricing mechanisms while also diminishing concerns about water consump-

tion rates. Meanwhile, English-speaking Latinos opposed increasing the price of water compared to the reference (Anglo) group, while Spanish-speaking Latinos were more supportive of pricing policies. Spanish-speaking Latinos were also more concerned about water consumption than Anglos, and they perceived residential uses of water as relatively significant while supporting restrictions on them.

Of the control variables, all were significant in at least one model, except gender, which did not affect any of the environmental perspectives examined (Table 3). While age influenced cognitive perceptions and conative attitudes, income, education, and residency in the Phoenix region were each significant in only one model — respectively, for the perceived causes of scarcity and support for pricing policies and restrictions on water uses. In particular, wealth diminished the degree to which respondents perceived residential uses as contributing to water scarcity, and having a college degree raised support for increasing the price of water relative to others. Finally, long-term residents more strongly opposed restrictions on water use relative to newcomers, and elderly people tended to view anthropogenic causes of water scarcity as more critical than young people. Older residents also exhibited greater support for pricing and regulatory policies. Although select social attributes helped explain cognitive and conative judgments, they did not affect concerns about resource consumption, and the cultural domains better explained human-ecological perspectives overall.

### Discussion of Results

Among the cultural domains examined, pro-ecological worldviews appear to elevate concerns about specific issues, such as water consumption, while also leading to heightened perceptions about the anthropogenic causes of resource scarcity as well as support for regulations on residential uses



Table 3. Explanatory Models for Judgments about Water Scarcity and Resource Governance (note  $p < 0.01^{**}$  and  $p < 0.05^{*}$ )

	<b>Model 1</b> <b>Affective</b> <i>Concern about</i> <i>Consumption</i>	<b>Model 2</b> <b>Cognitive</b> <i>Anthropogenic</i> <i>(Residential) Causes</i>	<b>Model 3</b> <b>Conative</b> <i>Support for</i> <i>Pricing</i>	<b>Model 4</b> <b>Conative</b> <i>Support for</i> <i>Restricting</i>
Variable	B (SE)	B (SE)	B (SE)	B (SE)
Constant	2.289 (0.185)	4.947 (0.629)	3.694 (0.883)	3.167 (0.818)
<b>Cultural Domains</b>				
<i>Ecological Worldview</i>	0.221** (0.043)	0.384** (0.147)	0.380 (0.204)	0.910** (0.190)
<i>Political Orientation: Liberal</i>				
Moderate	-0.040 (0.066)	0.159 (0.225)	-0.585 (0.316)	-0.166 (0.292)
Conservative	-0.145* (0.065)	-0.212 (0.221)	-1.265** (0.310)	-0.164 (0.286)
<i>Ethnicity: English-speaking Anglos</i>				
English-speaking	-0.032 (0.084)	-0.043 (0.289)	-0.879* (0.409)	0.049 (0.377)
Spanish-speaking	0.834** (0.108)	0.833* (0.365)	1.341** (0.510)	1.149* (0.472)
<b>Social Attributes (Control Variables)</b>				
<i>Years of Residency</i>	0.001 (0.002)	-0.003 (0.006)	0.010 (0.008)	-0.026* (0.007)
<i>Income</i>	0.007 (0.009)	-0.074* (0.035)	0.042 (0.049)	-0.001 (0.45)
<i>Gender: Female</i>	0.061 (0.051)	0.049 (0.175)	-0.438 (0.245)	-0.154 (0.227)
<i>Age</i>	.001 (.002)	0.021** (0.006)	0.019* (0.008)	0.027** (0.008)
<i>Education: Bachelor's or more</i>				
Less than high school	-0.146 (0.125)	-0.444 (.428)	-0.006 (0.595)	-0.459 (0.551)
High school graduate	-0.002 (0.069)	-0.221 (0.234)	-0.504 (0.328)	-0.538 (0.306)
Some college	-0.027 (0.067)	-0.210 (0.228)	-0.654* (0.318)	0.063 (0.295)
$R^2$	0.19	0.07	0.09	0.09
$F$	11.614	3.382	4.731	4.675
Sig.	<0.001	<0.001	<0.001	<0.001

of water. This can be seen in the consistent relationship between broad-based ecological worldviews — emphasizing biocentrism, rather than anthropocentrism, as evaluated by the New Ecological Paradigm scale — and diverse affective, cognitive, and conative judgments. Yet environmental value orientations were not significant in explaining attitudes about pricing policies, which were better predicted by other cultural and demographic factors including political and ethnic affiliations as well as age and education. Overall, the fact that varying human judgments — specifically, concerns about water scarcity, the perceived causes of risks, and attitudes toward regulatory policies — are best predicted by different sets of socio-cultural factors highlights the value and validity

of robust, multifaceted approaches to understanding public perspectives on complex environmental challenges.

