

**LETTER**

# Gender differences in poaching attitudes: Insights from communities in Mozambique, South Africa, and Zimbabwe living near the great Limpopo

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**Abstract**

To what extent and how do men and women differ in their attitudes about poaching? Although research suggests that women can be more concerned about environmental degradation than men, inquiries about communities in protected areas are ambiguous: women are disproportionately affected by anti-poaching laws and can have greater motivations to violate rules. We conducted a large-scale survey in communities within the Great Limpopo Transfrontier Park in Mozambique, South Africa, and Zimbabwe and explored attitudes regarding; concern about resources, rule compliance, poaching, and anti-poaching activities. Although women's attitudes generally are not divergent from men's, we find some differences among nonelectrified households and those with a dependence on resources; these women are less likely to condemn commercial poaching and less willing to engage in anti-poaching activities. Men in poorer households are more likely to know a poacher. We identify a need of further understanding the causes behind gender differences in conservation attitudes.

**KEYWORDS**

attitudes, gender, Mozambique, poaching, South Africa, survey, transfrontier conservation, women, Zimbabwe

**1 | INTRODUCTION**

Although being a complex relationship, women's generally lower access to natural resources is known to affect sustainability, equity of distribution, and empowerment of users (Meinzen-Dick, Brown, Sims Feldstein, & Quisumbing, 1997). Such asymmetries have led to the policy supposition that women often have different priorities and make different choices than men when included in decision-making about natural resources. The assumption suggests that a gendered perspective in conservation is appropriate, particularly

when women are underrepresented in institutions responsible for managing resources (Sodhi, Davidar, & Rao, 2010). The prominence of women mobilizing in forest preservation, for example, in the Kenyan Green Belt Movement and the Chipko Andalan in India, reinforces the notion that women's organizations may have potential to reverse environmental degradation (Bretherton, 2005). Nongovernmental organizations claim that "better integrating women into conservation projects could increase the benefits to people" (Nature Conservancy, 2017). Other examples of how gender and conservation intersect are related to policy. The Black Mambas,

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a ranger force in the South African Kruger Park composed mainly of women, was formed based on the hypothesis that women can be more effective in anti-poaching efforts (Time, 2015).

Although there is general agreement in conservation science that eradicating gender asymmetries would be considered progress, normatively, and instrumentally, few studies have examined how attitudes toward conservation compare among men and women (e.g., Abd Mutalib, Fadzly, & Foo, 2013; Agarwal, 2009; Allendorf & Yang, 2017; Dougherty, Fulton, & Anderson, 2003; Gore & Kahler, 2012). We contribute by assessing the context of communities living in protected reserves, as the behavior among such people is crucial for the success of conservation (Agrawal & Gibson, 1999). We focus on communities in Mozambique, South Africa, and Zimbabwe living within the Great Limpopo Transfrontier Park and test the notion that women hold different attitudes regarding four themes important for effective conservation management: concern over resources' depletion, intentions to comply with conservation rules, attitudes about poaching, and willingness to engage in anti-poaching activities. We study the heterogeneity of such effects through focusing on households' levels of poverty and dependence on resources.

## 2 | PRIOR RESEARCH AND RESEARCH QUESTIONS

The behavior of people living in nature reserves is a crucial factor for the effectiveness of conservation (Gibson, Williams, & Ostrom, 2005). Communities affect resources through activities such as hunting and firewood collection, which may be affected by conservation rules. Indeed, "the success of biodiversity conservation in African countries depends to a large extent on the cooperation of local communities" (Abukari & Mwalyosi, 2018, p. 1). We assume that understanding attitudes toward poaching is crucial to grasp the prospects for conservation (Dewu & Røskoft, 2018). Attitudes can be divided in the cognitive (beliefs about a subject), the affective (how the subject makes you feel), and the behavioral (how you intend to behave with regard to the subject). These aspects are often overlapping but might not have the same determinants. The attitude items we study differ in this sense: the ones gauging resource depletion are more related to cognition, whereas those on compliance relate to behavioral intentions (Heberlein, 2012).

Following Kleiber, Harris, and Vincent (2014), we believe that to fully understand local communities' attitudes toward conservation, a gendered perspective is important. The inclusion of women into conservation efforts might very well be a goal in itself. However, assuming that the inclusion of women automatically brings instrumental benefits

into wildlife and natural resources management could mean relying on an oversimplified understanding and potentially excluding other important aspects that determine sustainable outcomes. Expanding our knowledge on this subject is, hence, critical for focusing conservation policy in relation to a local context and therefore motivates our focus on exploring gender differences in attitudes.

