TITLE

How worldview and personal values can shape conservation conflict – the case of captive-bred lions

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Glossary

CBL.....Captive-Bred Lion
CL .....Captive Lion
CV.....Conservation Value
F.....Female
ID .....Identification
KI .....Key-Informant
NGO.....Non-Government Organisation
M.....Male

Abstract

Conservation debates, fuelled by social media, are becoming increasingly polarised, especially where animal conservation and welfare are concerned. This study reveals how the 'evidence-based approach' founded on scientific knowledge and consensus-building can be insufficient when addressing conflicts that are driven by deeply held and opposing belief systems about nature, wildlife and their exploitation. Using targeted semi-structured interviews grounded in inductive approaches, we unveil core attitudes and viewpoints of captive lion breeders in South Africa and compare them to those of key-informants from science and governance arenas. Further, we demonstrate how the value-systems and worldviews of stakeholders influence their interpretations of scientific knowledge when assessing the conservation value of captive-bred lions. Since polarised conflicts are frequent in conservation, the insights of this study highlight the need to create a deeper understanding of the social-psychological perspective of all main stakeholders to prepare the foundation for solution-building processes and evidence-based decision-making.

Keywords: conservation value, conservation psychology, conservation conflict, lion trade (*Panthera leo*), inductive research, complex problems

1 Introduction[1]

Many human-wildlife issues in conservation are complex, dynamic and characterised by uncertainty and ambiguity as they are embedded in a context of ecological, social and economic trade-offs. Complexity within such socio-ecological systems refers to a lack of clearly defined boundaries, innumerable nonlinear interactions and constant change (Game et al., 2014). In other words, these conservation challenges lack cause-and-effect relationships and the possibility to determine the right intervention. Rather, stakeholders' personal values and beliefs shape their problem statement, objectives and tactics (Mason et al., 2018) and are regarded as one source of conservation conflict (Redpath et al., 2013). Rittel and Webber (1973) coined the term "wicked" problems for such complex issues where no objective and definitive solution exists and where resolutions rely on political judgement influenced mainly by the differing levels of power of all actors involved (Mason et al., 2018). Such issues, almost by definition, defy classical problem-solving approaches grounded in the quantitative sciences, where optimal solutions are often identified or engineered by addressing deficits and disagreements through research and knowledge exchange (Dickman et al., 2015; Kidd et al., 2019), even when supplemented by consensus-building techniques such as the 'Delphi Approach' (MacMillan and Marshall, 2006).

Complex problems resist such knowledge-based approaches and represent a fundamental hurdle for policy-making, with final decisions often left to political expediency. In the globalised world, featuring increasingly heterogeneous societies, political decision-making becomes more complicated and fallible, with decisions influenced by powerful but perhaps cloaked vested interests, prevailing political ideologies or cultures and the fast-evolving nature of global value-systems. It is becoming increasingly difficult for governance agencies to mediate the co-construction of a broadly accepted way forward while stakeholder groups drift further apart, and simple but extreme solutions emerge and fill the solution-void, increasingly via social media. Untangling and understanding such contextualised problems can only be achieved through in-depth qualitative social science (Moon et al., 2019).

Farming wild animals for human purposes is a contentious issue in many countries. Still, none more so than in South Africa, where breeding wild animals in captivity is an established sector in rural areas and where the debate has considerable salience to policymakers and society at large, both at home and abroad (Coals et al., 2019; Nelson at al., 2016). In this study, we explore the conflict over captive-bred lions (CBLs) (*Panthera leo*) in South Africa, which now outnumber wild populations by more than two to one, with 8 000 CBLs (Williams and 't Sas-Rolfes, 2019) compared to an estimated 3 490 free-roaming lions (Miller et al., 2016).

The polarisation of the conflict about CBLs has surged following numerous (social) media reports and several ensuing court cases or parliamentary debates (Parliament of the Republic of South Africa: Portfolio Committee on Environmental Affairs, 2018; Republic of South Africa: Department of

[1] CBL…….Captive-Bred Lion
CV……..Conservation Value

Environment, 2019; The High Court of South Africa, 2019; The Supreme Court of Appeal of South Africa, 2010). Thus far, quantitative data analyses have largely been used to create knowledge about the sector and support reconciliatory conflict-resolution attempts (Coals et al., 2020; Williams et al., 2015, 2017; Williams and 't Sas-Rolfes, 2019). Mostly, these efforts have stopped in their tracks by the continued claim of animal rights, welfare and even biodiversity conservation organisations, seemingly supported by public interest groups on social media, that the only acceptable way to deal with the captive lion sector is to completely shut it down and ban captive breeding of lions (Ban Animal Trading South Africa, 2020; Blood Lions, 2019; Born Free Foundation, 2020; Campaign Against Canned Hunting, 2019; FOUR PAWS, 2020). The most recent court case lodged by the National Council of Societies for the Prevention of Cruelty to Animals challenged the lion bone quotas set by the South African Minister of Environment, Forestry and Fisheries (DEFF) in accordance with the COP17 decision by the Convention on International Trade in Endangered Species (CITES 2017), and resulted in the widened mandate of DEFF to include animal wellbeing aspects when deciding on lion part quotas (The High Court of South Africa, 2019). Currently, a high-level ministerial panel has been established to "Review Policies, Legislation and Practices related to the Management, Breeding, Hunting, Trade and Handling of Elephant, Lion, Leopard and Rhinoceros" (Republic of South Africa: Department of Environment, 2019).

