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EXPERT PERCEPTIONS OF CONFLICTS IN AFRICAN VULTURE CONSERVATION: IMPLICATIONS FOR OVERCOMING ETHICAL DECISION-MAKING DILEMMAS

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ABSTRACT.—Because African vultures are declining due to anthropogenic causes, we linked conservation management with social science by examining the ethical perspectives of individuals responsible for the management of vultures. Understanding these perspectives can help balance scientific knowledge with stakeholder concerns, resulting in more effective decision-making. We interviewed 37 vulture conservationists: 24 in South Africa and Kenya from July–August 2017, and the remaining 13 at a conference in the United States from October–November 2017. We used a Q-Methodology activity in which participants ranked a set of statements (termed Q-sort questions) that we had generated based on pre-study interviews and published literature. This methodology is a social science tool that quantitatively evaluates subjective characteristics such as the values that shape a participant's ethical worldview. A follow-up, semi-structured interview provided a deeper understanding of the participants' statement rankings. Together, both steps addressed individual beliefs and how the participants framed their ethical value structures. We found that the conservationists interviewed, regardless of background, held an overall ethical commitment to duty that guides them as they pursue their conservation management work. The Q-sort analysis suggested three different factors that reflected their expressed views: (1) a biocentric perspective (moral status given to all living things in nature) but with strong negative linkage toward vultures having value for human use (non-anthropocentric intrinsic value), (2) an environmental virtue ethics perspective (moral values are based on a person's character rather than whether specific actions are right or wrong) with consideration given toward vultures having possible value for human use, and (3) an ecocentric perspective (holistic, wherein moral consideration is given to both species and ecosystems) that was neutral with regard to vultures having value for human use (intrinsic value). Insights gained from this study represent an initial step in elucidating stakeholder perspectives and will contribute to the conservation of African vultures.

KEY WORDS: *African traditional belief-based uses*; *conservation management*; *environmental ethics*; *Q-Methodology*; *vulture*; *wildlife poisoning*.

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PERCEPCIÓN DE LOS EXPERTOS SOBRE LOS CONFLICTOS ASOCIADOS A LA CONSERVACIÓN DE LOS BUITRES AFRICANOS: IMPLICACIONES PARA SUPERAR LOS DILEMAS ÉTICOS EN LA TOMA DE DECISIONES

RESUMEN.—Debido a que los buitres de África están disminuyendo por causas antrópicas, vinculamos la gestión de la conservación con las ciencias sociales mediante el análisis de las perspectivas éticas de los individuos responsables del manejo de estas aves. Entender estas perspectivas puede ayudar a equilibrar el conocimiento científico con las preocupaciones de las partes interesadas, resultando en tomas de decisiones más efectivas. Interrogamos 37 personas dedicadas a la conservación de buitres, 24 en Sudáfrica y Kenia en julio-agosto 2017, y las 13 restantes en una conferencia en octubre-noviembre 2017. Usamos una actividad con Metodología Q en la que los participantes clasificaron un conjunto de enunciados (llamadas preguntas Q-sort) que fueron generadas en base a entrevistas previas y a literatura publicada. Esta metodología es una herramienta de las ciencias sociales que evalúa cuantitativamente características subjetivas, tales como los valores que dan forma a la cosmovisión ética de un participante. El seguimiento posterior con una segunda entrevista semiestructurada proporcionó una comprensión más profunda de la clasificación que hicieron los participantes de los enunciados. Juntos, ambos pasos abordaron las creencias individuales y cómo los participantes enmarcaron sus estructuras de valores éticos. Encontramos que los conservacionistas entrevistados, independientemente de sus antecedentes, mantuvieron un compromiso ético general con el trabajo que los guía en su labor de gestión de la conservación. El análisis Q-sort sugirió tres factores diferentes que reflejan las visiones que expresaron: (1) una perspectiva bio-céntrica (estatus moral dado a todos los seres vivos de la naturaleza) pero con un fuerte vínculo negativo hacia el valor de uso para los humanos de los buitres (valor intrínseco no-antropocéntrico), (2) una perspectiva ética de virtud ambiental (los valores morales están basados en el carácter de una persona más que si las acciones específicas están bien o mal) teniendo en cuenta que los buitres tienen un posible valor de uso para los humanos, y (3) una perspectiva eco-céntrica (holística, donde se da consideración moral tanto a las especies como a los ecosistemas) que fue neutral con respecto a que si los buitres tienen un valor de uso para los humanos (valor intrínseco). Las lecciones obtenidas de este estudio suponen un paso inicial para dilucidar las perspectivas de las partes interesadas y contribuirá a la conservación de los buitres de África.

[Traducción del equipo editorial]

INTRODUCTION

Many African vultures are at risk of extinction; seven of the 11 species of African vultures are classified as endangered or critically endangered (Long 2015). Potential factors contributing to the endangerment of these birds include poisoning incidences, demand for parts in traditional belief use, and interactions with electrical infrastructure (Ogada et al. 2015). However, vultures are important to ecosystem stability (Long 2015, Buechley and Şekercioğlu 2016). As such, the critical conservation status of many vulture species is of broad concern for the health and well-being of people, other animals, and the ecosystems that interact with them (Ogada et al. 2012, Moleón et al. 2014, Henriques et al. 2020, van den Heever et al. 2021).

As scavengers, vultures serve a crucial ecological role in both regulating and provisioning ecosystem services (Millennium Ecosystem Assessment 2005). Vultures consume the rotting flesh of dead animals that could contaminate water, which may help limit the spread of disease originating from such carcasses (Houston and Cooper 1975, Ogada et al. 2012, Moléon et al. 2014, van den Heever et al. 2021). This disease-limiting role is not yet definitive according to the International Union for the Conservation of Nature (IUCN) Vulture Specialist Group (A. Botha pers. comm.), but because vultures are important consumers of dead animals, it is reasonable to conclude that they may help limit disease spread at carcasses (A. Botha pers. comm., van den Heever et al. 2021).

