The changing sociocultural context of wildlife conservation

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Abstract: We introduced a multilevel model of value shift to describe the changing social context of wildlife conservation. Our model depicts how cultural-level processes driven by modernization (e.g., increased wealth, education, and urbanization) affect changes in individual-level cognition that prompt a shift from domination to mutualism wildlife values. Domination values promote beliefs that wildlife should be used primarily to benefit humans, whereas mutualism values adopt a view that wildlife are part of one’s social network and worthy of care and compassion. Such shifts create emergent effects (e.g., new interest groups) and challenges to wildlife management organizations (e.g., increased conflict) and dramatically alter the sociopolitical context of conservation decisions. Although this model is likely applicable to many modernized countries, we tested it with data from a 2017–2018 nationwide survey (mail and email panel) of 43,949 residents in the United States. We conducted hierarchical linear modeling and correlational analysis to examine relationships. Modernization variables had strong state-level effects on domination and mutualism. Higher levels of education, income, and urbanization were associated with higher percentages of mutualists and lower percentages of traditionalists, who have strong domination values. Values affected attitudes toward wildlife management challenges; for example, states with higher proportions of mutualists were less supportive of lethal control of wolves (Canis lupus) and had lower percentages of active hunters, who represent the traditional clientele of state wildlife agencies in the United States. We contend that agencies will need to embrace new strategies to engage and represent a growing segment of the public with mutualism values. Our model merits testing for application in other countries.

Keywords: multilevel analysis, social change, values, value shift, wildlife value orientations

Abstract: Introdujimos un modelo multinivel del cambio de valores para describir el cambiante contexto social de la conservación de fauna. Nuestro modelo representa cómo los procesos a nivel cultural llevados por la modernización (p. ej.: aumento de riqueza, educación y urbanización) afectan a los cambios en la cognición a nivel individual que incitan a un cambio de los valores de dominación a los valores de mutualismo de la fauna. Los valores de dominación promueven la creencia de que la fauna debería usarse principalmente para beneficio de los humanos, mientras que los valores de mutualismo adoptan una visión de que la fauna es parte de la red social de uno y digna de cuidados y compasión. Dichos cambios generan efectos emergentes (p. ej.: nuevos grupos de
interés) y retos para las organizaciones de manejo de fauna (p. ej.: conflictos mayores) y alteran dramaticamente el contexto sociopolítico de las decisiones de conservación. Aunque este modelo probablemente pueda aplicarse a muchos países modernizados, lo pusimos a prueba con datos de un censo nacional de 2017-2018 realizado (por correo y correo electrónico) a 43,949 residentes de los Estados Unidos. Realizamos un modelo de rango jerárquico con el fin de examinar las relaciones. Las variables de modernización tuvieron efectos sólidos a nivel estatal sobre la dominación y el mutualismo. Los niveles altos de educación, ingresos y urbanización estuvieron asociados con los porcentajes más altos de mutualistas y con los porcentajes más bajos de tradicionalistas, quienes tienen valores de dominación fuertes. Los valores afectaron a las actitudes hacia los retos para el manejo de fauna; por ejemplo, los estados con proporciones mayores de mutualistas mostraron un menor apoyo para el control del lobo (Canis lupus) y tuvieron porcentajes más bajos de cazadores activos, quienes representan a la clientela tradicional de las agencias estatales de vida silvestre en los Estados Unidos. Sostenemos que las agencias necesitarán adoptar nuevas estrategias para envolver y representar a un segmento creciente del público con valores mutualistas. Nuestro modelo amerita ser evaluado para su aplicación en otros países.