Simultaneously, the debate about CBLs has for large parts been revolving around their potential conservation value (CV) (US Fish and Wildlife Service, 2018; Williams and 't Sas-Rolfes, 2019). This renewed attempt to deal with the controversy based on more scientific knowledge results in further efforts to collect evidence garnered from genetic, behavioural, ecological and socio-economic data to be evaluated within a CV-framework. As we demonstrate with our research, we are inclined to doubt the prospects of CV-based approaches to mitigating polarised conflicts. Traditionally, as described by MacMillan and Marshall (2006), consensus-building techniques such as the Delphi approach can be integrated to resolve disagreements between stakeholders and deal with uncertainties. Furthermore, it is already well-established that developing a vision for conservation success with all relevant stakeholders can create a positive atmosphere for cooperation (Redford et al., 2011) and allow for structured engagements like scenario-based planning or structured risk evaluation approaches to achieve pragmatic, accepted solutions for wicked problems (Woodford et al., 2016).

However, these practices and techniques assume common perception about the nature of the problem and the objectives of the project or policy. In the context of CBLs, several issues arise. First, there is no agreed definition of CV (Capmourteres and Anand, 2016; McGowan et al., 2017). Capmourteres and Anand (2016) instead emphasise that the term conservation value in academia comprises a wide variety of meanings and associated metrics and that the CV theory is evolving by adapting to different conservation management scenarios making CV-frameworks highly case-specific. Second, scientific research is patchy. Some studies have investigated the direct impact of CBLs on rehabilitating extirpated or declining wild populations through reintroductions or by keeping genetic repositories (Edwards, 2014; Frankham, 2008; Lindsey et al., 2012; Slotow and Hunter, 2009). Others have examined how CBLs could alleviate trade-related pressures for free-roaming animals (Lindsey et al., 2012; Macdonald et al., 2017; Williams et al., 2017). But many other factors, such as contribution to habitat protection or raising conservation funds, are much more difficult to investigate scientifically and are under-researched (Bauer et al., 2018; Coals et al., 2019). Third, even with fuller scientific knowledge and understanding, it may be difficult to obtain consensus about strategy or policy decisions when the major stakeholders have very different views about the problem and vested interests, in particular solutions related to conservation and animal rights (Williams and 'Sas-Rolfes, 2019; Woodford et al., 2016).

In this study, we use an inductive research approach based on in-depth interviews to establish the role of an emergent CV-framework for conflict resolution that directly incorporates social-psychological components of the CV-debate about captive populations. The social-psychological perspective seeks to comprehend human behaviour in social situations. It helps to understand how stakeholders construct their goals and perceptions based on feelings, thoughts, values and beliefs, in this case, about the CV of CBLs, within their social context and interactions with others (Allport, 1985). We explore the attitudes of lion breeders towards conservation and their understanding of the CV of their animals, and we compare views of lion breeders with those of scientific experts and policymakers. We believe our model can move the debate forward by shedding light on the specific socio-ecological context in which this farming-related controversy takes place as well as on the contextual "realities" of stakeholder and their core values and beliefs (Moon et al., 2019). We hope that our extended CV-framework will provide a more resilient and enabling platform for deeper, less polarised debates to be undertaken by conservation professionals worldwide.

2 Materials and Methods

Semi-structured interviews were used to obtain qualitative data permitting us to gain access to the relevant stakeholder groups as well as to overcome logistical challenges due to their wide geographical distribution. With open questions, these interviews are the best way to gain a deeper understanding of perceptions, dilemmas, emotions, conflicts, beliefs and values of especially hard-to-access stakeholder groups such as lion breeders (Drury et al., 2011). They can yield high-quality data and insights into complex situations (Young et al., 2018), especially when a more inductive social research approach is adopted. Guided by the core principles of grounded theory (Corbin and Strauss, 1990), we used the interviews to build a theory of how the CBL-industry links to CV through the eyes of the respondents (Khan, 2014).