As the only explanatory factor significant in all of the models we examined in our regression analysis, ethnic identity and acculturation widely explained variation in tripartite perspectives. Further research is needed to help determine more precisely which Latino beliefs or experiences are responsible for these relationships. For instance, beliefs about human-environment interdependencies and social resistance have been highlighted as distinguishing aspects of Latino environmentalism (Heyd, 2004), and thus, these worldviews might underlie cultural influences on ecological views that are captured by ethnic identity by not the New Ecological Paradigm of thought (i.e., as measured by Dunlap et al.'s NEP scale). In our analysis, English-speaking Latinos opposed raising the price of water relative to Anglos, perhaps because they have become accustomed to cheap water rates in the region while still holding other cultural beliefs that influence their views. Perhaps tenacious social resistance among acculturated Latinos explains their opposition to raising water prices, for example, even though they exhibit similar levels of concern about water consumption compared to Anglo residents. Since Spanish-speaking Latinos expressed the strongest affective worries about consumption, beliefs about the interdependence between society and nature might make them feel more vulnerable to and concerned about environmental risks compared to others. Collective social orientations among Latinos (Matsumo et al., 1997) may also contribute to altruistic concerns about the environment or support for policies, but additional studies

are needed to examine how distinctive aspects of ethnicity and acculturation influence diverse judgments.

Political ideologies affect specific environmental perspectives through values and beliefs about individualism and collective societal actions. Specifically, politically conservative people — who tend to value individualism and oppose government intervention in the free market — are less concerned about consumption and are more opposed to increasing the price of water compared to liberals. This finding reflects the personal interests of conservative residents and their ideological opposition to regulatory controls. Somewhat surprisingly, though, political orientations did not affect conative attitudes about water-use restrictions in this study.

Perhaps familiarity with the region's seemingly abundant water supplies trumps political orientations in explaining perspectives over the long run, especially given the lack of regulations on water use in the region. However, since political orientation does influence attitudes toward environmental regulations in other cases (e.g., Carman, 1998; Schaaf et al., 2006), more research is needed to further assess the relationships between an array of human-ecological judgments and political beliefs across varying geographic and policy contexts.

In Phoenix, long-term residents appear socialized to a local environment of minimal regulations over water resources. Place-based acculturation to the lush landscapes throughout the region may ultimately reinforce lax consumption practices, as does the promotion of the area as a water-rich oasis by ecologically-ignorant booster campaigns claiming, "the desert is a myth" (Stearns, 2005). Other research has drawn similar conclusions, finding that long-time Phoenixians' prefer irrigated lawns more so than newcomers, who tend to prefer drought-tolerant, rock-based yards (Larson et al., 2009b; Yabiku et al., 2008). While a history of abundance and familiarity with the status quo in the Phoenix oasis appear to fortify opposition to water-use restrictions, the experience that comes with age seems to enhance awareness about the anthropogenic sources of risks while also increasing support for conservation-oriented regulations. As a whole, these findings indicate the importance of both place-based and social experiences in shaping risk perceptions and policy attitudes.

In our analysis, cognitive perceptions about residents' contributions to water scarcity were least well explained among the models. Beyond ecological worldviews and ethnic acculturation, age and income influenced the degree to which residents perceived anthropogenic sources as critical causes of potential water risks. Since affluence also increases water consumption (Harlan et al., 2009), the perception among wealthy residents that outdoor water uses play a minor role in determining resource scarcity has detrimental implications for reducing municipal demand. As high-income residents, young people, or others displace blame for water resource problems away from their own residential activities and local communities, changing consumptive habits among these populations will be especially difficult. Thus, efforts to reduce water demand by encouraging conservation behaviors should establish the critical role of household uses in contributing to regional water demand while attempting to cultivate a sense of efficacy and personal responsibility for conservation among residential communities.

Based on this Phoenix-based study, one suggestion is to foster shifts in ecological worldviews, cognitive perceptions, and policy attitudes. One cautionary note, however, is that

values and value-based ideologies, worldviews, and attitudes tend to be steadfast and slow to change, which makes it all the more imperative to shift regional identities and marketing campaigns toward a culture of conservation, as opposed to the culture of consumption established by the long-time promotion of the area as a lush, oasis environment. Given that people often mistakenly blame newcomers for bringing thirsty lawns to the region, the views, expectations, and practices of long-time residents must be specially addressed. Yet in the face of conservative political ideologies and dominant Anglo perspectives, attempts to foster conservation through regulations or reductions in water use may prove challenging. Thus, voluntary efforts or appeals to existing cultural views may be necessary, along with the political will to change the status quo of high rates of consumption and few restrictions on water use. Informing the public about water pricing structures may help garner support for such policies, especially since many block-rate structures for water conservation maintain water prices for essential, basic uses while aiming to increase the price primarily for excessive amounts of water used for non-essential purposes.