Palabras Clave: análisis multinivel, cambio en los valores, cambio social, orientaciones de los valores de la fauna, valores

Introduction

The current state of biodiversity conservation is largely the result of sociocultural systems that have emerged in adaptation to the environment (Martin et al. 2016). Scientific understanding of how to predict or intentionally affect change in these systems is limited, in part, due to narrow views of social phenomena. Traditionally reductionist and isolated social science disciplines are now advancing broader, multilevel, dynamic social-ecological systems approaches that can enhance understanding of the social context that shapes and responds to environmental conditions (Wilson 1999; Oishi & Graham 2010). We adopted this approach in depicting a multilevel model of the changing sociocultural context of wildlife conservation and tested it in the United States through a 2017–2018 nationwide survey of over 43,000 U.S. residents. We sought to find empirical evidence of such change and to determine its implications for conservation.

Background

The governmental organizations responsible for conservation and management of natural resources in the United States emerged in the early 1900s to address concerns about resource overuse (Pisani 1985; Hays 1999). They viewed natural resources as a commodity to fuel the country’s rapid expansion. This utilitarian view represented public values at the time, and the culture of government agencies developed in symmetry with those values. This utilitarian culture was at the core of university programs that trained agency professionals in wildlife management, and professional societies sustained the norms of the profession (Gill 1996). Funding through the sale of recreational hunting and fishing licenses provided resources for state wildlife agencies and closed the iron triangle of U.S. politics (i.e., policy-making relationship among Congress, agencies, and interest groups [Adams 1981]), resulting in a top-down, expert driven, client-based approach to wildlife management (Jacobson & Decker 2008). The guiding principles of the North American model of wildlife conservation are still held as foundational by agencies. Hunting, fishing, and trapping are considered fundamental uses of wildlife to be managed in trust for the public (Organ et al. 2010). Agency actions transformed the natural environment (e.g., unregulated populations enhanced at the expense of predators to ensure abundant prey for hunters) (Berger et al. 2001; Ripple et al. 2014).
More recently, the percentage of the U.S. population that hunts and fishes has declined steadily (in 1975 10% and 27% and in 2015 4% and 14%, respectively) (U.S. Fish and Wildlife Service 2016). These declines have raised concerns about the future of state agency funding to support conservation (Williams 2010). Challenges have also arisen from increased social conflict over wildlife policy issues, particularly around management of predators, suggesting the public is increasingly at odds with traditional management approaches (Manfredo et al. 2017; Slagle et al. 2017; Bruskotter et al. 2019). In response to these challenges, wildlife agencies have sought to include a broader array of stakeholders while also investing in efforts to recruit hunters (Council to Advance Hunting and the Shooting Sports 2016; Association of Fish and Wildlife Agencies 2019).

**Model of Sociocultural Change Affecting Wildlife Conservation**

Building on theories of modernization and cultural change, we propose that this growing social conflict and declines in hunting are due to a fundamental cultural shift reflected in changing societal values (Fig. 1). In the period of economic growth following World War II, increased U.S. productivity created an extraordinary degree of prosperity (Ciment 2015). Economic growth was also associated with other changes, such as increased education and urbanization, that altered the context of U.S. life. Cross-cultural-values researchers believe such modernization spawned a global shift in human needs and a corresponding shift in values that increasingly emphasize self-expression, social affiliation, and egalitarianism over subsistence needs (Schwartz 2006; Inglehart 2018). Longitudinal data supporting this idea also reveal how the shift generated greater concern for the environment, increased interest in public participation in political processes, and new perspectives, including a greater emphasis on harmony over mastery in human–environment relationships (Schwartz 2006; Gelissen 2007; Haller & Hadler 2008; Inglehart 2018; Franzen & Meyer 2010).