Grounded theory postulates that data collection, coding and analysis happen simultaneously in overlapping cycles uncovering themes and their interconnections. Data analysis involves annotations, memo-writing and coding of transcribed interviews. When interviews elicit no new information on the research topic, the process is understood to be saturated, and research can conclude. In a final step, writing up the findings and insights with reference to relevant literature enhances the resulting narrative. Since this inductive approach lacks an initial hypothesis, the researcher ought to adopt a "not-knowing-stance" and trust that the patterns and insights representing the real-world phenomena emerge through the process.

2.1 Study area and sampling strategy

Inductive research based on grounded theory deploys theoretic sampling evolving from the simultaneous collection and analysis of data, becoming more purposeful over time as emerging theories become more robust (Khan, 2014). This study was conducted in South Africa, currently the only country with a large-scale CBL-industry (Williams and 't Sas-Rolfes, 2019). A short fieldwork timeframe of six weeks and the widespread distribution of interview partners across most parts of South Africa (Fig. A1) rendered theoretic sampling infeasible. As an alternative, purposive sampling was used to coordinate interviews with key-informants such as scientists and policymakers who are very knowledgeable about the industry or aspects of lion conservation (Bernard and Ryan, 2010) and could also provide us with an entry point with lion farmers. For the owners and managers of CBL-facilities, we used a snowballing strategy as this was the best approach to overcome their scepticism and reluctance to engage with outsiders (Drury et al., 2011). All interviews were conducted by the main researcher, a permanent resident of South Africa for 15 years, in English language and without the need to engage a translator. Meeting interview partners face-to-face at their chosen location was essential to secure their voluntary participation, build rapport (Young et al., 2018), and obtain permission to record the conversation. Rapport was further enhanced after explaining all measures implemented to ensure anonymity and by maintaining a neutral and curious stance throughout the interview. Furthermore, it was necessary to address the lion farmers' concern that the research results might not reflect the full picture conveyed by them but rather selected aspects, an experience described by many interviewees about how (social) media regularly portrays the controversy.

2.2 Data gathering

The length of the 28 semi-structured interviews outlined in Table 1 ranged from 41 minutes to 1 hour and 47 minutes, with an average duration of 1 hour and 12 minutes. The interview guide was developed to collect qualitative data from both representatives of the CBL-industry and key-informants addressing the same core topics (Fig. A2/A3). The wording of the open-ended questions was adjusted during interviews to modulate the flow of the conversation. No pilot interviews were conducted as the questions evolved from interview to interview due to the inductive nature of the research (Newing et al., 2011). An early interviewee permitted the research supervisor to listen to this particular recording and provide feedback to improve the interview technique. Each interview started by explaining the research aims and addressing ethical concerns, including confidentiality, anonymity and the comprehensive analysis of the information shared. Standardised interview topics were not discussed in a specific order, thereby allowing the conversation to flow naturally and follow new threads as they surfaced (Young et al., 2018). All interviewees accepted the offer to receive a copy of the final report.

2.3 Data analysis

The inductive social research designed for this study featured three distinct phases, described in more detail in the supplementary material (Table A1). Annotations and theoretical memos based on hand-written interview notes during the first two phases constituted the core components to allow for a

continuous comparison of interviews and to support the formulation and revision of emerging concepts and their links (Corbin and Strauss, 1990). The third phase served to refine the emerging theory ensuring the identified common threads represented the viewpoints shared by the interview partners (Newing et al., 2011).

An open coding system derived from the annotations and memos served to code the transcripts (Table A2). Categories received letter-codes and sub-categories numbers. Subsequently, selective coding helped to structure final themes, whereas an in-depth analysis of coded data provided the platform to evidence, triangulate and link the various findings, thereby creating a representative storyline. The comprehensive literature review before commencing fieldwork influenced which sub-categories were defined. However, utmost care was taken to only work with categories which at least one interviewee had themselves introduced into the research.

3 Results

The inductive research process uncovered six interrelated main themes resulting in a diagram with three contiguous components directly linked into the central category “conservation value appraisal-spectrum” (Fig. 1). In the bigger picture, two more themes emerged connected to two components people use when explaining their CV-appraisals.

3.1 The CV of CBLs is about lions

3.1.1 Common ground

Most interviewees framed their CV-appraisal within the context of threats to free-roaming lions and desired outcomes of conservation efforts. Habitat loss or fragmentation represented the most frequently mentioned threat by both captive lion owners and key-informants (eight/66.7% of all interviewed CL-facilities) and ten/62.5% of all interviewed key-informants), followed by human-wildlife conflict (five/41.7% of all interviewed CL-facilities and nine/56.3% of all interviewed key-informants). Threats to lions due to wildlife trade and disease were only brought up by a few interview partners from both CL-facilities (two/16.7% and one/8.3% respectively) and key-informants (three/18.8% and three/18.8% respectively). All in all, the interviews revealed broad awareness of the human-induced threats to lions, with many stakeholders sharing the view that the apparent solution to lion conservation would be to shrink the human population [1]. (Numbers in square brackets in Results refer to exemplified quotes in Table 2). Similarly, most interviewees described successful conservation as resulting in one or more of three outcomes: (i) functioning ecosystem processes (two/16.7% of CL-facilities and six/37.5% of key-informants) [2], (ii) extant, healthy wild lion populations (six/50.0% of CL-facilities and eleven/68.8% of key-informants) [3] and (iii) conserved evolutionary potential (twelve/100% of CL-facilities and four/25% of key-informants) [4].