Research stresses the importance of involving local people affected by conservation rules (Ribot, 2004). The conclusion that including women in conservation projects can contribute to sustainability traces from different literatures. Ecofeminist thought theorizes that women, due to differences in socialization and social roles, may have a contrasting relationship with nature compared to men, because they are fostered to hold nurturing and reproductive values rather than those of domination and production (Gaard, 2017). An empirically oriented literature finds that women espouse greater environmental concern, often explained by women's higher risk perceptions (McCright & Sundström, 2014).

In rural parts of lower-income countries, women are generally disadvantaged in the labor market and denied basic rights available to men (Meinzen-Dick et al., 1997). Women, frequently confined to the domestic sphere, are often responsible for livelihood-generating activities related to resource harvesting. Bina Agarwal (1992) outlines how this role of dependence can explain why women are affected differently by resource depletion. Degradation may increase the hours in the working day for women through the prolonged collection of water, fodder, and firewood. Such changes, for instance droughts, can affect income, because the time spent on harvesting may lead to reduced crop cultivation time and a drop in farm productivity. Agarwal (2009), drawing from research in India and Nepal, argues that the inclusion of women in conservation has intrinsic as well as instrumental benefits; because many women are more resource dependent, they may have a greater stake in conservation.

The literature is ambiguous about the role of women in conservation near protected areas, as many perceptions about gender might build on stereotypes, depicting women as "virtuous" (Arora-Jonsson, 2011). Rule compliance in communities living in reserves may have important gendered dimensions. Arun Agrawal's (2001) study of forest-dependent households in northern India suggests that violations of forest regulations were more common among women, responsible for firewood collection. Following this insight, it is possible that conservation rules may disproportionately burden women if harvesting is restricted. Agarwal (2001) notes that gazetted a forest into a protected area can have gendered consequences; women may lose more income from forest closures. Another aspect concerns benefits; male community members tend to reap greater economic advantage from conservation projects than women (Ogra, 2012). Allendorf and Yang (2017) suggest that a way to understand the ambiguous trends in gendered attitudes is

that women might perceive problems from reserves differently (Allendorf & Allendorf, 2012, 2013; Moorman, 2006).

Few studies on conservation attitudes in Africa focus on gender (Browne-Nuñez & Jonker, 2008). These studies do not report fully consistent trends; on the one hand, some studies find an absence of gender differences in perceptions of protected areas (Kideghesho, Røskraft, & Kaltenborn, 2007) and bushmeat consumption (Nassary 2017) in Tanzania, or support for forest conservation among communities in Sierra Leone (Larson, Conway, Hernandez, & Carroll, 2016). On the other, Loibooki, Hofer, Campbell, and East (2002) report, in a study of Tanzanian reserves, that men more often than women are involved in illegal hunting.

For the specific countries in focus, few studies have explored gendered aspects of conservation attitudes near protected reserves. In a study of Northern Zimbabwe (Mutanga, Vengesayi, Gandiwa, & Muboko, 2015), women are more positive toward conservation-related tourism, possibly due to their relatively higher involvement in this industry. However, Nabane (1994) notes that women in a village in this region are the ones more dependent on natural resources. In the South African side of the Great Limpopo, women have had the main responsibility of collecting firewood (Tanner, 2007). It can be noted that in a study by Gandiwa, Zisadza-Gandiwa, Mutandwa, and Sandram (2012), which assesses illegal fishing in the Zimbabwean side of the park, the majority of people arrested for illegal fishing during a period of 6 months were women.

## 2.1 | Research questions

As a first step, we pose four research questions: To what extent do men and women differ in their concerns about wildlife conservation and poaching? To what extent do they differ in their stated intentions to comply with rules? To what extent do they differ in their likelihood to condone rule violations? To what extent are women more willing than men to assist in anti-poaching activities?