We argue these same modernization forces propelled a series of changes that altered the social context of wildlife conservation. This cultural-level change affected social and ecological conditions and had a profound effect on human cognitive processes about wildlife. At the individual level, this change unfolded at the intersection of 2 phenomena. First, modernization elevated the need for social affiliation, while increased urbanization led to social isolation (Hortulanus et al. 2006). Social priorities shifted to emphasize the need for companionship and a sense of community (Bess et al. 2002), which helped foster a social connectedness with wildlife as fellow life forms or companions. Second, modernization lessened people’s reliance on wildlife for subsistence and their day-to-day experiences with wildlife, decreasing wildlife-related risks and fear of encounters (Bruskotter et al. 2017). Learning through direct experience was replaced by learning about wildlife indirectly through media and other outlets, where wildlife are often highly anthropomorphized. Wildlife were increasingly seen as more humanlike and coexisting with humans in a shared social context (Franklin 1999; Manfredo et al. 2019). As people categorized animals more frequently as conspecifics, ideals and ethics about wildlife changed. The results of these changes are described as a shift from domination to mutualism wildlife values (Manfredo et al. 2009; Teel & Manfredo 2009). Modernization’s effects on broader values are necessary but not sufficient for explaining this shift toward mutualism. Although modernization resulted in less direct contact with wildlife, we contend increased emphasis on anthropomorphism and social affiliation catalyzed the shift (Manfredo et al. 2019). At the state level, this shift was propelled by intergenerational replacement and immigration.

Domination values support a view that wildlife should be used to benefit humans. Domination is a defining cultural ideal that has dramatically shaped U.S. residents’
Interactions with the natural environment (Kluckhohn 1951; Schwartz 2006). It is believed to have originated during the Protestant Reformation in Europe (Pattberg 2007). Findings supporting this notion show that domination wildlife values are stronger among U.S. residents with ancestry from European countries where the Reformation began (Manfredo et al. 2016). Part of the process of domination is to elevate differences between humans and wildlife, which is exemplified in the Cartesian view of animals (i.e., animals are unable to feel pain and undeserving of compassion) (Cottingham 1978). Psychologically and ethically, this facilitates the assignment of wildlife to roles and treatment undesirable to humans and a view that it is culturally acceptable to use wildlife to benefit humans. In contrast, mutualism values, emerging through modernization and the associated trend toward anthropomorphic thinking, reflect a view that wildlife are part of one’s social network, possessing many of the same characteristics as humans, and deserving of rights and compassion like humans.

We take a broad systems view of values, as defined by 4 basic characteristics (Manfredo et al. 2017a). First, values represent enduring social ideals embedded in all aspects of life, including attitudes, norms, identities, stories and myths, language, institutions, and material culture. Values are fundamental goals and principles that guide human behavior across many situations. Second, values are multilevel (represented in layers of social organization) and are attributes that bind groups, organizations, and cultures. Third, values are adaptive, functioning to situate people in relation to others and their environment. Finally, values are dynamic; they change in response to modifications in social–ecological conditions over time. Although changes occur, value structures are remarkably persistent within individuals and across generations over time (Manfredo et al. 2016, 2017a). Values are formed through the accumulation of experiences in early life, during which time individuals’ social and environmental surroundings are associated with purpose, reward, and social appropriateness.

The cross-level downward trend of emergent effects of modernization on individuals’ wildlife values was followed by emergent effects arising up through levels of the sociocultural system (which flow back down through the system reinforcing the trend) (Fig. 1). For example, with the growth of mutualism values, new formal and informal groups emerged at higher levels of social aggregation to affect wildlife policy. Mutualist positions on policy issues often stand in stark contrast to those borne from U.S. traditions of wildlife management rooted in a domination ideology. Historically, people opposing wildlife management practices had little access to the political decision-making structure. In the 1990s the emergence and strengthening of wildlife-associated nongovernmental organizations gave voice to those who were alienated from traditional policy processes. This ideological struggle was also apparent in a growing number of citizen ballot initiatives to eliminate certain forms of hunting and trapping, which in turn seemed to stimulate a cultural backlash among traditional groups who responded by introducing measures to protect their hunting privileges (Manfredo et al. 2017b). This growing conflict has put pressure on agencies to respond to a broader suite of public interests in wildlife conservation. We sought to determine how value shift is contributing to this situation and provide scientific data to assist agencies in planning for the future and considering ways to respond.

