

Research Note

Relationships Between Value Orientations and Wildlife Conservation Policy Preferences in Chilean Patagonia

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*Conflicts over wildlife conservation in protected areas can occur because stakeholders hold divergent values and value orientations. In this exploratory study, differences in value orientations among visitors to Chile's Tamango National Reserve (TNR) were examined. Questionnaires were completed by visitors (n = 97) during the Chilean summer of 2012. Respondents were grouped into strong protection (63%) and mixed protection–use (37%) value orientation groups using cluster analysis. Mixed protection–use group members were more likely to be local residents, less formally educated, less likely to pay the reserve entry fee, and less supportive of huemul (*Hippocamelus bisulcus*) conservation policies compared to the strong protection group. Most TNR visitors would support policies that protect wildlife in the reserve, and development with deleterious effects on the huemul would be viewed less favorably. It is suggested that a post-material shift and place relations moderate relationships between value orientations and Chilean wildlife conservation policy preferences.*

Keywords Chile, protected area, huemul, policy, value orientations

Introduction

Debates about how wildlife should be managed in the context of protected areas can occur because stakeholders hold divergent value orientations that can be classified along different continuums, such as protection–use (Peterson, Peterson, Peterson, Lopez, & Silvy, 2002) or anthropocentric–biocentric (Vaske & Donnelly, 1999). Value orientations are valuable for

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protected area managers to understand because they can influence preferences for wildlife management and policy (Layden, Manfredi, & Tucker, 2003; Vaske & Donnelly, 1999). Value orientations are “an expression of basic values and are revealed through the pattern and direction of basic beliefs held by an individual” (Manfredi, Teel, & Bright, 2003, p. 289). These basic beliefs are situated around a specific domain, such as wildlife, and provide “more concrete views . . . on wildlife management” than general values (Buius, 2009, p. 420). A “use” orientation reflects a belief that wildlife should be primarily managed for human benefit, whereas a “protection” orientation reflects closer and more equitable relations between humans and wildlife (Vaske, Jacobs, & Sijtsma, 2011).

Several sociodemographic background variables have been linked to value orientations, including income, age, sex, education, and place of residence (Hunter & Brehm, 2004; Needham, 2010; Schwartz, 2007; Vaske, Donnelly, Williams, & Jonker, 2001). Studies on wildlife value orientations have suggested that young, more formally educated, urban dwelling females tend to be more protection orientated, whereas older and less educated males tend to be more use oriented (Teel & Manfredi, 2010). Value orientations may also influence payment of protected area entrance fees. Kyle, Graefe, and Absher (2002), for example, concluded that acceptable entry fee prices are closely linked to individual values, and Trainor and Norgaard (1999) highlighted how spiritual and intrinsic values of wilderness predict willingness to pay fees.

Research on wildlife value orientations is needed in South America for at least two reasons. First, despite growing research on these value orientations around the world (e.g., Manfredi & Fulton, 1997; Raadik & Cottrell, 2007; Zinn & Shenn, 2007), South America has been somewhat neglected in peer-reviewed publications on this concept. Thus, it is important to identify value orientations in South America to assist with theory development. Second, protected area administrators in less-industrialized countries are increasingly challenged by land use changes within and adjacent to administrative borders that affect local stakeholders. Generating preliminary data linking value orientations and preferences for wildlife conservation policies (e.g., land use restrictions, fee access) will provide decision makers with critical information about how changing demographics (e.g., increasing education) may influence stakeholder support for decision making. In North America, such demographic trends have been associated with wildlife value orientations shifting from utilitarian to mutualistic with important implications for wildlife conservation policy (Manfredi et al., 2003; Teel & Manfredi, 2010).

This study focused on wildlife value orientations within the context of protected area visitor management in the Tamango National Reserve (TNR), also known as Lago Cochrane National Reserve, in Chilean Patagonia. The study involved diverse stakeholders and interests, and a setting that encapsulated pressures of changing land use and increased nature based tourism. Specifically, this study measured visitor (locals and tourists) value orientations and asked the following research questions: (a) what is the relationship between sociodemographic variables (income, age, sex, education, place of residence) and value orientations and (b) how do these value orientations relate to preferences for local wildlife conservation policies, including fees for access to TNR?