However, building on Meinzen-Dick et al. (1997), we acknowledge that this relationship is complex: gender might interact with other individual characteristics on attitudes toward conservation (Abd Mutalib et al., 2013). There exist large differences between communities and households in low-income contexts that could intersect in the formation of attitudes about conservation. King and Peralvo (2010) discuss how a range of factors shapes the relationship between gender and views about a protected reserve. Because their work is based on fieldwork in South Africa, we find it important to analyze such heterogeneous aspects in our study as well. Therefore, in a second step we wish to study the above four research questions in relation to confounding factors. We build on Barrett, Travis, and Dasgupta (2011) and posit that the two features—“poverty” and “resource dependence”—might

be such factors that structure one’s relationship to conservation efforts. We rely on King and Peralvo (2010), discussing how wealthier households might have disinvested from natural resource collection and therefore could view resources differently than households in poverty (p. 278). Although this relationship is highly complex, we wish to explore if the answers to the questions posed above becomes more nuanced when introducing these two dimensions.

## 3 | RESEARCH DESIGN

This study’s focus is the Great Limpopo Transfrontier Park (GLTP), a collaboration among the governments of Zimbabwe, Mozambique, and South Africa. The park, established in 2002, covers about 35,000 km<sup>2</sup> and encompasses the Kruger National Park (NP; South Africa), Gonarezhou NP (Zimbabwe), and Limpopo NP (Mozambique) (GLTP 2016). Illegal harvesting remains a challenge for biodiversity management in the park and behaviors range from firewood collection to subsistence bushmeat hunting and commercial poaching.

We use data collected from May 2017 to May 2018. Through face-to-face interviews, we surveyed 2,281 respondents living within the GLTP (769 respondents from Zimbabwe, 582 from South Africa, and 931 from Mozambique). These households reside in the so-called “buffer zone,” next to the national parks and were selected through random selection from a given sampling frame. A pilot round in one village trained our survey enumerators. We primarily sought to survey household heads and if they were not available we then interviewed the spouse. In total, 1,518 respondents (67%) were female. The interviews were done in Shangani, the mother tongue of about 95% of respondents and a language the other few also spoke. About half of all enumerators (46%) were female (Table S1). Respondents generally have not attended school for long: 25% has zero years of formal education. The age distribution is relatively equally dispersed among age groups (Table S2).

We use 19 survey items to gauge the four themes in focus. For coding and statistics of these items, see Table S3. We first analyzed the full sample. We then built on the insight that these households differ in their dependence on resources and levels of poverty. Two variables gauged these dimensions: first, *resource dependence* captured that about 80% of respondents noted that their household is reliant on using natural resources. Second, *electrification* captured about 30% of respondents stating that they live in households with electricity, an established indicator of wealth. These two binary measures allowed us to split the sample and perform a nuanced analysis of these subsets.

**TABLE 1** Results from ordered logistic regressions, the effect from the predictor variable gender (man = 0, woman = 1)

	Full sample			Resource dependent			Not resource dependent			Has electricity			Does not have electricity		
	Coeff (SE)	p-Value	95% CI	Coeff (SE)	p-Value	95% CI	Coeff (SE)	p-Value	95% CI	Coeff (SE)	p-Value	95% CI	Coeff (SE)	p-Value	95% CI
Concern over resources' depletion															
Wildlife and nature risk being depleted	.11 (.08)	.17	[-.05, .27]	.05 (.09)	.60	[-.13, .23]	.37 (.18)	.04	[.01, .73]	.10 (.17)	.17	[-.24, .43]	.08 (.09)	.40	[-.10, .26]
Wildlife nowadays more abundant	.02 (.08)	.80	[-.14, .18]	-.03 (.09)	.73	[-.21, .15]	.25 (.19)	.19	[-.12, .61]	.21 (.17)	.21	[-.12, .55]	-.03 (.09)	.78	[-.21, .16]
Threats to wildlife/resources increased	.19 (.08)	.02	[.03, .35]	.14 (.09)	.13	[-.04, .32]	.42 (.19)	.02	[.06, .79]	.33 (.17)	.05	[-.00, .66]	.13 (.09)	.18	[-.06, .31]
Illegal hunting increased or decreased recent years	.31 (.12)	.008	[.08, .55]	.34 (.14)	.02	[.06, .61]	.22 (.23)	.33	[-.22, .67]	.22 (.20)	.27	[-.17, .62]	.28 (.15)	.06	[-.01, .58]
Poaching has decreased	-.14 (.08)	.09	[-.31, .02]	-.18 (.09)	.06	[-.36, .00]	.01 (.19)	.95	[-.36, .38]	-.08 (.17)	.63	[-.43, .26]	-.15 (.10)	.13	[-.33, .04]
Intentions to follow conservation rules															
Obey park regulations	-.20 (.08)	.02	[-.36, -.03]	-.14 (.09)	.10	[-.33, .03]	-.36 (.18)	.05	[-.73, -.00]	-.37 (.17)	.03	[-.70, -.03]	-.17 (.09)	.08	[-.35, .02]
Willing to follow park rules	-.12 (.09)	.16	[-.29, .05]	-.11 (.10)	.26	[-.29, .08]	-.19 (.19)	.33	[-.57, .19]	.00 (.18)	.98	[-.34, .35]	-.17 (.10)	.09	[-.36, .02]
Consider violating park rules	.02 (.04)	.60	[-.06, .11]	.00 (.05)	.94	[-.09, .09]	.13 (.11)	.25	[-.09, .34]	.14 (.10)	.19	[-.07, .34]	.01 (.05)	.78	[-.08, .11]
Attitudes to poaching															
Knows a person involved with poaching	-.27 (.10)	.007	[-.46, -.07]	-.29 (.11)	.008	[-.50, -.07]	-.17 (.23)	.46	[-.61, .28]	-.17 (.24)	.47	[-.64, .29]	-.25 (.11)	.02	[-.46, .04]