**Study Objectives**

We tested our model (Fig. 1) through a series of 3 objectives addressing different model components in a 50-state study of values. Our intent was to provide empirical evidence illustrating the potential implications of a shift toward mutualism, occurring due to modernization, for wildlife conservation in the United States. To represent the multilevel nature of our model, states were the macrounit of observation and individual residents were the microunit. As in our previous work (Manfredo et al. 2009), we treated states as aggregate social–ecological units given that wildlife regulatory authority and institutional structure (e.g., state agencies) exist largely at the state level. States approximate different ecotypes because the composition of wildlife species tends to be somewhat unique across states and states differ on variables, such as mode of economic production, that are tied to modernization.

Objective 1 was to examine the relationship between state-level indicators of modernization and wildlife values. We expected aggregate measures of education, income, and urbanization to be positively associated with mutualism and negatively associated with domination values. In line with the proposed shift, we anticipated a higher prevalence of mutualism in more modernized states, defined by higher scores on these indicators. We did not, however, expect to find strong relationships at the individual level (i.e., treating the indicators as individual-level sociodemographics) given that modernization is a cultural-level phenomenon shaping change across generations.

Objective 2 was to examine the impact of wildlife values on attitudes toward traditional management practices, with lethal control of wolves (*Canis lupus*) preying on livestock as the example. Beyond confirming the role of wildlife values in shaping wildlife-related attitudes, this tested our proposal that a shift toward mutualism is associated with a rise in social conflict over wildlife-related issues such as predator control. Wolf management, in particular, has been highly contentious. Wolves are seen as a symbol of ecological integrity and wildness as well as a
threat to economic well-being and human safety (Wilson 1997). At the individual level, we expected mutualism to be negatively associated and domination to be positively associated with support for lethal removal of wolves. At the state level, we anticipated greater public opposition to this practice in the more mutualist states.

Objective 3 was to examine the impact of wildlife values on behaviors; hunting participation was the example. We sought to explore the implications of a shift toward mutualism for continued declines in traditional forms of wildlife-related recreation, such as hunting emphasized by state wildlife agencies (Manfredo et al. 2017b). At the individual level, we expected domination to be positively associated and mutualism to be negatively associated with hunting. At the state level, we predicted states with a higher prevalence of mutualism would have lower rates of hunting participation.

Methods

Data Collection

We collected data via mail surveys with an online option administered to a random sample of residents in all 50 states in 2017 and 2018. Given low response rates that are increasingly a challenge for U.S. public surveys (Stedman et al. 2019), we supplemented samples with email panel surveys in each state. To boost response in underrepresented racial and ethnic categories, we also conducted a separate follow-up email panel survey targeting these groups.

We obtained samples from commercial firms: Survey Sampling International (Shelton, Connecticut) for mail surveys and Qualtrics (Provo, Utah) for email panel surveys. We recruited mail survey participants via 3 mailings (2 survey mailings and reminder postcard) and requested participation by the adult in the household with the most recent birthday to attempt equal representation of males and females (Dillman et al. 2014). We oversampled residents under age 35 and undersampled residents age 55 and older to help correct for the disproportionately higher response typical among older age categories in mail surveys. We recruited email panel participants via an email invitation and employed screening criteria to ensure samples were representative of gender and age proportions in each state. We merged mail and email panel data by state and weighted data by age, gender, race, and ethnicity (U.S. Census Bureau 2017) and participation in hunting and fishing (U.S. Fish and Wildlife Service 2011) for greater accuracy in state population estimates. Because some states contributed funds to obtain a larger, stratified geographic sample (e.g., by county), we also weighted data in these states to reflect the relative proportion of the state’s population in each stratum. For reporting at the national level (all states combined), we assigned an additional weight to account for state population sizes. Final survey and administration procedures were approved by Colorado State University’s Institutional Review Board (protocol 049-17H).