Throughout the interviews, the respondents introduced and elaborated on eight criteria relevant for determining the CV of CBLs (Table 3). All interview partners discussed at least two of the criteria and the vast majority more than five, while none of them commented on all eight. Almost everyone talked about “genetics”, “reintroductions”, or “wild population buffer” when assessing the CV of CBLs and more than half of all interviewees about “safety net population”. At least eight interviewees deliberated “habitat protection”, “research”, “raising conservation awareness”, and “raising conservation funds” as assessment criteria. Overall, the interviews revealed that views on (i) threats to wild lions, (ii) desired conservation outcomes and (iii) criteria used to assess the CV of CBLs showed high levels of consonance or compatibility across all stakeholder groups.

3.1.2 Conservation value appraisal spectrum

In contrast, the extent to which the interview partners thought that CBLs possess CV was very diverse and contentious, ranging from “no CV” via “potential” and “limited” to “substantial” CV. Table 3 exhibits the spectrum of opinions shared during the interviews. (Quote codes A1-H4 in square brackets in Results refer to exemplified quotes). The emergent theory revealed that people either use “conservation status uncertainty” or “knowledge ambiguity” to frame their appraisal on the CV-spectrum.

3.1.3 Conservation status uncertainty

Uncertainty about the future conservation status of lion populations in different regions of Africa regularly served to argue for or against the benefit of keeping lions in captivity from a conservation

point of view. Notably, the “safety-net” criterion [C1-C4], the “research” criterion [F1-F4] and the criterion for “raising conservation awareness” [G1-G4] proved to be subject to uncertainty-based appraisals, in addition to other examples relating to reintroductions [B3]. Interviewees arguing against the CV of CBLs mostly alluded to an expectation that conservation efforts will be successful and that the prolific breeding qualities of lions will stabilise or even increase wild lion populations in the future. In contrast, positive CV-appraisals were mainly based on the prospect that a growing human population in Africa will escalate human-induced threats to lions, further diminishing or losing existing wild lion populations and a corresponding need for ex-situ conservation efforts.

3.1.4 Knowledge ambiguity

Respondents also arrived at different conclusions based on ambiguous knowledge and understanding inherent to the assessment criteria summarised in Table 3.

Firstly, some respondents mentioned a lack of knowledge of the genetics of CBLs [A2], while others referred to differing, often unpublished results claiming CBLs either exhibit insufficient, inappropriate or unexpected genetic diversity [A1, A3, A4]. Furthermore, a vague understanding of what constitutes “the right” genetics emerged. From a conservation point of view, the spectrum ranged from purist to pragmatic positions. For purists, it is essential to split lions into separate management units based on observed local adaptations and only reproduce within those, whereas for pragmatists, all lions can be mixed. One conservation genetics expert claimed that detailed knowledge of the whole lion genome would be necessary to understand genetic profiles for maintaining their evolutionary capacity [A2].

Secondly, ambiguous knowledge also characterised the “reintroduction” criterion. A few interviewees referred to failed attempts of CBL-reintroductions [B1-B3]. In contrast, some stakeholders reported on successful introduction projects with ongoing research or the development of science-based release models [B4]. Moreover, differing views were expressed as to whether the existence of other lions in the release area constitutes a pre-requisite to deciding on the release success in addition to self-sufficiency, successful breeding and the survival of the progeny of the discharged lions [B1, B3].

Thirdly, in relation to the “habitat protection” criterion, a couple of interviewees contemplated the ecological functioning of hunting farms and breeding facilities in comparison to other types of land use, especially livestock and crop farming [D1-D4]. A lack of information about the combined size of CBL-facilities and their level of ecological functioning became noticeable.

Fourthly, the “wild population buffer” criterion yielded different judgements based on ambiguous knowledge about market mechanisms and the extent of demand. A few interviewees expressed the view that the legal bone trade fuels demand and encourages legal and illegal lion hunts, thereby increasing the pressure on wild lions [E1]. Other respondents argued that the legal trade meets the demand, thus discouraging poaching and wild lion hunts by acting as a buffer for wild lion populations [E4]. Along those lines, several interview partners deliberated how the demand for trophy hunts and lion bones had been met before trade interventions were introduced [E2], while others eluded to an “infinite” demand due to growing consumer numbers and wealth in Asia [E3].