Although our findings illustrate the value of robust, multifaceted approaches to understanding complex environmental perspectives, the low variance explained in the regression models warrants attention in future studies. One suggestion is to employ multi-item measures of social-psychological constructs for enhanced reliability, including incorporation of the entire NEP scale. Improving the conceptualization and measurement of varying cultural domains is also recommended. One construct and measure to consider incorporating into future studies is the Human Interdependence Paradigm (HIP) developed by Corral-Verdugo et al. (2008), who illustrated that different cultural groups (evaluated by nations of origin) recognize that human welfare depends on environmental conditions and vice versa. In contrast to the common anthropocentric versus biocentric dichotomy, this worldview — which resonates with the concepts and goals of sustainable development — may be more appropriate than the NEP, at least for some people or some places, and especially for Latino cultures that tend to view people and the environment as interconnected.

## Conclusions

In sum, cultural domains better explained environmental perspectives than demographic factors, with ethnicity and ecological worldviews most significantly influencing affective, cognitive, and conative judgments about water issues in metropolitan Phoenix, AZ. Yet conservative political beliefs increased opposition to raising the price of water, while ecological worldviews had no impact on this particular attitudi-

nal judgment. Liberal political orientations, meanwhile, heightened residents' concerns about consumption, which were best explained by the three cultural domains analyzed herein and not at all by demographic factors. Among ethnic groups, Spanish-speaking Latinos exhibited relatively strong pro-environmental views for all dimensions of judgment, whereas English-speaking Latinos appear acculturated to local Anglo perspectives. Long-term residents also appear acculturated to the status quo of well-watered landscapes and few regulations in the Phoenix oasis, given heightened opposition to water-use restrictions among them compared to newcomers. The findings of this study, overall, suggest that cultural beliefs, social experience, and other demographic attributes influence tripartite human-ecological perspectives in distinctive ways, thereby illustrating the validity of our cultural domains approach to understanding multifaceted judgments about water risks and policies.

To generalize across studies of complex environmental perspectives and human-ecological interactions, we strongly recommend the use of the tripartite model and cultural domains framework. Both conceptually and methodologically, research should continue to advance knowledge about how various domains of culture influence different judgments about risks across diverse ethnic groups and geographic contexts. Building on the tripartite approach, explicit definitions of social constructs and consistent methods for evaluating them are crucial for conceptual clarity, while avoiding ambiguous references to terms such as "ecological concern" or inconsistent uses of specific measures such as the New Ecological Paradigm scale. Clearly conceptualizing and analyzing an array of environmental perspectives in relation to cultural, structural, and other factors will not only facilitate comparisons across studies but will also aid the development of robust theories about risk perceptions, environmental attitudes, and other judgments. Additionally, considering how the particularities of places affect human-ecological perspectives and dynamics is crucial, especially for fostering governance approaches that are sensitive to people's concerns, understanding, and willingness to support various policies and actions.

By diverting streams and by pumping non-renewable groundwater, the Phoenix region has historically developed and fostered an idealized, lush, oasis environment. Although water managers have traditionally provided reliable supplies through technological solutions, such as building dams or importing water, prominent scholars have called for demand-side approaches that address consumptive lifestyles (Gleick, 2002; Gober and Kirkwood, 2010). Enhancing water-use efficiency through conservation efforts is an increasingly critical adaptation strategy, as climate change renders regions such as the southwestern U.S. drier and as new water supplies become scarcer and more costly. While balancing water sup-

plies and demands for urban sustainability, reducing resource consumption is a matter of stewarding a finite resource for both anthropocentric and biocentric purposes. As such, developing ways to move away from a culture of consumption towards one of conservation will help establish the ethics and actions needed for sustainable resource management and adaptation to environmental change.

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## Appendix: Survey Statements and Descriptive Statistics for NEP Scale Items

Ecological Worldviews	Mean	St. Dev.
<i>Composite NEP variable (<math>\alpha=0.60</math>)</i>	3.23	0.60
Despite special abilities, humans are still subject to laws of nature.	3.48	0.74
Plants and animals have as much right as humans to exist.	3.30	0.89
When humans interfere with nature, it produces disastrous consequences.	3.18	0.88
Earth is like spaceship with limited room/resources.	2.97	0.99

## Endnotes

- 1 Email: kelli.larson@asu.edu
- 2 The first wave of PASS, a pilot study, was fielded in 2001 and the third and fourth waves will be fielded in 2011 and 2016.
- 3 Location was defined as: core, or within 5 miles of downtown Phoenix or within 1.5 miles of the 7 other large-city downtowns; fringe, or urban growth areas developed between 2000-2005 with moderate amount of undeveloped land within a mile of the neighborhood in 2005; suburban, including all other neighborhoods. Income levels (annual 1999 median) were defined as: high (greater than \$70,000); middle (between \$35,000 and \$69,999); low (less than \$35,000). Middle/high income core BGs and low/middle income fringe BGs were combined into two groups because there were two few cases of each individual combination.

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