Measurement and Analyses

We measured wildlife values with multiple survey items representing basic beliefs about wildlife and wildlife management (Manfredo et al. 2009; Teel & Manfredo 2009) (Supporting Information). A domination value orientation was indicated by beliefs representing dimensions of hunting and wildlife use, whereas a mutualism value orientation was indicated by belief dimensions of caring and social affiliation. Respondents rated their level of agreement with belief items on a scale from 1 (strongly disagree) to 7 (strongly agree). We measured attitudes toward wolf management on a 5-point agree–disagree scale with the following item: “Wolves that kill livestock should be lethally removed.” For hunting behavior, we asked respondents to indicate whether they had ever participated in “recreational (noncommercial) hunting” and whether they did so in the last 12 months (yes or no). We requested birth year for age and used fixed-response options to measure gender, education, income, and urbanization.

We analyzed data in SPSS version 25 (Chicago, Illinois). We conducted reliability analysis to examine the internal consistency and structure of value-orientation scales. To compute value-orientation scores, we assigned respondents a score for each belief dimension (e.g., wildlife use), computed as the mean of all items within that dimension. We then assigned a value-orientation (e.g., domination) score by computing the mean of corresponding belief-dimension scores. We segmented respondents into one of 4 value-orientation types by comparing their scores on domination and mutualism simultaneously. High scores were >4.50, and low scores were ≤4.50. Traditionalists scored high on domination, low on mutualism. Mutualists scored high on mutualism, low on domination. Pluralists (i.e., individuals with domination and mutualism orientations) scored high on both scales, and distanced respondents (i.e., individuals not advocating either a domination or mutualism view) scored low on both (Teel & Manfredo 2009).

We conducted analyses at the individual and state levels to examine relationships specified in our objectives. For state-level analysis, we calculated the percentage of respondents in each value-orientation type by state. We created state-level modernization variables by aggregating responses for education, income, and urbanization as follows: percentage of respondents with higher education (bachelor’s degree or more), percentage of respondents with annual income above the national mode ($50,000 to <$100,000), and percentage of respondents residing in urban areas (cities with ≥50,000 residents).
For objective 1, we correlated (Pearson’s $r$) each of these variables with the percentage of mutualists and percentage of traditionalists in a state. For objective 2, we correlated the percentage of mutualists with the percentage of residents in a state indicating agreement (response of 4 or 5) on the wolf item. For objective 3, we correlated the percentage of mutualists with the percentage of active hunters in a state. Active hunters were respondents who indicated having hunted in the past and in the last 12 months. We examined individual-level associations for objectives 2 and 3 by correlating individual domination and mutualism scale scores with raw scoring on the wolf (Pearson’s $r$) and hunting (point biserial $r_{pb}$) items. We tested these same associations with our wildlife values typology through analysis of variance (wolf item) and chi-square (hunting items) analyses.

We also conducted hierarchical linear modeling (HLM) in Mplus version 8.1 (Los Angeles, California) for objective 1, which allowed for simultaneous assessment of individual- and state-level effects of modernization variables on domination and mutualism (individual-level scale scores). We used random-coefficient regression models for continuous outcomes. First, we specified null models to assess the variance within and between states and calculate the intraclass correlation (ICC) for domination and mutualism. Next, we assessed relationships with contextual-effects analysis (Raudenbush & Bryk 2002). The effect of covariates measured at the individual level was decomposed into within-state (individual-level) and contextual effects that were treated as latent variables (Asparouhov & Muthén 2006). Contextual effects represented the state-level impact of modernization variables on value orientations while controlling for their influence as individual-level sociodemographics. We also controlled for individual gender and age given prior research showing gender- and age-related differences in wildlife-related attitudes and value orientations (Manfredo et al. 2009; Teel & Manfredo 2009). The total between-states effect for the relationship between value orientations and modernization variables was derived by adding the coefficients for individual-level and contextual effects. We also calculated the proportion of variance explained by covariates at both levels of the model (Snijders & Bosker 1999). We used an alpha level of $p < 0.05$ to designate statistical significance for all analyses, but relied largely on effect size measures to account for a higher likelihood of finding statistical significance with large sample sizes (Cohen 1988).