(Continues)

TABLE 1 (Continued)

	Resource dependent			Not resource dependent			Has electricity			Does not have electricity					
	Coeff (SE)	p-Value	95% CI	Coeff (SE)	p-Value	95% CI	Coeff (SE)	p-Value	95% CI	Coeff (SE)	p-Value	95% CI			
Subsistence poaching morally wrong	-.15 (.09)	.08	[-.32, .02]	-.13 (.10)	.17	[-.32, .06]	-.23 (.20)	.25	[-.61, .16]	.15 (.18)	.41	[-.21, .50]	-.25 (.10)	.01	[-.45, -.06]
Commercial poaching morally wrong	-.31 (.09)	.000	[-.48, -.13]	-.37 (.10)	.000	[-.56, -.18]	-.06 (.20)	.75	[-.45, .32]	-.09 (.18)	.61	[-.46, .27]	-.39 (.10)	.000	[-.58, .19]
Collecting firewood morally acceptable	.05 (.08)	.52	[-.11, .21]	.08 (.09)	.37	[-.10, .26]	-.07 (.18)	.71	[-.43, .29]	-.26 (.17)	.12	[-.59, .07]	.15 (.09)	.12	[-.04, .33]
Illegal fishing morally acceptable	.17 (.09)	.05	[.00, .34]	.20 (.10)	.04	[.01, .38]	.04 (.20)	.82	[-.34, .43]	.14 (.18)	.43	[-.21, .49]	.21 (.10)	.04	[.01, .40]
Willingness to engage in poaching reducing activities															
Willing to support stricter rules	-.13 (.08)	.12	[-.29, .03]	-.16 (.09)	.09	[-.34, .02]	-.01 (.19)	.98	[-.37, .36]	-.26 (.17)	.13	[-.60, .08]	-.09 (.09)	.37	[-.27, .10]
Willing to refrain from illegal hunting	-.18 (.09)	.04	[-.34, -.01]	-.20 (.10)	.04	[-.39, -.01]	.07 (.20)	.73	[-.45, .32]	-.04 (.18)	.81	[-.40, .31]	-.21 (.10)	.03	[-.40, .02]
Willing to conduct surveillance	-.23 (.08)	.007	[-.40, -.06]	-.22 (.09)	.02	[-.40, -.03]	-.28 (.19)	.14	[-.65, .09]	-.23 (.18)	.21	[-.58, .13]	-.24 (.10)	.01	[-.43, -.06]
Willing to tell about suspicious activities	-.23 (.08)	.007	[-.39, -.06]	-.23 (.09)	.02	[-.41, -.04]	-.24 (.19)	.22	[-.61, .14]	-.19 (.18)	.31	[-.17, .54]	-.35 (.10)	.000	[-.54, -.16]
Willing to tell about poachers' activities	-.25 (.08)	.003	[-.42, -.09]	-.26 (.09)	.006	[-.44, -.07]	-.23 (.19)	.24	[-.60, .15]	-.04 (.18)	.82	[-.40, .32]	-.33 (.10)	.001	[-.52, -.14]
Willing to tell about poachers you know	-.19 (.08)	.02	[-.35, -.03]	-.19 (.09)	.04	[-.37, -.01]	-.20 (.19)	.28	[-.57, .16]	.04 (.18)	.82	[-.30, .39]	-.28 (.09)	.002	[-.47, -.10]
N	2,281			1,831			445			555			1,726		

Note: Unstandardized coefficients, standard errors in parentheses. 95% CIs are reported in [lower limit, upper limit].