In addition to potential disease control, vultures serve as ingredients in traditional medicines such as *muti* (also known as *muthi*) or for belief-based uses, and as components of fetishes, charms, or other occult materials to increase clairvoyant powers (Muhammad and Mustapha 2020). They are also used in cultural rituals such as rites of passage, as well as in ancestor worship through animism (Simelane and Kerley 1998, Chemhuru and Masaka 2010, Whiting et al. 2011, Ekwealo 2012, McKean et al. 2013, Behrens 2014, Williams et al. 2014, Kelbessa 2015, Emeagwali 2016, Williams and Whiting 2016, Yee 2018; also see Supplemental Material Part 1 of this study).

These cultural services may result in ethical dilemmas among local tribal peoples, conservation-

Table 1. Summary of ethical terms used to describe the approach of a Q-sort analysis for the purpose of evaluating conservationists' perspectives of African vulture conservation.

TERM	WORKING DEFINITION
Normative ethic	An ethical construct that judges whether things are right or wrong (i.e., what should or ought to be the correct moral action).
Virtue ethic	An ethical approach that focuses on the individual building good character, which allows the individual to act ethically.
Deontological ethic	An ethical construct that emphasizes the individual's duty. The action itself is more important than the consequences.
Consequential or utilitarian ethic	An ethical construct that focuses on maximizing good for the greatest number of individuals. It is concerned with the consequences of the action. Actions are not right or wrong in themselves.
Values	Principles that help guide and motivate an individual's behavior.
Attitudes	Attitudes arise out of an individual's values and inform the individual's behavior.
Beliefs	Beliefs are assumptions and convictions held to be true or false without positive knowledge or proof.
Instrumental value	The concept that a thing has value because it provides a means to some desired end. Utilitarian.
Intrinsic value	The concept that a thing has value (or is good) for its own sake.
Anthropocentrism	The ethical worldview that only humans have moral status and intrinsic value.
Biocentrism	The ethical worldview that all living things in nature have moral status and intrinsic value.
Ecocentrism	A holistic ethical worldview in which the scope of moral status and intrinsic value are extended to the entirety of ecosystems including biotic and abiotic components.

ists, and other stakeholders, because the attitudes and beliefs shaping their behaviors (e.g., Manfredo et al. 2009) may conflict with the need for conservation. Some cultural groups exercise strong beliefs by using vulture parts (e.g., brain, eyes, feet) in traditional medicines for physical and mental healing (Nikolaus 2011, Whiting et al. 2011, McKean et al. 2013, Saidu and Buij 2013, Buij et al. 2016, Williams and Whiting 2016). Other peoples view killing vultures as taboo because of the perceived animistic connection (Chemhuru and Masaka 2010, Low 2011). Depending on the cultural group in power and their alignment with other stakeholders, unsustainable demand for traditional medicine purposes or belief-based uses could increase even as vulture populations continue to decline. These conflicts can lead to further management issues for conservationists and responsible agencies, including reallocation of financial and human resources, strategic planning, and stakeholder engagement.

An understanding of the ethical reasoning underlying decision-making can enhance technical and political efforts to improve vulture management. The Multi-Species Action Plan to Conserve African-Eurasian Vultures, for example, is a strategic vulture management plan that presents collaborative actions that can help save vultures from extinction (Botha et al. 2017). Such strategic approaches, coupled with discussion of ethical concerns with diverse stakeholders, can illuminate the influence of culture on decision-making and improve adaptive conservation management strategies for vulture protection (Browne-Nuñez and Jonker 2008, Nelson and Vucetich 2012). These efforts are important because some stakeholders may only value vultures for their economic worth (i.e., sale to traditional medicine or belief-use markets), whereas others may value them for spiritual or religious connections and find monetizing such an animal to be abhorrent. Still others may consider vultures as having intrinsic value and a right to exist simply because they are living organisms. In this last case, stakeholders believe cultural use of vultures should not be allowed because it hinders the perceived needs of vultures to survive and thrive (i.e., realize their *telos*). Such diverse ethical views are expressed in stakeholders' differing attitudes and beliefs, which can place managers in a difficult situation. The potential conflict exists then between human interests (i.e., instrumental value) and the ethical notion that living organisms in nature warrant moral consideration because of their intrinsic value (Rolston 2005, Svoboda 2011, Scoville 2016, Batavia and Nelson 2017; Table 1).

To understand and discuss values, attitudes, and beliefs as they relate to ethics and behavior, we must

use some discipline-specific terms associated with ethics (Table 1). Values are the basis from which worldviews and beliefs evolve and are the ultimate drivers of behavior. Instrumental value describes the goodness or utility of a thing as a means to another end; the holder of this perspective is concerned about the net gain in the end result (Baggini and Fosl 2007; Table 1). Intrinsic value describes the inherent goodness of a thing; the holder of this perspective views a thing as having value for its own sake (Baggini and Fosl 2007; Table 1). By focusing on the two related concepts of instrumental value and intrinsic value, one can better understand how and why these values relate to environmental ethics, as well as the conflicts that may arise in wildlife management.

For wildlife, Manfredo et al. (2003, 2009) described instrumental value (Table 1) as a domination wildlife-value orientation, in which wildlife should be managed and used (mastered) to benefit humans. In contrast, Manfredo et al. (2003, 2009) categorized intrinsic value as a wildlife-appreciation or mutualistic wildlife-value orientation in which adherents think wildlife should have rights similar to those of humans as part of an extended community deserving of care and compassion. Because of these differing societal values, it is important to examine the diversity and range of ethical views when attempting to implement conservation policies. Given the urgency surrounding the conservation of Africa's vultures (Ogada et al. 2012, Long 2015, Buechley and Şekercioğlu 2016, Buij et al. 2016, Muhammad and Mustapha 2020), attempting to minimize ethical conflict by understanding what people value is essential prior to development and implementation of conservation policies.

Further, value constructs shape an individual's environmental ethical thought, be it anthropocentric, biocentric, or ecocentric (Attfield 2014; Table 1). These value constructs represent environmental subsets of the classical normative ethical theories of virtue, deontology, and consequentialism (Table 1). Virtue ethics as a theory is anthropocentric and clashes with the entire premise of environmental ethics (Dzwonkowska 2018). Environmental virtue ethics (EVE), in contrast, is pluralistic and may have implications for both humans and non-humans (Sandler 2007). Therefore, EVE is the form of virtue ethics discussed herein because it applies to the overarching principle of having good character regarding care for all life.