**Results**

We received 43,949 completed surveys, including over 400 per state in our combined samples, which allowed for population estimates within 5% at the 95% confidence level (Scheaffer et al. 1996). Reliability analyses revealed our groupings of items into belief dimensions and value orientations provided a good fit for the data (Supporting Information). In support of expectations for objective 1, we found a strong positive association between state-level modernization factors of education ($r = 0.50$) and income ($r = 0.60$) and the percentage of mutualists in a state (Fig. 2). States with higher
percentages of mutualists had higher education and income levels. We found a moderate correlation ($r = 0.30$) in the same direction between urbanization and percentage of mutualists in a state. We identified stronger correlations after separating noncoastal ($r = 0.71$) from coastal northeastern states ($r = 0.41$), where population densities are much greater. Results were similar, but in the opposite direction, for the association between modernization variables and the percentage of traditionalists in a state (Fig. 3). States with higher levels of education ($r = -0.44$), income ($r = -0.56$), and urbanization (noncoastal $= -0.61$; coastal $r = -0.50$) had lower percentages of traditionalists.

Multilevel modeling showed significant variances within and between states on mutualism (within [SE] $= 1.68 [0.03]$, between [SE] $= 0.03 [0.01]$) and domination (within [SE] $= 1.19 [0.02]$, between [SE] $= 0.07 [0.01]$). As is typical in multilevel modeling, a greater amount of variation existed within groups (i.e., among individuals within states) versus between groups (states) on these measures. The ICC revealed that 1.8% of the variance in mutualism and 5.2% of the variance in domination existed between states. Contextual effects were significant in the expected direction for education and income, meaning the modernization characteristics of the state in which an individual resided had a significant impact on his or her value orientations beyond any effect due to that individual’s level of education or income (Table 1). Contextual-effect coefficients indicated the change in an individual’s value-orientation score produced by a 1-unit increase in the independent variable at the state level. To illustrate, for a 1-unit increase in a state’s mean level of education, an individual’s mutualism score would increase by 0.496, while controlling for the effect of his or her own level of education, age, and gender. This coefficient can also be interpreted as the difference in mutualism scoring between 2 individuals with the same education, age, and gender residing in states differing by 1 unit in mean level of education. Further, the total between-states effect of education on mutualism was 0.421 ($-0.075 + 0.496$), indicating the difference in mean scores on mutualism between 2 states that differed by 1 unit in average level of education. At the individual level, sociodemographics other than gender had a negligible impact. At the aggregate level, however, these characteristics accounted for 7–13% of the variance in mean mutualism scoring and 22–34% of the variance in mean domination scoring across states (Table 1).

Consistent with expectations for objective 2, we found a negative association ($r = -0.32$) at the individual level between mutualism and support for lethal removal of wolves that kill livestock and a positive association ($r = 0.44$) between domination and this measure. The effect sizes, interpreted based on the size of the correlation coefficients, were moderate to large. Comparison of the value types revealed a clear division among groups; 53% of traditionalists (mean [SD] $= 3.36 [1.34]$) and 14% of mutualists (mean [SD] $= 2.06 [1.16]$) were in agreement with lethal removal of wolves ($F_3, 43,577 = 2532.15, p < 0.001, \eta = 0.39$). At the state level, we found a strong negative association ($r = -0.89$) between the percentage of mutualists and the percentage of residents agreeing with wolf control (Fig. 4; Supporting Information). States with higher percentages of mutualists had substantially
Table 1. Results of multilevel modeling testing for the effects of modernization variables on wildlife value orientations from a 50-state survey of U.S. residents (2017-2018; n = 43,949).