Lastly, in terms of the “conservation funding” criterion, no clear account was given in what way conservation funds raised through CBLs would have to be allocated and spent to consistently result in a positive CV-appraisal of CBLs [H2-H4].

3.2 The CV of CBLs is not about lions, but personal values and worldviews

The inductive research process unveiled that people’s values and worldviews greatly influence how they refer to uncertainty and ambiguity to substantiate their appraisal for different criteria on the CV-spectrum for CBLs.

3.2.1 View on breeders/concept of humankind

Data relating to the image of lion breeders uncovered a value iceberg with money-related valuations being discussed above the surface and core values below (Fig. 2). Three distinctive value-based patterns became transparent, each with an associated tendency to assess the CV of CBLs either positively, sceptically or negatively, exemplified by quotes in Table 2. The figure depicts how opposing values result from vastly different character judgements of lion farmers and attitudes towards them. Within the positive section, above the surface, the value “money” signifies business acumen and entrepreneurship [5]. By contrast, money symbolises greed and selfishness for personal enrichment

within the sceptic and the negative sections [6]. The ostensibly polarised views serve as a breeding ground for mistrust and escalating emotions [7]. Astonishingly, many interviewees expressed the view that non-government organisations (NGOs) operating in the field of lion conservation have no interest to change this situation since the conflict serves as the basis for their fund-raising business model [8].

The core values in the submerged part of the iceberg are less transparent and not part of the overt debate. Overall, the values within the different sections of the iceberg give rise to distinct breeder images. These character judgements are transferred to general attitudes towards CBLs and influence a person's CV-appraisal. The breeder image and stance towards CBLs in the positive section [9] rests on an ambition to produce top-quality [10] in combination with a sense of responsibility for animals and nature [11]. At the other extreme, core values to ensure animal justice and to protect the welfare of animals [12] characterised a negative sentiment and attitude towards breeders and CBLs [13]. In the centre, the underlying core values to conserve and enable nature, combined with caution to avoid irreversible mistakes [14], lead to scepticism towards lion farmers and CBLs [15].

3.2.2 Conservation worldview

The analysis also unveiled the theme "conservation worldview", showing that interviewees hold diverging views of the approach conducive to bring about conservation success. The elicited sub-themes summarised in Fig. 3 suggest that two paradigms are currently relevant in the case of CBLs. Some interviewees associated with either a "sustainable use" paradigm [16] or with "wilderness protection" [17], whereas others alluded to the shortfalls of both models resulting in a neither-nor position [18]. Adopting a "sustainable use" paradigm resulted in more favourable CV-appraisals of CBLs. In contrast, the "wilderness protection" paradigm promoted the opposite. The perception of some interviewees that both these paradigms feature serious flaws resulted in scattered CV-appraisals on the spectrum.

Overall, the emergent theory highlights how human value systems and conservation-related worldviews influence CV-appraisals of CBLs. The inner frame merely serves as a mechanism to translate a person's worldview and values into a CV-appraisal. As a consequence, a CV-framework based on scientific knowledge will not resolve the conflict. Emotionality, which links strongly to NGO business models, and which 'despises' private profits from wild animal management and breeding, represents perhaps the biggest barrier to conflict resolution between conservationists and lion farmers.

4 Discussion

Scientists and policymakers have almost exclusively focused on creating more knowledge to resolve contentious conflict issues in conservation. However, debates turn ever more polarised, while numerous questions remain unresolved from a scientific viewpoint. Our research demonstrates how the real-world debate about a complex conservation issue tacitly turns deeply anthropocentric, revolving around worldviews and personal values in the form of deeply felt beliefs, to substantiate extreme positions in the dispute. Consequently, scientific knowledge concepts like the CV of CBLs fade into the background and lions, both wild and captive, suffer from a lack of in-depth discourse. For example, critical knowledge gaps, highlighted by this study, relate to market mechanisms and demand for consumptive and non-consumptive lion products and the quantity and quality of land managed by the CBL-industry and remain unanswered. Furthermore, analysing the genetic composition of the CBL-population, defining "ideal" genetic profiles and overcoming ambiguity when determining successful reintroductions could help to gauge the suitability of CBLs to maintain evolutionary potential and to aid the restoration of extirpated or diminished lion populations.

Once stakeholders are prepared to engage, conservation can make use of its conventional problem-solving approach and continued knowledge-creation has a valuable role to play. However, the inherent emotional complexity of the CBL-issue with the associated lack of direct, science-based cause-effect relationships suggests that there are no easy answers (Game et al., 2014; Rittel and Webber, 1973; Woodford et al., 2016).