Methods

Study Area

TNR is located approximately 9 km (almost 6 miles) outside of Cochrane (2,996 inhabitants), the largest town in Aysén, Chile. The reserve encompasses 6,925 hectares and

provides important protection and habitat for the endangered huemul (*Hippocamelus bisulcus*), or South Andean deer. Annual visitation to TNR increased from approximately 122 visitors in 1984 to 1,237 in 2009.¹

Protection of the remaining huemul population is the top management priority for CONAF, the Chilean forest service. The huemul is an International Union for Conservation of Nature (IUCN) Red List endangered species and Chile's national symbol, protected by law. The huemul is also TNR's most popular visitor attraction. Historic and current threats to the remaining huemul population include habitat conversion (Flueck & Smith-Flueck, 2006), overhunting and poaching (Frid, 2001; Povilitis, 1998), competition with domestic livestock for food, diseases (Povilitis, 1998; Simonetti, 1995), exotic species (Flueck, Smith-Fleuck, & Naumann, 2003), and predation (Povilitis, 1998). New development proposals for the area and increased visitation at TNR are expected to place additional pressure on the huemul.

Research Design and Sampling

CONAF conducted a survey to understand TNR visitor values about reserve wildlife and related policy preferences. Administration of questionnaires occurred between the summer months of December 2012 and February 2013, both in the reserve and in Cochrane's urban center. Questionnaires were administered in English or Spanish, depending on the preference of the respondent. Every second visitor was approached as they passed the reserve's administration office. In Cochrane's urban center, every tenth person was approached and screened for past visitation to TNR. In total, 97 questionnaires were collected with approximately 10% refusal at the park and 25% in the urban center.² The margin of error was calculated at 9.5%.

Value orientations were measured with eight belief statements similar to those used in other studies (Fulton, Manfredo, & Lipscomb, 1996; Needham, 2010; Vaske & Donnelly, 1999), except "species" and "reserve" were inserted as the context, and used a 5-point scale of 1 = *strongly disagree* to 5 = *strongly agree* (Hermann, Voß, & Menzel, 2013). The same 5-point scale was used for measuring visitor preferences for wildlife conservation policy. Data on visitation frequency, entry fee payment, sex, education, and residency were collected using fixed and open-ended response options. Questionnaire creation included two independent forward and backward translations from English into Spanish by bilingual members of the research team.

Data Analysis

Analysis took place in three phases: evaluation of measurement reliability and robustness, sociodemographic comparison of value orientation groups, and examination of relationships between value orientations and wildlife conservation policy preferences. Cronbach's alpha reliability coefficients and confirmatory factor analysis (CFA) were used to measure reliability and construct validity of the eight statements, respectively. Alpha coefficients greater than or equal to .65 and item-total correlations greater than or equal to .40 indicated there was little variance between statements, suggesting acceptable reliability (Vaske, 2008). CFA with Browne's Asymptotically Distribution Free estimator was used to assess model robustness (Arbuckle, 2011). Chi-square divided by the degrees of freedom value (CMIN/DF [<2.00]); Global-Fit-Index (GFI, [$\geq .90$]); Robust Corrected Comparative Fit Index (CFI, [$\geq .90$]); p of Close Fit (PCLOSE, [$> .05$]); and Root Mean Square Error of Approximation (RMSEA, [$\leq .06-.07$]) estimated model fit. K-means cluster analysis on

the belief statements was used to group respondents based on their value orientations. Discriminant analysis validated the K-means cluster solution. Mann-Whitney *U* tests, Chi-square tests, and independent sample *t*-tests examined differences in sociodemographics and policy preferences between value orientation groups. Given the sample size, an alpha level of .10 was adopted for all tests. Effect sizes are also reported with r_{pb} for Mann-Whitney *U* tests, *Phi* for Chi-square tests, and η^2 for *t*-tests (Pallant, 2007; Vaske, 2008).