The primary dividing factors among anthropogenic, biocentric, and ecocentric ethical thoughts are the determination of whether nature has intrinsic value and whether it warrants moral consideration. Anthropocentrism holds that humans are the only organisms that have intrinsic value (and thus nature does not), but adherents to this perspective can incorporate concern for the overall ecosystem because of how the ecosystem impacts human utility. Biocentrism ascribes intrinsic value to all individual living creatures, including humans, fish, and trees. Ecocentrism attributes intrinsic value to the ecosystem as a whole, both biotic (including humans) and abiotic factors. None of these perspectives are considered inherently good or bad; they are simplified categorizations of what individuals believe holds intrinsic value (Attfield 2014). It is useful, therefore, to identify the main values that underlie an individual's ethical reasoning to support or oppose a conservation decision (Baggini and Fosl 2007, Attfield 2014). Although ecocentrism and anthropocentrism are conceptualized as opposing worldviews and may seem mutually exclusive, in practice they are not. People may adopt these worldviews without perfectly adhering to them.

Normative ethical theories describe morality in terms of what should be done and why (Spielthenner 2005, Curry 2006); these theories evaluate why an action is considered right or wrong. According to the normative theory of deontology, the rightness of an act depends on the act itself and whether the act aligns with known principles or duties, rather than the effectiveness of the act in achieving its goal (Table 1). In contrast, the normative theory of consequentialism focuses on the outcome of the action as it relates to the greater net benefit for the greater number of individuals (Table 1). Virtue ethics (another normative theory) focuses on pursuing qualities that cultivate an ideal moral character marked by excellence in traits such as temperance and personal flourishing (Mijuskovic 2007, Shafer-Landau and Cuneo 2007; Table 1).

Recognizing the range of possible values and ethical thought is a necessary first step to understanding the complexity of perspectives and creating conservation management policies that consider ethical concerns. This consideration is important because success of management implementation is often contingent on understanding how cultural differences can drive ethical behavior (Baggini and Fosl 2007, Attfield 2014). Although ethical terms are useful for understanding differing viewpoints, stake-

holders may not self-identify as having a particular ethical viewpoint, nor are they necessarily aware of these academic categorizations. In fact, most people do not adhere to a specific ethical construct and may express ethical views from many categories, even those that are conflicting or inconsistent. Only through exploration of the diverse ethical perspectives that stakeholders express can we better understand core values that shape behavior. Such understanding is valuable for developing inclusive, transparent, and socially accountable management policies while still allowing conservation managers flexibility in decision-making when conflicts arise between people with different values.

For this study, conservationists familiar with the issues associated with vulture declines served as the baseline cohort. We chose this cohort because they are tasked with the overall protection and management of an area's natural resources. In addition, unless they are administrators, they rarely have direct input on policy development; instead, they are responsible for carrying out policy with their "boots on the ground." If there is a direct conflict between the field manager and the institutional, state, or country policy, the field manager may be faced with an ethical dilemma: to carry out the mandated policy or hold to personal convictions.

The goal of this study was to provide baseline information on conservationists' ethical perspectives surrounding the natural, ecological, and cultural value of African vultures. We also discuss how managers and wildlife specialists may want to consider ethical perspectives in designing management strategies to help mitigate vulture population declines.

Methods

The study took place in South Africa and Kenya, countries that have both experienced a rapid decline in African vulture populations and support an ongoing, concerted effort to protect and manage the populations. Our focus on the two different regions of Africa allowed us to investigate a broader range of cultural experiences.

The conservationists we interviewed included raptor biologists, conservation managers, regional wildlife specialists, law enforcement rangers, government and nongovernmental organization specialists, rural tribal peoples trained to protect wildlife, and other wildlife management specialists. The sample population included Zulu and Maasai conservationists, some of whom were also tribal leaders and/or held wildlife law enforcement or management responsibilities. Some participants possessed tertiary educational degrees, while others did not. None were involved in commercial vulture harvesting or using vultures for traditional medicines or belief-use, but they were aware of how these activities may impact population declines. Participants were aware of the potential conflict between traditional African belief-based uses of vultures and the conservation objective of protecting endangered vultures and needed little to no further education about the focal issue.

We used a snowball sampling technique to identify as many participants as possible (Chromy 2008). The University of Maryland, College Park Institutional Review Board approved the methods and protocols: 00005856 (IRB Project 1074563-1).

Preliminary research using informal one-on-one semi-structured interviews took place in South Africa in March 2017. This pilot study involved interviewing 12 conservationists to gather a baseline understanding of the African vulture decline, as well as insights about the meaning of conservation ethics. Initial questions came from topics emphasized in published literature around the subject (i.e., the value of nature, the role of humans in the ecosystem, poaching, management, and problems contributing to the African vulture decline; Ogada et al. 2012, Long 2015, Buechley and Şekercioğlu 2016). These subdivisions became the basis for the categories of emphasis in the primary research.

The primary mixed-methods research took place from July to August 2017 and involved two sequential parts: a semi-quantitative Q-Methodology activity and a qualitative, semi-structured follow-up interview (Supplemental Material Part 2, 3). We completed 24 of 37 interviews during this time. The remaining 13 interviews were conducted at the end of October to November 2017 while African conservationists gathered in the United States for a conference.