|                  | Individual-level effect | Contextual effect | PVE |          |          |
|------------------|-------------------------|-------------------|-----|----------|----------|
|                  | estimate | SE       | estimate | SE       | individual, state |
| Education $^d$ $\rightarrow$ mutualism | | | | | |
| education        | -0.075   | 0.008$^c$ | 0.496     | 0.183$^e$ | 0.05, 0.13 |
| gender           | 0.441    | 0.024$^c$ |           |           |          |
| age              | -0.005   | 0.001$^c$ |           |           |          |
| Income $^e$ $\rightarrow$ mutualism | | | | | |
| income           | -0.117   | 0.011$^c$ | 0.449     | 0.136$^e$ | 0.06, 0.13 |
| gender           | 0.406    | 0.025$^c$ |           |           |          |
| age              | -0.005   | 0.001$^c$ |           |           |          |
| Urbanization $^f$ $\rightarrow$ mutualism | | | | | |
| urbanization     | 0.015    | 0.006$^c$ | 0.032     | 0.039     | 0.05, 0.07 |
| gender           | 0.450    | 0.025$^c$ |           |           |          |
| age              | -0.005   | 0.001$^c$ |           |           |          |
| Education $\rightarrow$ domination | | | | | |
| education        | -0.025   | 0.012$^c$ | -1.090    | 0.180$^c$ | 0.11, 0.32 |
| gender           | -0.566   | 0.015$^c$ |           |           |          |
| age              | 0.008    | 0.001$^c$ |           |           |          |
| Income $\rightarrow$ domination | | | | | |
| income           | 0.059    | 0.008$^c$ | -0.946    | 0.138$^c$ | 0.12, 0.34 |
| gender           | -0.540   | 0.014$^c$ |           |           |          |
| age              | 0.007    | 0.000$^c$ |           |           |          |
| Urbanization $\rightarrow$ domination | | | | | |
| urbanization     | -0.060   | 0.004$^c$ | -0.090    | 0.042$^c$ | 0.12, 0.22 |
| gender           | -0.564   | 0.015$^c$ |           |           |          |
| age              | 0.006    | 0.001$^c$ |           |           |          |

$^a$Estimates are unstandardized regression coefficients representing the individual-level effect of the covariate (modernization variable) on value orientation scoring.

$^b$State-level effect of the covariate, while controlling for its individual-level impact on value orientation scoring.

$^c$Proportion of variance explained.

$^d$Education response options: 1, less than high school; 2, high school diploma or equivalent (e.g., GED); 3, 2-year associate’s degree or trade school; 4, 4-year college degree; 5, advanced degree beyond 4-year college degree.

$^e$p < 0.05.

$^f$Income response options: 1, <$10,000; 2, $10,000 to <$25,000; 3, $25,000 to <$50,000; 4, $50,000 to <$100,000; 5, $100,000 to <$250,000; 6, ≥$250,000.

$^g$Urbanization response options: 1, farm or rural area; 2, small town or village with <5,000 people; 3, town with 5,000-9,999 people; 4, town with 10,000-24,999; 5, small city with 25,000-49,999 people; 6, city with 50,000-99,999 people; 7, city with 100,000-249,999 people; 8, large city with ≥250,000.

Figure 4. State-level association between percentage of respondents identified as mutualists from a 50-state survey of wildlife values among U.S. residents (2017-2018; n = 43,949) and support for lethal removal of wolves that kill livestock (agree, 4 [slightly] or 5 [strongly] on 5-point response scale).
active hunters (Fig. 5; Supporting Information). Consistent with expectations, states with higher percentages of mutualists showed lower rates of active participation.

Discussion

We introduced and tested a multilevel model of cultural shift that is altering the composition of wildlife values from domination to mutualism orientations in North America, but posit that domination is still deeply embedded in the cultural ideology (Manfredo et al. 2016). Our findings provide important hypotheses regarding the effects of modernization on wildlife values to be tested in other world regions, particularly postindustrial regions with a strong Judeo-Christian heritage like the United States, including Europe, Australia, and New Zealand (Manfredo et al. 2016). Looking beyond those regions, the path dependence of cultural practices and stage of transition in the socioeconomic development process of a given society will certainly alter modernization effects. For example, in China, which parallels the United States in its strong domination ideology (Schwartz 2006), the consumption of wild game in several major Chinese cities remained relatively constant from 2004 to 2012, but consumption was higher among the more educated and wealthy citizens (Zhang & Yin 2014).