Results

The sample ($n = 97$) comprised approximately 8% of annual visitation for TNR and first-time visitors to TNR comprised most of the sample (64%). More than half of the subjects were male (60%), Chilean (82%), and resided outside of Cochrane (65%). Respondents were younger, with slightly less than half of the sample between 18 and 29 years of age (48%). They were also formally educated, typically having completed a university (55%), high school (18%), or postgraduate (10%) education. Most respondents paid the fee to enter TNR (72%).

After removing two belief statements that did not meet the criterion of total correlation $\geq .40$ (Vaske, 2008), reliability of the final six-statement composite scale for measuring value orientations was acceptable with a rounded score of .70. Factorability of the correlation matrix was supported by Kaiser-Meyer-Olkin value ($> .60$) and Bartlett's Test of Sphericity ($p < .05$). CFA results revealed the presence of two factors with eigenvalues greater than 1, explaining more than 62% of the variance. Factor loadings met the criterion of being greater than or equal to .40 (Hair & Black, 2000), and the presence of a weak correlation between the two scales ($r = .00$) supported the notion that use and protectionist scales were different. Robustness testing revealed an adequate model fit: CMIN/DF = 1.29; GFI = .94; CFI = .92; PCLOSE = .41; RMSEA = .05.

Cluster analysis and discriminant analysis suggested that a two-group solution provided the best fit for categorizing respondents based on their responses to the value orientation statements. Discriminant analysis predicted these groups 89% and 98% of the time. Respondents who scored high on the protection scale and low on the use scale were placed into the strong protection ($n = 61$) group, and those who scored nearest to the center point for both scales were placed in the mixed protection–use ($n = 36$) group.

Comparison of value orientation groups suggested that tourists were more likely to hold strong protection value orientations than locals (Table 1). Those with strong protection orientations were also more likely to pay the entry fee and have more formal education. Both groups identified wildlife as an important motivation for visiting TNR, although wildlife viewing was more important for those in the strong protection group. Small effect sizes were revealed for most variables tested, whereas stronger effects were noted for residency and education.

Both groups favored policies that benefited the huemul and other wildlife, but there was a clear trend that the strong protection group indicated stronger support than the mixed protection–use group (Table 2). The latter group was least supportive of corridor creation and restrictions on infrastructure development in the reserve, and was less supportive of these policies than the strong protection group. There were statistical differences between strong and mixed protection–use groups for four policy options, and the magnitude of the differences in means for all but one policy option was large.

Table 1
Comparison of value-orientation groups by sociodemographic characteristics

Variable (<i>n</i>)	Strong protection (%)	Mixed (%)	χ^2 or <i>U</i> value	<i>p</i> -value (<i>Phi</i> / <i>V</i> / <i>r_{pb}</i>)
Residency			8.98	.003 (.30)
Non-resident (64)	73.4	26.6		
Resident (33)	42.4	57.6		
Fees Paid			4.22	.038 (.23)
No (23)	47.8	52.2		
Yes (54)	72.2	27.8		
Gender			.97	.320 (.11)
Male (49)	61.2	38.8		
Female (32)	71.9	28.1		
Age			.45	.930 (.07)
<18	—	—		
18–29 (47)	66.0	34.0		
30–50 (29)	62.1	37.9		
51–65 (7)	71.4	28.6		
>65 (2)	50.0	50.0		
Education			10.24	.037 (.33)
Primary (3)	33.3	66.7		
Technical (7)	14.3	85.7		
High school (18)	61.1	38.9		
University (54)	68.5	31.5		
Postgraduate (10)	80.0	20.0		
Importance of wildlife in motivation to visit TNR (\bar{x} [<i>n</i> , SD]) [†]	4.66 (59, .63)	4.34 (32, .87)	727.00	.032 (.22)

Percentages given represent only those subjects within Strong and Mixed Protection–Use groups.