Q-Methodology is used in social sciences to quantify and qualify individual attitudes, beliefs, and viewpoints. This method allows for the simultaneous study of objective and subjective issues to determine an individual's perceptions (Cross 2005). We chose Q-Methodology to determine ethical drivers of decision-making because it is based on both philosophical and epistemological premises that are qualitative and thus subjective (Watts and Stenner 2012, Zabala et al. 2018). Q-Methodology was an appropriate tool because ethical viewpoints are inherently subjective, and this method embraces

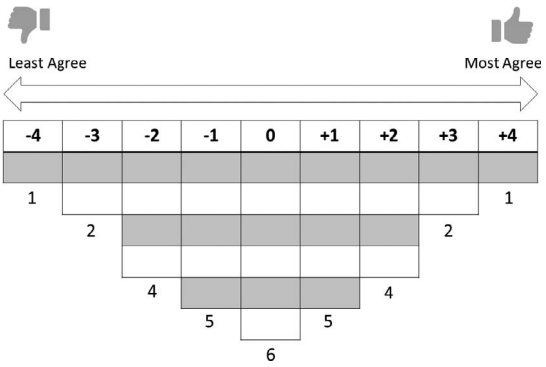

Figure 1. Participants in the Q-Methodology activity ranked statement cards in a Likert-scale format ranging from least agree (–4) to most agree (+4), yielding a preset quasi-normal distribution.

the systematic study of subjectivity (Brown 1993, 1996, Barker 2008, Coogan and Herrington 2011, McKeown and Thomas 2013, Zabala and Pascual 2016). We (the researchers) were not considered neutral actors because we took an active role in interpreting the results based on our collective knowledge of the topics addressed as they related to ethical constructs (Zabala et al. 2018).

The Q-Methodology procedure afforded the ability to examine and analyze subjective perspectives through a ranking activity (Barker 2008, Coogan and Herrington 2011, McKeown and Thomas 2013, Zabala and Pascual 2016, Zabala et al. 2018). For the ranking activity, we provided participants with individual cards containing a set of 30 statements deemed germane to the issue (Table 2). Participants were asked to sort these statements according to their subjective prioritization and rank the statements against each other. The participants used the statement cards to recreate a preset, quasi-normal distribution by ranking the cards from Strongly Disagree (–4) to Strongly Agree (+4); see Table 2 for the statements and Fig. 1 for visualization of how this sorting occurred. This recreation of the distribution is called a Q-sort (Barker 2008, Coogan and Herrington 2011, McKeown and Thomas 2013). Having to sort both abstract and concrete statements required the participants to prioritize the concepts that were most important to them and to reflect on the origin of their priorities. The abstract statements were derived from concepts in the literature, and the concrete statements came from the analysis of the informal preliminary research interviews. Topics were selected because of their prominence during the preliminary research and their relevance to potential policy decisions (Coogan and Herrington 2011).

The Q-sort activity complemented the follow-up, semi-structured interviews by showing the participants' priorities, and the interviews clarified their reasons for valuing them. The responses of the Q-sort activity and the interviews allowed us to classify responses quantitatively and qualitatively as they aligned with the guiding principles of different normative ethical theories. The chosen 30 statements were purposefully ambiguous to allow the participants to interpret each statement subjectively. The use of mixed methods offered a richer, more detailed understanding of conservationists' perspectives on the African vulture crisis than could have been achieved by either a quantitative or a qualitative assessment alone (Barker 2008, Coogan and Herrington 2011, McKeown and Thomas 2013).

The PQMethod software, a statistical tool designed to correlate and interpret Q-sort activities, was used to generate weighted averages for a group of participants who arranged their Q-sorts similarly (Schmolck and Atkinson 2014). These weighted averages, referred to as factors, captured distinct groups of stakeholders who held shared and vested perspectives on the issue. Factors were labeled describing categories of valuation related to decision-making and management approaches. The PQMethod software performed data reduction to identify the most important information. We performed a principal component analysis (PCA) to produce eigenvalues, in which values <1 were considered to be insignificant (McKeown and Thomas 2013). An automated factor rotation commonly used in Q-Methodology called Varimax eliminated the concerns of incomparability (Zabala and Pascual 2016). We interpreted the data to decide how many factors were most important and which best represented the participants' values.

Factor scores and *z*-scores represent the compatibility of each statement with each factor (Coogan and Herrington 2011). Factor scores are the integer rankings for each individual's Q-sort (McKeown and Thomas 2013, Zabala and Pascual 2016). In this study, the factor scores are column rankings such as +1, 0, and –1 as shown in Fig. 1. The *z*-scores are standardized values showing the distance of a particular data point from the mean (of all the Q-sort scores); the greater the *z*-score of a statement, the more that statement aligned with the relevant factor (e.g., a statement with a *z*-score of 1.308 is

Table 2. *Z*-scores and factor scores showed how each statement ranked according to each factor perspective. The higher the factor score or *z*-score, the better a statement aligned with a given ethical construct. Bold-faced type indicates distinguishing statements, * identifies factors $P < 0.05$, and † indicates consensus statements, which have similar rankings among the three factors.