As Fig. 3 shows, the conflict is partly fuelled by the different worldviews of stakeholders about the 'right' approach to conservation. Conservation science is familiar with shifting views about the purpose and frame of conservation (Kareiva and Marvier, 2012; Mace, 2014). The "sustainable use" and "wilderness protection" paradigms in this study represent such divergent worldviews and mirror the observation of Mace (2014) that differing underlying ideologies of conservation paradigms tend to

provoke tension and frictions. Our results suggest that a wide gap between these different paradigms exists with little evidence of an evolution into a more nuanced “nature and people” approach that recognises the interlacement and dynamic relationship between nature and people, as suggested by Mace (2014).

Our research results elicited an understanding of the emerging limits to the sustainable use approach based on the business case for conservation in South Africa (Fig. 2 and Fig. 3). Not only do business leaders like owners of CBL-facilities fail to incorporate the ecological and social objectives of sustainability on an equal footing (Elkington, 2018; Rogers and Hudson, 2011), the approach does not resonate with the increasingly strident calls for banning CBLs from the animal rights and welfare movement. Concerns about animal welfare are now penetrating legal processes and policies about CBLs, with a recent High Court Ruling in South Africa requiring the Department of Environment, Forestry and Fisheries (DEFF) to consider welfare matters during its process to decide on the annual lion bone export quotas (The High Court of South Africa, 2019). This shift is a reflection of the movement of funds into conservation NGOs from western donors that seek to abolish CBL-enterprises run for profit through the use of disconcerting imagery to create very negative perceptions of CBLs via social media (Ban Animal Trading South Africa, 2020; Blood Lions, 2019; Born Free Foundation, 2020; Campaign Against Canned Hunting (CACH), 2019; FOUR PAWS, 2020). The potential to mediate between the “animal rights and welfare” movement and the idea of “sustainable use”, as hitherto pursued by governance agencies in Southern Africa for the past decades, becomes increasingly remote.

Our results show that the conflict is also rooted in different personal values resulting in a lack of trust between stakeholders. Young et al. (2016) confirmed trust to be a central element to biodiversity management, especially in areas of conflict. As illustrated by this study, conflict and mistrust characterise the interactions of stakeholders in the CBL-industry (Fig. 2). According to Covey & Merrill (2006), trust rests on people’s character and competence, which can be promoted by sharing values and knowledge, respectively (Cvetkovich and Winter, 2003; Young et al., 2016).

In terms of values and character, the value iceberg (Fig. 2) describes two different levels, above and below the surface. The polarised debate above the surface represents a taboo trade-off (Tetlock, 2003). Sacred values like preserving the natural environment stand against secular, monetary valuations of scarce resources. As in the case of CBLs, taboo trade-offs lead to harsh character judgements (“*lion breeders are bad or dodgy people*”), and these deep-seated beliefs generate moral outrage and a reluctance to deal with the issue *or rather not engage with the industry*) fuelling the polarised extremes. Trust-building through value-sharing exclusively refers to core values in the submerged part of the iceberg and must not be confused with secular valuations central to the polarisation above. According to Schwartz (1994), core values are motivational goals transcending specific situations which guide people’s evaluation of behaviour, events and people. Based on Schwartz’s circular continuum of values, people tend to arrive at similar or different judgements dependent on whether they apply compatible or opposing values. As an illustration, the self-transcendent motivation of the values “responsibility for nature” and “protecting animal welfare” in Fig. 2 make them by and large compatible and easier for people to align their opinions. In contrast, the drive for self-enhancement inherent to the “ambition to achieve top-quality” competes with such self-transcending values, making it more difficult to agree.

However, core values cannot be changed for conservation purposes (Manfredo et al., 2016). Consequently, conservation advocates would be wise to respect that personal values vary across human beings and that a different set of values does not automatically turn them into bad or dodgy people. Much rather, exploring ways how differing core values could be mobilised to achieve conservation goals could prove more constructive than rendering general, intolerant judgements about different groups of people who hold different sets of core values and provide the potential to leverage the opportunity for trust-building through value sharing. In the case of the CBL-industry, all emerged core values of stakeholders are principally compatible, except for the opposing nature of the ambition to achieve top-quality, which is, however, still socially desirable to strive towards (Schwartz and Bardi, 2007; Teed et al., 2019). It, therefore, does not appear impossible for the various stakeholders to mutually appreciate each other’s underlying core values with the potential to move the moralised debate about the breeders’ bad character to a more nuanced and potentially trust-building discussion (Young et al., 2016), especially when key-parties interact in small groups to share values and knowledge and evaluate policy-options (Biggs et al., 2017). Nevertheless, such progress requires involved parties to let go of the taboo trade-off debate, seemingly grounded in their worldviews about the validity of business needs linked to the sustainability concept discussed above.