[†] Respondents were asked, “Please indicate how important each of the following reasons was for your decision to come to the Tamango National Reserve.” Scale: 1 = *not at all important*; 2 = *not very important*; 3 = *not sure*; 4 = *somewhat important*; 5 = *very important*; Mann-Whitney *U* test used.

Effects size: *Phi*, Cramer’s *V*, and *r_{pb}* reported.

Discussion and Implications

Demographic trends in Chile (e.g., higher education, more wildlife tourism) suggest that the relationship between strong protection value orientations and support for pro-wildlife policy may be an important consideration in other regions. Chile is experiencing surges in urbanization, income, and education (Griffen, Lizano, Moe, Siaba, & Stone, 2000). These variables are associated with more protectionist value orientations (Manfredo et al., 2003; Vaske et al., 2001), and a post-material shift in many regions (Inglehart & Baker, 2000). Future research should examine whether these results reflect a Chilean society that is

Table 2
Comparison of policy preference by value orientation (independent sample *t*-tests)

Policies	Strong protection	Mixed	<i>t</i> -value	<i>p</i> -value (Eta ²)
	(\bar{x}, SE)			
Parts of the reserve should be closed to allow huemul to breed undisturbed.	4.30 (.13)	3.94 (.22)	1.44	.150 (.15)
Wildlife should be able to move across private lands between reserves.	3.92 (.17)	3.29 (.22)	2.22	.029 (.22)
Landowners near the reserve should change their livestock grazing patterns to benefit huemul recovery.	3.77 (.18)	3.38 (.24)	1.80	.076 (.19)
Activities in the reserve should not disturb the huemul.	4.05 (.14)	3.54 (.24)	1.39	.170 (.15)
Infrastructure development (e.g., roads, communication, electricity) in the reserve should not be permitted.*	3.95 (.17)	3.46 (.17)	1.73	.086 (.18)
Landowners near the reserve should be compensated for creating huemul habitat.	3.36 (.17)	3.46 (.23)	.35	.730 (.04)

*Policy preference was recoded prior to analysis.
Scale: 1 = *strongly disagree*, 5 = *strongly agree*.

moving from a culture dominated by materialistic values to one that favors non-materialistic life-goals, and whether this shift moderates relationships between value orientations and wildlife conservation policy preferences.

The observed sociodemographic differences between TNR visitors may be attributed to differences between locals' and tourists' place relations. Sense of place can influence preferences for landscape development (Kianicka, Buchecker, Hunziker, & Müller-Böker, 2006) and influence interactions between value orientations and policy preferences (Kaltenborn & Bjerke, 2002). Value orientations may have a geography and be multidirectional and dependent on the social experience within a given place (McIntyre, Moore, & Yuan, 2008). Larger scale research could begin to explicate the role of place in Chilean value orientations.

Protectionist value orientations that dominate the sample in this study possibly bode well for funding huemul conservation because visitors with strong protection value orientations were much more likely to pay entry fees. TNR entry fees are important to CONAF because government spending for Chilean protected area management is inadequate (Lara & Urrutia, 2010) and this can lead to fee structures that fail to address congestion (e.g., fee decrease) (Shultz, Pinazzo, & Cifuentes, 1998) and perturb huemules. At the time of this study, Chileans paid US\$2.71 to enter TNR, and non-Chileans paid US\$5.42. Results suggest expanding this split fee schedule so that non-local tourists pay more than local residents, offering CONAF a way to reduce revenue gaps (Gelcich et al., 2013) and fund huemul conservation efforts.

Identification of value orientations of TNR visitors can help CONAF anticipate conflicts over proposed reserve development and thus design alternatives that best meet visitor and wildlife needs. As in the case of prior value orientation studies in protected areas (Layden et al., 2003; Needham, 2010), visitors holding strong protection value orientations would likely prefer more assertive conservation policies; in this case, those who favor the huemul (e.g., keeping the reserve primitive) over development for visitor consumption (e.g., lodging, cell towers). Similarly, TNR visitors with mixed protection–use value orientations may oppose conservation policies that negatively impact local livelihoods dependent on wildlife tourism (e.g., limiting visitation) or animal husbandry (e.g., expanding huemul population or range). Value orientations identified in TNR coupled with likely urbanization shifts suggest that policy makers have strong and growing support for: (a) limiting urban expansion and development on TNR borders, (b) pursuing increased involvement from Cochrane citizens to encourage huemul recovery compatible with human wellbeing, and (c) promoting viable alternatives for huemul conservation where protected areas face internal and external development pressure (Teel et al., 2010).