		Factor 1		Factor 2		Factor 3	
		Biocentrism		Environmental Virtue Ethics		Ecocentrism	
Statement Number	Statement	Factor Score	*Z*-Score	Factor Score	*Z*-Score	Factor Score	*Z*-Score
1	**Endangered species should be given special attention to be protected.**	**1**	**0.552**	**0**	**0.269**	**3**	**1.511***
2	**Some species are more important than other species.**	**−2**	**−0.991**	**−3**	**−1.410**	**1**	**0.616***
3	Animals should have rights.	−1	−0.328	1	0.660	0	0.120
4	**Individual animals have a right to be considered in policy discussion.**	**0**	**0.151***	**−1**	**−0.585**	**−2**	**−1.204**
5†	Species have a right to be considered in policy discussion.	1	0.593	0	−0.072	1	0.483
6†	The conservation of the species is more important than the conservation of an individual organism.	1	0.321	1	0.481	2	0.957
7	**The conservation of the ecosystem is more important than the conservation of the species.**	**0**	**0.116**	**0**	**0.293**	**2**	**1.237***
8†	The demands for a healthy ecosystem are greater than the cultural/spiritual needs of humans.	−1	−0.151	0	−0.444	0	0.165
9	The demands for a healthy ecosystem are greater than the personal needs of humans.	−1	−0.243	0	0.281	2	0.730
10	**Nature would be better off without humans.**	**0**	**0.299**	**−2**	**−1.115***	**0**	**0.019**
11	**Humans are a part of nature.**	**0**	**0.133**	**4**	**1.958***	**1**	**0.700**
12†	Humans should be the dominant species.	−2	−1.284	−2	−1.198	−3	−1.708
13	**Humans need to change the way they treat nature.**	**3**	**1.308**	**2**	**0.990**	**−1**	**−0.423***
14†	Illegal taking of wild animals should be treated the same as theft of personal property.	1	0.415	1	0.497	2	0.802
15†	Illegal taking of wild animals is acceptable if it is for sustenance.	−2	−1.217	−3	−1.225	−2	−1.247
16	Humans should be allowed to hunt any kind of wildlife.	−4	−2.022	−2	−1.214	−4	−1.757
17†	Humans' use of vultures is acceptable if it is done in a sustainable manner.	−2	−1.024	−1	−0.543	−1	−0.301
18†	Humans' use of vultures is acceptable if it is done in a humane manner.	−3	−1.470	−2	−0.972	−1	−0.805
19	Vultures need to be protected because of their value to the ecosystem.	2	0.923	3	1.376	0	0.352
20†	The use of vulture parts for knowing the future is important.	−3	−2.011	−4	−1.952	−3	−1.426
21	**Killing vultures by poisoning carcasses for any reason is wrong.**	**4**	**1.647**	**−1**	**−0.705***	**3**	**1.252**
22	**The main reason for the vulture decline is because of the size of the human population.**	**3**	**1.462***	**0**	**−0.332**	**−1**	**−0.791**
23	**Humans managing nature is good.**	**−1**	**−0.784**	**1**	**0.695***	**−2**	**−1.044**
24	**The government has an obligation to protect nature.**	**2**	**1.292**	**2**	**0.844**	**0**	**−0.081***
25	Individuals have an obligation to protect nature.	0	0.176	2	1.038	1	0.535
26†	The application of conservation management needs to be stronger.	2	0.859	2	0.967	0	0.303
27	**It is important to practice sustainable management for future generations.**	**2**	**0.974***	**3**	**1.717**	**4**	**2.076**
28†	It is necessary to adapt old practices to more effective practices as information is discovered.	1	0.822	1	0.761	1	0.550
29†	**People's opinions are only validated if there is scientific evidence to support it.**	**−1**	**−0.430**	**−1**	**−0.583**	**−2**	**−1.180***
30†	One does not have a right to impose upon another's culture even if the cultures conflict.	0	−0.087	−1	−0.478	−1	−0.442

more strongly associated with the factor than a statement with a *z*-score of 0.299). *Z*-scores can be negatively associated; the lower the *z*-score, the more the participant disagreed with the factor (e.g., a statement with a *z*-score of −1.204 is even less associated with the factor compared to a statement with a *z*-score of −0.585). The more positive the factor score and *z*-score, the more the statement resonated with the factor.

Additionally, the PQMethod software extracted "distinguishing statements" for each factor with $P < 0.05$ (Schmolck and Atkinson 2014); *P*-values represented the probability of occurrence of a given event. In this context, a statement would be classified as distinguishing if most participants agreed on its ranking position and if it helped to define the subtleties among factors (Coogan and Herrington 2011).

The PQMethod also identified "consensus statements" among the three factors (i.e., statements for which the three different perspectives all agreed; Table 2). Although the distinguishing statements and consensus statements illustrate the most defining qualities of the factors, some uncategorized statements were also included to refine the meaning of the factors.

The interviews were conducted in English and digitally recorded for accurate referencing. Three participants required a translator from the Maasai or Maa language. The translator spoke both languages fluently, and the three interviews were translated by the same person for consistency. All interviews were transcribed from the recordings and handwritten notes for ease of reference, using numbered pseudonyms to maintain confidentiality. Transcribing the interviews facilitated finding parallel or notably different results between the Q-sorts and the interviews.

RESULTS

The quantitative data collected for this study showed how participants aligned with different environmental ethical perspectives. The qualitative data further explored those ethical perspectives to uncover potential conflicts related to vulture conservation and decision-making.

Reasoning Underlying Conservationists' Perspectives. *Q-methodology factors.* Three distinct factors illustrated different ethical perspectives among the participants and accounted for a total of 62% of the variance. Using ethical theory and vulture ecology, coupled with the participants' perspectives expressed in the Q-sort results and follow-up interviews, these factors were categorized as: (1) biocentrism (26% of the variance), with a strong negative linkage toward vultures having value for human use (i.e., vultures should be valued for their intrinsic value, not their instrumental value); (2) environmental virtue ethics perspective (EVE; 20% of the variance), an ethic of moral character, with consideration given toward vultures possibly having value for human use; and (3) ecocentrism (16% of the variance), with a perspective that was neutral with regard to vultures having value for human use.

As previously mentioned, we based factor categorization on the collective knowledge of the authors, the semi-structured interviews, and the Q-sort results. Biocentrism emphasized the duties humans have toward living beings and how humans should, but often do not, treat the biota with respect. The focus is on the principle that, as living beings, vultures should be given moral consideration. This reasoning was expressed overtly in Statement 21 ("Killing vultures by poisoning carcasses for any reason is wrong"). Likewise, Statements 22 ("The main reason for the vulture decline is because of the size of the human population") and 27 ("It is important to practice sustainable management for future generations") were biocentric and notable because of their high factor scores. They were also statistically significant distinguishing statements (Table 2). Although Statement 22 is not a value *per se,* and Statement 27 had an inherent anthropocentric slant because it looks toward future humanity without consideration of nature, they were both classified as biocentric. They express a negative view of humanity toward nature because one of the root causes of the vulture decline is the increased population growth of humans and the resultant habitat loss.

Likewise, the term sustainability exceeds the simple concept of instrumental value (i.e., vultures being present for human utility only). Statement 13 ("Humans need to change the way they treat nature") implied an element of intrinsic value because it has a sustainability slant that transcends a strictly anthropocentric perspective (i.e., humanity needs to change the way it treats nature because nature is valuable in and of itself). This view was further substantiated in the semi-structured interview discussions.