Besides the core values, knowledge-sharing also advances the development of trust (Young et al., 2016). This trust-related function of knowledge often remains overlooked in favour of the commonly accepted purpose to contribute evidence for management decisions and policy definition (Dickman et al., 2015). Conservationists often work on the assumption that for people to change their viewpoints and behaviour, it is merely necessary to share knowledge and educate them (Kidd et al., 2019). Sophisticated levels of knowledge might, however, be detrimental to trust-building when scientists and policymakers are reluctant or even refuse to engage with local types of expertise, such as the experience of breeders, that might be deemed short of rigour or merit (Young et al., 2016). All in all, acknowledging and deliberately making use of value- and knowledge-sharing appear to play a vital role in transcending the existing extremist views and assuming responsibility for a sustainable solution despite differing core values.

Our study found lots of potential for dialogue between conflict parties based on common ground, compatible or at least socially acceptable core values and a potential to bridge different worldviews by transcending the existing wildlife economy model in favour of a “nature and people” approach to conservation (Mace, 2014). However, if worldviews and personal values in the form of unquestioned beliefs prevent stakeholders from being interested in identifying common ground and searching for solutions to resolve complex conservation issues, this should be concerning to conservation professionals. Especially worrisome is the tendency of some animal rights actors to categorically reject any way forward other than banning CBLs altogether. If pursued by governance agencies, such a simple solution in a context of complex social-ecological systems might also prompt unexpected and unintended consequences, constituting a significant risk to biodiversity conservation. In the light of these developments, we propose that the traditional, knowledge-focused way to resolve conservation conflict has to be rethought, even when supplemented by consensus-building methods.

5 Conclusion

Our study has broader implications for conservation practitioners and policymakers. The results emphasise the importance of conservation-related worldviews and trust as prerequisites to applying scientific knowledge in polarised conflict situations. This study set out to explore how scientific knowledge and conservation value can contribute to resolving the polarised conflict characterising the captive lion sector. However, the in-depth, inductive research uncovered the socio-psychological nature of the conflict and how deep-seated, belief-led positions rendered the conservation value/scientific knowledge approach impotent.

In our research on CBLs, we found that CV-appraisals only helped to polarise the debate further instead of assisting in identifying common ground and co-constructing solutions supported by all involved parties. Our findings suggest that conservation practitioners and policymakers must understand that differing belief systems underpin stakeholder values and worldviews and must be regarded as legitimate and key aspects of any conflict resolution process.

This study emphasises the importance of establishing a conservation frame mindful of the worldviews of all stakeholders as well as enforcing efforts to develop trust through sharing core values and knowledge. We, therefore, recommend that the conservation sector is equipped with the competencies and skills to address different human beliefs and personal value systems to gradually prepare the ground for the design and implementation of solution-building processes in addition to evidence-based problem-solving. Pro-actively addressing worldviews and existing character judgements about breeders will serve as a precursor to solution-building, but without preparing the ground, it is highly unlikely that relevant stakeholders will accept any rational, analytical approach yielding little hope for resolving the conflict.

Above all, progress will depend on the openness of stakeholders to participate in a solution-building process. Applying the insights from this study, we propose conservation to be at a turning point in an increasingly belief-led world, where it is crucial to understand, acknowledge and integrate the inherent anthropocentricity when faced with complex problems embedded in social-ecological systems. Due to the increasing heterogeneity of our societies, we conclude that conservation professionals need to introspect and emerge from their safe space of exclusively creating more scientific knowledge for evidence-based problem-solving. Taking a stand by creating the platforms for dialogue about worldviews and personal values towards shared visions that are transparent to the public might constitute the missing link to ignite the co-creation of new, unforeseen solutions to serve biodiversity conservation long-term.

Data availability statement: The interview data generated and analysed during the current study are not publicly available due to the necessity to uphold confidentiality and anonymity of the part-taking interviewees.

Competing interest statement: The authors declare that there is no conflict of interest.

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639

640 **Table 1** Number of interviewees and their roles relating to the captive lion industry

Role	Male	Female	Total	%
Owners/managers of captive lion facility	12		12	42.9
Representatives of captive lion association	2		2	7.1
Scientists (with expertise on both with captive and free-roaming lions in terms of genetics, physiology, conservation biology and conservation management)	5	3	8	28.6
Policymakers (concerned with predator conservation in South Africa)	1	3	4	14.3
Other key-informant (lion welfare organisation specialised in rescue operations)	1	1	2	7.1
Total	21	7	28	100
%	75	25	100	