Notes

1. These figures were retrieved from internal CONAF documents.
2. The agency collecting the data did not systematically record non-response. The field technician reported that nonresponse bias could have been existent due to differences in peoples' schedules, with those in town being in more of a hurry.

References

- Arbuckle, J. L. (2011). *IBM® SPSS® Amos™ 22 User's Guide*. Retrieved from http://www.sussex.ac.uk/its/pdfs/SPSS_Amos_User_Guide_22.pdf
- Buius, A. E. (2009). Lay people's images of nature: Comprehensive frameworks of values, beliefs, and value orientations. *Society & Natural Resources*, 22, 417–432.
- Flueck, W. T., & Smith-Flueck, J. M. (2006). Predicaments of endangered huemul deer, *Hippocamelus bisulcus*, in Argentina: A review. *European Journal of Wildlife Research*, 52, 69–80.
- Flueck, W. T., Smith-Flueck, J. M., & Naumann, C. M. (2003). The current distribution of red deer (*Cervus elaphus*) in southern Latin America. *Zeitschrift für Jagdwissenschaft*, 49, 112–119.
- Frid, A. (2001). Habitat use by endangered huemul (*Hippocamelus bisulcus*): Cattle, snow, and the problem of multiple causes. *Biological Conservation* 100, 261–267.
- Fulton, D. C., Manfredo, M. J., & Lipscomb, J. (1996). Wildlife value orientations: A conceptual and measurement approach. *Human Dimensions of Wildlife*, 1, 24–47.
- Gelcich, S., Amar, F., Valdebenito, A., Castilla, J. C., Fernandez, M., Godoy, C., & Biggs, D. (2013). Financing marine protected areas through visitor fees: Insights from tourists willingness to pay in Chile. *Ambio*, 42, 975–984.
- Griffen, E., Lizano, E. G., Moe, K.-A., Siaba, M., & Stone, M. (2000). Chile: The success story of a developing country. *The Park Place Economist*, 8, 71–80.
- Hair, J. F., & Black, W. C. (2000). Cluster analysis. In L. G. Grimm & P. R. Yarnold (Eds.), *Reading and understanding more multivariate statistics* (pp. 147–206). Washington, DC: American Psychological Association.
- Hermann, N., Voß, C., & Menzel, S. (2013). Wildlife value orientations as predicting factors in support of reintroducing bison and of wolves migrating to Germany. *Journal for Nature Conservation*, 21, 125–132.