Statements 22, 13, and 24 ("The government has an obligation to protect nature") aligned with both biocentric and ecocentric deontological values

because they expressed that society has an ethical duty to protect and respect nature. Participant responses indicated that this goal is not being met at a satisfactory level, a conclusion supported by the continual decline of vulture populations due to lack of governmental protection, urban sprawl without consideration of its effect on nature, and an apparently cavalier attitude toward nature's rights in general.

The EVE factor grouped statements that emphasized that humans should pursue environmentally virtuous acts as a reflection of moral character. From an EVE perspective, Statement 11 ("Humans are a part of nature") illustrated the participant's worldview, which recognizes humanity's role as part of a greater whole. This statement had the highest factor score (+4) for EVE but was ranked neutral or "slightly agree" for biocentrism and ecocentrism (factor scores of 0 or +1, respectively; Table 2). It was the top distinguishing statement, with a *z*-score of 1.96 (Table 2). Statement 23 ("Humans managing nature is good") also related to EVE because it connects one's perspective of nature possessing good value with human activities. It had a positive rating of +1 for EVE, which contrasted with its negative ratings of −1 for biocentrism and −2 for ecocentrism (Table 2), the latter of which does not consider the action as good or bad because humans (as agents) can manage nature poorly or well. EVE also reflects a perspective that recognizes humanity's role in sustainability. Statements 27, 25 ("Individuals have an obligation to protect nature"), and 13 were three of the top five highest ranked statements, all emphasizing the moral responsibility for humans to care for nature (Table 2).

Ecocentrism illustrated a holistic perspective, with minimal attention directed specifically toward an anthropocentric viewpoint. This factor should not be interpreted as indicating that the utility of nature for humans was not considered at all, but rather that the needs of the entire ecosystem were most important. Statements 27, 7 ("The conservation of the ecosystem is more important than the conservation of the species"), and 6 ("The conservation of the species is more important than the conservation of an individual organism") affirmed this holistic view (Table 2). They received positive factor scores of +4, +2, and +2, respectively. Statement 27 considered sustainability relative to the need for resources for future generations, not just the needs of people today. Statements 6 and 7 examined the comparison of the needs of the system rather than the constituent parts and, in both instances the needs of the system were prioritized in ecocentrism. Statement 1 ("Endangered species should be given special attention to be protected") focused on giving special attention to specific biological entities and was the second highest ranking statement and a distinguishing statement for ecocentrism. Statement 13 was also a distinguishing statement for ecocentrism, as the current way humans are treating nature negatively affected different aspects of the ecosystem.

Reasons for environmental stewardship. All participants agreed that humanity has an ethical duty to protect nature. This was not an explicit Q-Methodology statement but rather a question presented in the interview and implicitly embedded within the Q-Methodology statements themselves (i.e., Statements 1, 4–9, 13–14, 18–19, 23–25, 27–28; Table 2). There were five reasons underlying this duty to protect nature: (1) duty because of previous human manipulation of the environment, (2) duty because of future generations, (3) duty because of the influence humans have on the environment, (4) duty because of religious teachings, and (5) duty because of the environment's influence on human survival (Fig. 2). The first four reasons were deontological, and the last was consequential. Although participants sometimes expressed multiple reasons for protecting nature, we included each participant in only a single category that best expressed the most important reason for them.

Of the 37 participants, 11 explained that a sense of duty arose because humans have already manipulated the ecosystem and negatively impacted it (Fig. 2). For instance, Participant 112 (P112) explained "Humans have a duty because we're on the top of the food chain. We have the power to control, and . . . it's up to us to correct the wrongs we've done."

Thirteen participants exhibited an attitude of duty to allow future generations the opportunity to experience wildlife in the natural environment (Fig. 2), a perspective that incorporates both instrumental and intrinsic values of beauty and a sense of rightness. P107 said "We should be responsible for what we did to the wildlife. My children might someday ask, 'What does a rhino look like?' I cannot just take out a picture. I should show them in the wild because it was there before me." Being able to share the aesthetic and intrinsic value of wildlife with future generations was a central reason for this individual working in conservation.

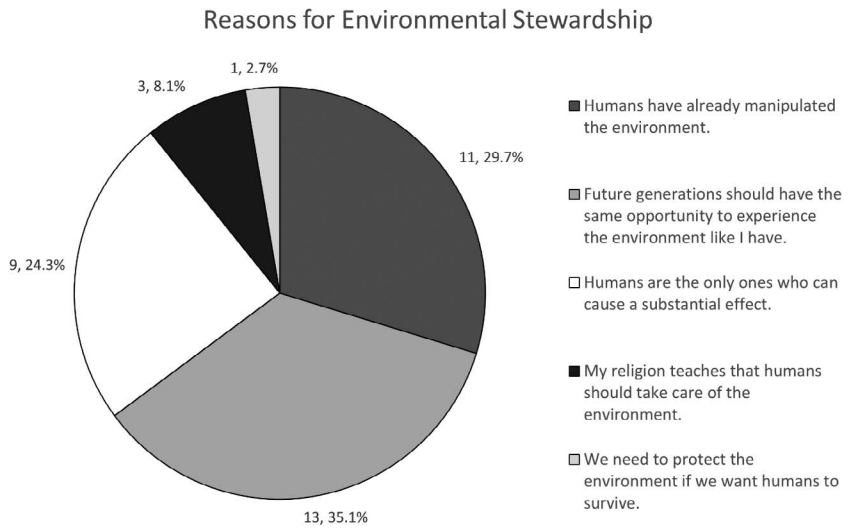

Figure 2. Reasons for practicing environmental stewardship given by conservationists knowledgeable about African vultures. The first number is the number of participants in that category. The reasons came from the semi-structured interviews in which participants were allowed to explain their reasons for environmental stewardship. If multiple reasons were given, we asked them to explain which reason was most important to them by following a similar prioritization scenario as the sorting activity. During the analysis, we found that the participants' reasons for environmental stewardship could be categorized into five distinct phrases.