We contend that as societal needs and the daily circumstances of life in the United States change, mutualism values lead individuals to perceive wildlife as fellow beings in one’s social world. This point of view is in stark contrast to domination values, which emphasize the separation between animals and humans and promote beliefs that wildlife should be used and managed for human benefit. The shift toward mutualism is driven by an increasingly modern lifestyle associated with increased economic well-being, urbanization, and education. In this process, changes in day-to-day life have expanded anthropomorphic thinking and, combined with a growing need for social affiliation, given rise to mutualism values. Our model suggests the cultural-level modernization change has affected individual values, which emerged up through aggregate levels of social organization, changing the value composition of states. We found the distribution of wildlife-value types across states varied considerably. These state-level changes are perpetuated through intergenerational replacement and migration into or out of the state. As the value composition changes, the cultural context changes. As new values emerge, new identities, behaviors, social discourses, social facts, and social interactions reduce reinforcement of traditionally held domination values.

Our results support this explanation, but there are 2 qualifications in our findings. First, results based on our mutualism and domination scales often showed less practical significance compared with grouping respondents in discrete value types (e.g., mutualists) based on a cross-tabulation of these scales. Our 4-group typology yielded strong associations with modernization variables at the state level and preferences for management at both individual and state levels. However, the strength of scoring on mutualism and domination scales introduced variance that was not well explained. One explanation for this discrepancy may be that the direction of values (e.g., whether people emphasize mutualism over domination) is predicted by modernization, but different and more individual-level factors affect the strength or extremity of values. Second, our theory entails value shift that occurred over the past century, but our analyses relied on cross-sectional data. Although this poses limitations, our findings support theory and prior research on modernization-induced value shift, including in the wildlife conservation context (e.g., Schwartz 2006; Inglehart 2018; Manfredo et al. 2016, 2019).

The transition from domination to mutualism is associated with a myriad of changes affecting wildlife conservation. One area of impact is in the social acceptability of traditional wildlife management practices. This is illustrated in our finding that states with higher percentages of mutualists had less support for lethal control of predators, such as wolves. It is reasonable to expect that these practices, frequently used by state wildlife agencies, will come under increasing public scrutiny should values continue to shift. Another area of impact involves declines in the traditional clientele of state wildlife agencies (hunters and anglers). We found that, as the percentage of mutualists increased in a state, the percentage of active hunters decreased. These findings offer evidence connecting culture shift to the multidecade declines in
proportions of hunters in the United States. Agency response to these declines in recent years has been to develop programs aimed at hunter recruitment, retention, and reactivation (Council to Advance Hunting and the Shooting Sports 2016). We propose that such programs may have a case-by-case, short-term effect but are unlikely to affect the long-term cultural trends underlying value shift and hunting participation. We contend that recreational hunting, and fishing to a lesser extent, is an expression of culture and a desired lifestyle that is deeply rooted in social traditions. Broad societal trends in hunting are unlikely to be driven by accessibility of opportunities to hunt or knowledge about the activity. They are more likely to be associated with new modern lifestyle goals, normative expectations, and social reinforcement.

As value transition occurs, wildlife conservation organizations confront the dilemma of how to adapt to this social change. Historically funded by license sales and equipment taxes, state wildlife agencies have developed client-based models of governance that attended primarily to hunters and anglers. Although these client groups are declining in representation among the national public, they vigorously defend their priority position through ballot initiatives and legislation (Manfredo et al. 2017b). Agencies attempting to embrace new stakeholders as part of their public trust obligations and remain relevant in a changing society face a difficult but important task that will ultimately determine how U.S. society can achieve broad-based wildlife conservation goals.

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Supporting Information

Survey items for wildlife values and additional details for analyses are available online (Appendix S1). The authors are solely responsible for the content and functionality of these materials. Queries (other than absence of the material) should be directed to the corresponding author.

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