- Hunter, L. M., & Brehm, J. M. (2004). A qualitative examination of value orientations toward wildlife and biodiversity by rural residents of the intermountain region. *Human Ecology Review*, *11*, 13–26.
- Inglehart, R., & Baker, W. E. (2000). Modernization, cultural change, and the persistence of traditional values. *American Sociological Review*, *65*, 19–51.
- Kaltenborn, B. P., & Bjerke, T. (2002). Associations between environmental value orientations and landscape preferences. *Landscape and Urban Planning*, *59*, 1–11.
- Kianicka, S., Buchecker, M., Hunziker, M., & Müller-Böker, U. (2006). Locals' and tourists' sense of place: A case study of a Swiss alpine village. *Mountain Research and Development*, *26*, 55–63.
- Kyle, G. T., Graefe, A. R., & Absher, J. D. (2002). Determining appropriate prices for recreation on public lands. *Journal of Park and Recreation Administration*, *20*, 69–89.
- Lara, A., & Urrutia, R. (2010). The growing significance of conservation: The Chilean experience. In J. N. Levitt (Ed.), *Conservation capital in the Americas* (pp. 5–14). Cambridge, MA: Lincoln Institute of Land Policy.
- Layden, P. C., Manfredo, M. J., & Tucker, P. (2003). Integrating public values toward wildlife into land use planning: A case study in La Plata County, Colorado. *Wildlife Society Bulletin*, *1*, 174–184.
- Manfredo, M., & Fulton, D. (1997). A comparison of wildlife values in Belize and Colorado. *Human Dimensions of Wildlife*, *2*, 62–63.
- Manfredo, M., Teel, T., & Bright, A. (2003). Why are public values toward wildlife changing? *Human Dimensions of Wildlife*, *8*, 287–306.
- McIntyre, N., Moore, J., & Yuan, M. (2008). A place-based, values-centered approach to managing recreation on Canadian crown lands. *Society and Natural Resources*, *21*, 657–670.
- Needham, M. D. (2010). Value orientations toward coral reefs in recreation and tourism settings: A conceptual and measurement approach. *Journal of Sustainable Tourism*, *18*, 757–772.
- Pallant, J. (2007). *SPSS survival manual: A step by step guide to data analysis using SPSS* (3rd ed.). New York, NY: McGraw-Hill.
- Peterson, M. N., Peterson, T. R., Peterson, M. J., Lopez, R. R., & Silvy, N. J. (2002). Cultural conflict and the endangered Florida Key deer. *Journal of Wildlife Management*, *66*, 947–968.
- Povilitis, A. (1998). Characteristics and conservation of a fragmented population of huemul *Hippocamelus bisulcus* in central Chile. *Biological Conservation*, *86*, 97–104.
- Raadik, J., & Cottrell, S. (2007). Wildlife value orientations: An Estonian case study. *Human Dimensions of Wildlife*, *12*, 347–357.
- Schwartz, S. H. (2007). Value orientations: Measurement, antecedents, and consequences across nations. In R. Jowell, C. Roberts, R. Fitzgerald, & G. Eva (Eds.), *Measuring attitudes cross-nationally* (pp. 169–202). London, UK: Sage.
- Shultz, S., Pinazzo, J., & Cifuentes, M. (1998). Opportunities and limitations of contingent valuation surveys to determine national park entrance fees: Evidence from Costa Rica. *Environment and Development Economics*, *3*, 131–149.
- Simonetti, J. A. (1995). Wildlife conservation outside parks is a disease-mediated task. *Conservation Biology*, *9*, 454–456.
- Teel, T. L., & Manfredo, M. J. (2010). Understanding the diversity of public interests in wildlife conservation. *Conservation Biology*, *24*, 128–139.
- Teel, T. L., Manfredo, M. J., Jensen, F. S., Buijs, A. E., Fischer, A., Riepe, C., . . . Jacobs, M. H. (2010). Understanding the cognitive basis for human-wildlife relationships as a key to successful protected-area management. *International Journal of Sociology*, *40*, 104–123.
- Trainor, S., & Norgaard, R. B. (1999). Recreation fees in the context of wilderness values. *Journal of Park & Recreation Administration*, *17*, 100–115.
- Vaske, J. J. (2008). *Survey research and analysis: Applications in parks, recreation and human dimensions*. State College, PA: Venture.
- Vaske, J. J., & Donnelly, M. P. (1999). A value-attitude-behavior model predicting wildland preservation voting intentions. *Society & Natural Resources*, *12*, 523–537.

- Vaske, J. J., Donnelly, M. P., Williams, D. R., & Jonker, S. (2001). Demographic influences on environmental value orientations and normative beliefs about national forest management. *Society & Natural Resources*, *14*, 761–776.
- Vaske, J. J., Jacobs, M. H., & Sijtsma, M. T. (2011). Wildlife value orientations and demographics in the Netherlands. *European Journal of Wildlife Research*, *57*, 1179–1187.
- Zinn, H. C., & Shen, X. S. (2007). Wildlife value orientations in China. *Human Dimensions of Wildlife*, *12*, 331–338.