For nine participants, the sense of duty came from the influence humans have over the environment (Fig. 2). P111 explained that humans are the only species able to create substantial change, stating "Who else is going to do it? . . . We can manipulate the system. If our ethics are right, and our knowledge is correct, then we can do this successfully." This individual concluded that it is humanity's responsibility to use this ability to better the system, not just for humans but for all parts of the ecosystem.

The concept of religion played a part in shaping some ethical worldviews toward environmental stewardship. The three conservationists who mentioned religion specifically cited Christianity as an influential factor driving their passion for conservation and stewardship (Fig. 2). P132 explained that ". . . I try to bridge my science understanding and our role as complex creation to extend moral consideration for other organisms and our responsibility for caring for those who can't speak for themselves." For these participants, Christianity influenced them to care for the environment.

The remaining participant explained that environmental stewardship is less a deontological reason to protect nature than a way to promote human survival, a statement that reflects a consequentialist point of view (Fig. 2). P133 emphasized the fact that without a healthy ecosystem, humans are in danger of suffering, stating "We have an obligation, but I think it's far more important to protect it for our own well-being. I don't think ethics are really important. It's common sense that if we don't protect it, we are going to suffer."

Identification of Potential Ethical Dilemmas. As participants defined their viewpoints on what gives a species value, the scope was narrowed to focus on the specific qualities of vultures that were valued by the individual. According to both the Q-sort data and the interview data, all participants appreciated the instrumental value of vultures as carrion eaters. Statement 19 reflected this sentiment, stating, "Vultures need to be protected because of their value to the ecosystem." This statement received positive *z*-scores for all three factors: 0.923 (biocentrism), 1.376 (EVE), and 0.352 (ecocentrism; Table 2).

A basis for ethical dilemma concerns was demonstrated with the statements involving vultures used for belief-based purposes (fetishes, occult, etc.). The Q-sort analysis found that for most of these related statements, the conservationists did not find such use of vultures acceptable under any circumstance. This consensus was most obvious when clairvoyance

was the reason for vulture usage. Statement 20 ("The use of vulture parts for knowing the future is important") represented an anthropocentric, consequentialist perspective. It was a negative consensus statement among all three factors, with *z*-scores of −2.01 (biocentrism), −1.95 (EVE), and −1.43 (ecocentrism; Table 2). Here the participants had strong opinions that differed from those of potential stakeholders such as users of vulture parts. The dilemma arises when wildlife managers must accept the cultural and societal differences represented by those who use vultures and/or vulture parts for their beliefs and practices.

None of the participants reported that they personally used traditional medicines or held to any belief-based uses practices where animal parts (brains, beak, feet, organs, etc.) were involved. About 35% of the participants stated that traditional medicines or belief-based uses, including traditional herbal medicines not containing animal parts, were "not part of their culture." However, some participants considered there may be circumstances in which vultures could be used in traditional medicine and belief-use practices, creating a spectrum of viewpoints on the level of acceptance of using vulture parts depending on how they were procured. P135 expressed that the use of vulture parts in traditional medicines and/or belief-based uses would be acceptable if vulture populations were sustainable. This individual further explained, "I'm not comfortable because it's not sustainable. If they were to take vultures that have already died, or if they were breeding vultures for the purpose of *muti* (traditional medicine) or belief-based uses, I think that would be doable. I don't like the idea, but it would be doable." In contrast, P137 found that using animal parts in belief-based uses was unequivocally unacceptable, stating, "It's only based on superstition. Animals are suffering because some people say it helps with winning the lotto, but no one has ever won because of it." This person exhibited a biocentric viewpoint because his emphasis was on individual animals suffering specifically for anthropogenic purposes. The specifics of how these convictions may result in ethical dilemmas are discussed below.

DISCUSSION

This study investigated some of the ethical issues surrounding the decline of African vultures. Differing worldviews of study participants illustrated various conservation beliefs and values, as well as the reasons and/or personal conflicts behind them. Learning the values behind these different viewpoints can aid in the construction of management strategies (e.g., stakeholder engagement, strategic planning, understanding practicality of implementing tactical approaches) to protect vultures and promote their long-term population stability.

Reasons Underlying Conservationists' Perspectives. *Q-methodology factors.* The Q-Methodology activity indicated that conservationists, although agreeing in general about vulture management, had value structures that differed among individuals and could present ethical dilemmas. These differences (and similarities) were likely due in part to the participants' familial and cultural heritage. At times, these ingrained values may conflict with their formal management training, which could lead to conflict in perspectives. Thus, the factors that drove values (biocentrism, EVE, and ecocentrism) were not consistent from an instrumental versus intrinsic perspective. Instead, they commingled the normative ethical constructs: deontological (duty-driven), consequential (utilitarian), and virtue (reflecting one's character).

Due to conservation management training, most participants exhibited a deontological viewpoint that guided them in their conservation career. Both biocentric and ecocentric perspectives align with the principles of a prescriptive deontological normative ethic (Curry 2006). Biocentrism, as a factor, means that humans have a duty to protect the living environment (Curry 2006), and that all individuals deserve to be protected (Attfield 2014). An ecocentric perspective expands on that thought and reflects a holistic perspective that values conservation for the sake of the entire ecosystem (Attfield 2014). Both of these ethical constructs incorporate a moral mandate to protect nature not only because of what value nature brings to humanity (instrumental value) but also because of the value of nature itself (intrinsic value). An EVE perspective reflects the view that humans should promote conservation as the right thing to do, which is an attitude that builds up virtuous character (Mijuskovic 2007). This pursuit of virtuous character was demonstrated through Statements 27, 25, and 13, which build on the concept of humans caring for nature, as well as Statement 23, which emphasizes that humans managing nature is "good." These statements may or may not be directed toward human utility. All three perspectives acknowledge the influence humans have on the environment and specifically vultures, but each had

a different slant on why humans should work toward conservation.

Reasons for environmental stewardship. Overall, the participants declared that humans have a duty toward the environment, which aligns with a view of stewardship (Muir and Wolfe 1938/1979). For each individual, attitudes about stewardship stem from the values and beliefs that help shape the individual's worldview and are ultimately expressed in behavior. All the reasons for environmental stewardship were deontological except, "We need to protect the environment if we want humans to survive." This reason was consequentialist, because although the means to persevere may involve the protection of the environment, the survival of humanity is of greatest importance, regardless of the actions needed to achieve this goal. P133 in particular expressed this perspective, which underscored that those within the conservation field can have varied viewpoints and still pursue common goals.