## 4 | FINDINGS

Table 1 reports the main findings from a series of ordinal regression analysis, where gender is used as a predictor (full results are available upon request). Analyzing the full sample, the first columns show numerous items that demonstrate small attitude differences between men and women (see Table S4 for distributions in response categories among men and women). For instance, women are less likely to condemn commercial poaching and are somewhat less willing to engage in a number of anti-poaching-related attitudes. Generally, men report a higher frequency of knowing a person involved in poaching. In many items, however, such as willingness to follow rules and to support stricter rules, there are no gender differences.

To better understand the trends we find, our subsamples of electrified and nonelectrified households illustrate that the bulk of them are heterogeneous. In the nonelectrified households, there is a gender effect on three items on willingness to be a part of anti-poaching surveillance and information activities where women are less interested than men. This difference is perhaps understood in the light of women in these poorer settings having the least availability of taking on additional heavy tasks. Men in electrified households report the highest share of stating that they will comply with park rules, which again might reflect that these households are not as burdened by costly regulations. Gender differences in the variable on knowing a poacher are only present in poorer households.

Looking at the sub-sample of households that are resource dependent and those that are not reveals trends that are not entirely consistent with the full sample. In general, women are more likely see a threat to wildlife, whereas they are also more likely to see illegal hunting as decreasing. Through the lens of resource dependence, it seems different types of households capture these effects: In households without dependence, a higher share of women than men state that threats have increased. Among those with resource dependence it is women who are less worried and state that illegal hunting has decreased.

Although these subsamples help us gain further insights, one should keep in mind that in several items we do not find any gender effects. When present, these effects' substantive size is small, differing in shares choosing a certain response category with only a few percentage points (Table S4).

## 5 | DISCUSSION

We report trends among communities living within the GLTP, suggesting that gender differences in poaching attitudes can

sometimes be absent or very small. Here, women were less willing than men to help in monitoring and surveillance of suspected poaching. We contribute by reporting heterogeneous effects through households' level of affluence, where men in electrified households are more willing to follow conservation rules. This speaks to the proposition of Agarwal (2001)), suggesting that women have more to lose by following such rules, adding that this is foremost true in the very poorest of households. We found that gender differences in whether one knows a poacher or the extent to which one condemns commercial poaching are contingent on a household's level of resource dependence, which develops the discussion on biodiversity conservation and poverty traps (Barrett et al., 2011).

Our wish is to stimulate further dialogue by pointing to the heterogeneous empirical trends found among communities in this context, where gendered differences in attitudes generally seem to be a less prominent dimension. We hope that our findings inform future research to investigate the conditions under which one finds gender differences in conservation attitudes. We believe more research is needed on identifying the certain types of households or communities in protected areas where one would expect women to hold different attitudes than men.



Our study suggests that different groups of women do indeed appear to have different views on environmental conservation. This could inform policy on including stakeholders and to hold realistic expectations about such processes. Although interventions to combat poaching certainly need a range of components, attitudes among the public remain a complex yet important feature (Heberlein, 2012). This study indicates that policies of including communities in anti-poaching activities might find less traction among women in poorer conditions. Because this effect was present foremost in nonelectrified households, it seems that voluntary programs could have difficulties recruiting women from such settings. However, we are not able to disentangle *why* poor women might be less willing than men to assist in monitoring activities or tell authorities about suspicious behavior. This could be an issue of restraints in terms of time and resources, but it might also have to do with aspects of risks and perceptions of security. In future research where to disentangle these relationships, such voluntary policies might be supplemented with schemes related to compensation or improving participants' security, in order to increase their traction. Related to the need of future studies, we did not investigate attitudes toward different types of poaching behavior. We urge researchers focusing on gender differences to contrast different types of poaching behavior (such as the type of species being targeted) to advance our understanding on the extent and how men and women differ in their conservation attitudes.



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## SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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