Religion was not a prompted topic of discussion, nor was the study designed to investigate participant perceptions on the role of religion. As mentioned however, three participants cited religion, specifically Christianity, as their reason for environmental stewardship. This response resonated most strongly with Factor 2 (EVE), as stewardship would be a positive reflection of the agent's character within the faith structure that includes divine creation (Lemke 2007). Other religious faiths such as Islam and native African faiths also have connections between spirituality and creation care, which may be a reason for participation in conservationist efforts (Muir and Wolfe 1938/1979, Gharebaghi et al. 2007). However, no religious beliefs other than Christianity were mentioned as a personal motivation for environmental stewardship.

Identification of Potential Ethical Dilemmas. Differing opinions can result in conflict for both the conservationist and the management agency. For example, conflicts can arise for the conservationist who both sees the utility of an animal for humans as important (e.g., food, use for ceremonial purposes, *muti*) and feels duty-bound to protect the species in question due to conservation training. For conservationists with an EVE perspective, ethical dilemmas may arise when management policies are directed toward anthropocentric utility (instrumental use of nature) and the conservationist's values are non-anthropocentric (intrinsic). Herein the conservationist must decide whether his or her job responsibilities override a personal philosophy.

A relevant example of this potential ethical dilemma can be illustrated through the participants' differing viewpoints about the acceptance of using vultures in traditional medicines and belief-based uses. For instance, participants who held more biocentric viewpoints such as P137 were not accepting of these practices because of the suffering individual animals endured for a cultural human benefit. In contrast, P135 explained that utilizing vulture parts in traditional belief use would be acceptable if vulture populations were sustainable. These conflicting viewpoints demonstrated there is no fixed agreement among conservationists given the different circumstances in which ecological and cultural conflicts may develop.

Given the different ethical perspectives, we reemphasize that these perspectives are not mutually exclusive, and they often overlap. When there is no challenge to one's core values, ambiguity can exist, and conflict is not important. However, when core values are challenged, dilemmas are likely to surface. The need to protect the environment for human survival and the duty to protect the environment for its own sake are two sentiments that can be held simultaneously by an individual. What is important in this duality of sentiments is which option becomes the guiding ethic when conflicts arise.

Ethical Perspectives and Natural Resources Management. Natural resource management is a complex and dynamic endeavor integrating natural science and social science insights in pursuit of goals and objectives. It is valuable to explore the different viewpoints of all stakeholders regarding protecting endangered vulture species. Policy making was not the main point of this study. The goal was to convey that understanding values and the ethics behind those values can be an important step toward developing cohesive strategies for management, and ultimately policy; doing so integrates social science considerations with the science of wildlife management. Many threats such as poisoning, electrical infrastructure collisions, and traditional belief use currently impact vulture populations in Africa (Ogada et al. 2015), and each threat brings unique policy and management challenges, some of which involve ethical dimensions. Individual ethical drivers are complicated, and, if not appropriately understood, can lead to behaviors resulting in personal, corporate, and societal conflicts. Different perspectives and identities can contribute knowl-

edge that should be considered during management decision-making, if for no other reasons than transparency, accountability, and inclusion.

Stakeholders' differences in perspectives and values can pose challenges for regulators and policy makers when stakeholders conflict in ways that delay decision-making or divert financial and human resources (Şekercioğlu et al. 2004, Goralnik et al. 2014). The perspective that nature is good because of its value for human benefit (e.g., belief-based uses) or because it is good within itself (striving to achieve its *telos*) do not inherently conflict, but they may be used as reasons for conflicting actions. Yet, people with different value systems can have a mutual understanding of the importance and urgency of working to conserve nature. Promoting and maintaining cooperation among such stakeholders is critical.

We recognize that we sampled a limited fraction of the stakeholders interested in vulture welfare: the conservation workers. Ideally, our study would have included others such as tribal leaders, traditional-belief-based users, ranchers, corporate leaders whose businesses conflict with vulture habitat and welfare, and pastoralists. There is significant opportunity to expand the study, especially to enlist public support for vulture conservation.

This study represents a first step in exploring why ethical considerations could be included as one of the tools in the decision-making processes of policy makers. Such a tool may help avoid potential pushback by stakeholders that would result in failure to achieve the goal of species protection. This study demonstrated that the conservationists responsible for vulture management have diverse ethical perspectives and laid the foundation for how stakeholder input can be incorporated. Although there may be no easy or correct responses to potential ethical conflicts, acknowledging their presence and finding common ground where management agencies and stakeholders agree about vulture conservation is vital for developing, implementing, and evaluating mutually acceptable solutions.

Conclusions. Wildlife conservation is a transdisciplinary field that involves the cooperation of many different stakeholders. This study explored the ethical perspectives of just one group of stakeholders, namely those who are actively involved in the conservation of vultures. Through a Q-sort activity and follow-up interviews, we found three distinct perspectives: (1) a biocentric perspective, with strong negative linkage toward vultures having value for human use, (2) an environmental virtue ethics perspective, with consideration given toward vultures having possible value for human use, and (3) an ecocentric perspective that was neutral with regard to vultures having value for human use. This study advances our understanding of vulture conservation from an ethical perspective because it considers personal ethical perspectives and possible conflicts within the individuals responsible for vulture management. The Q-sort factor analysis linked with the interview responses showed similarities and differences in participant perspectives that might shape the opinions expressed on the issues, including the importance of the inherent value of nature. Although the results were specific to Africa's vultures and knowledgeable conservationists in South Africa and Kenya, methodological and conservation-based insights may have broad implications for biodiversity conservation across the continent and for other species.

Supplemental Material (available online). Part 1. Additional background information. Part 2. Table S1: List of Q-methodology statements used to evaluate the type of ethical theory that interviewees expressed regarding the well-being of African vultures. Part 3. Base interview questions.

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