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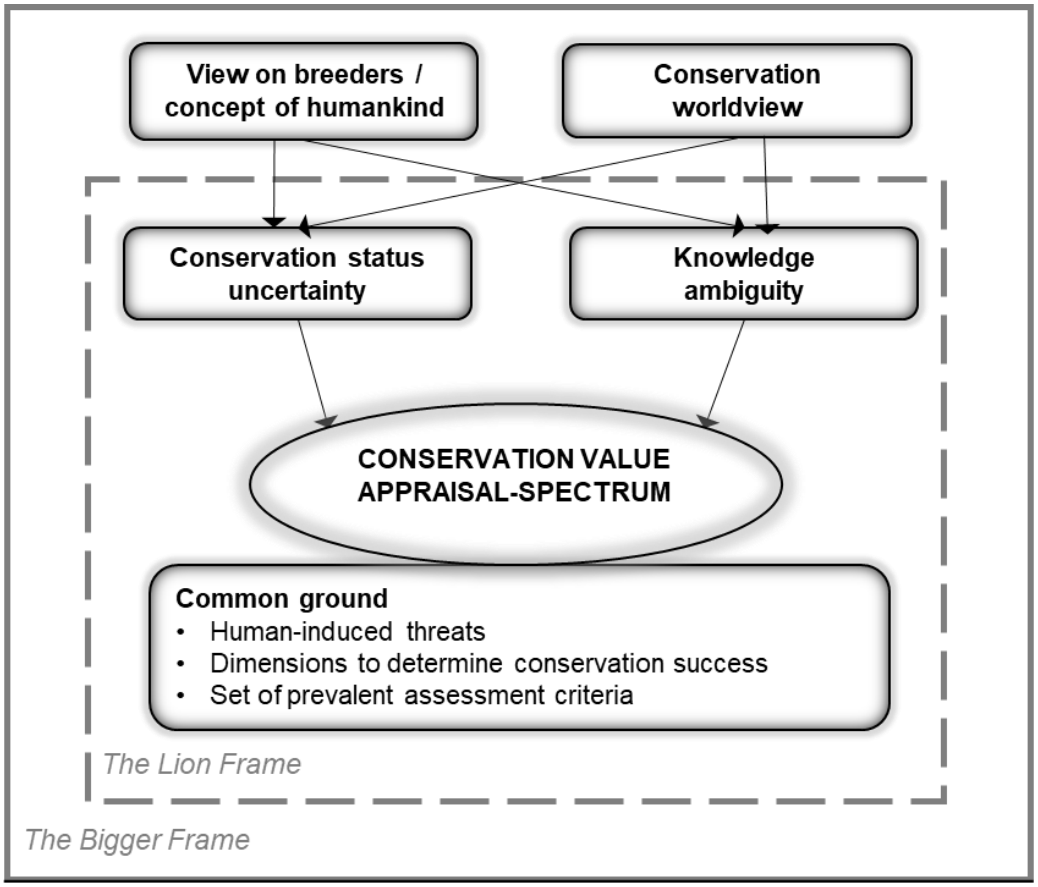

Theme	*Full theme description*
Conservation value appraisal spectrum	The conservation value of captive-bred lions is contentious with a broad appraisal spectrum.
Common ground	Areas of common ground exist for assessing the conservation value of captive-bred lions.
Conservation status uncertainty	Uncertainty regarding the future conservation status of lion populations in different geographical regions serves as a mechanism to argue for a specific conservation value appraisal of captive-bred lions.
Knowledge ambiguity	Ambiguous knowledge inherent to assessment criteria serves as a mechanism to argue for a specific conservation value appraisal of captive-bred lions.
View on breeders / concept of humankind	A person's judgement of the character of lion breeders based on personal values affects their conservation value appraisal for captive-bred lions.
Conservation worldview	A person's conservation-related worldview affects their conservation value appraisal for captive-bred lions.

Fig. 1 Conservation value appraisal framework showing the main emerging themes and their interrelations relevant for assessing the conservation value of captive-bred lions. Factors in the bigger frame affect how people interpret the factors in the inner frame to suit their conservation value appraisal

Table 2 Quotes from interviews with representatives of the captive lion industry and key-informants on the conservation value (CV) of captive-bred lions illustrating their common ground, values and conservation worldviews (quote numbers referenced in Results in square brackets)

Theme of conservation value appraisal framework	Quote code	Interviewee-ID (*KI…key-informant; CL…captive lion owner/manager; F…female; M…male*)	Quotation
Common ground	1	CLM95	*"So as long as you can't do anything about the human population, there's nothing you're going to do about the habitat. Therefore, there's nothing that you or anybody is going to give us any guarantee that the wild lion population is not declining."*
	2	KIF73	*"At the end of the day we are looking at ecosystem processes that are functioning. We're looking at species playing their role within that. And positive human outcomes in that."*
	3	CLM49	*"The definition of conservation is any activity, and by that I do not exclude anything, any activity which promotes or supports the species in the wild."*
	4	KIM11	*"Conservation in general … is about maintaining diverse populations with the genetic diversity that gives these populations a sort of enough standing variation to cope with whatever changes evolution throws at them … so, the word is about conserving evolutionary potential."*
View on breeders/concept of humankind	5	CLM03	*"That was my goal, to do my own breeding, get my own ranches and do my own businesses. … Of course I'm benefit out of it, but my animals also benefit out of it because they put me to the position to be able to buy more land so that I can give them back something."*
	6	KIM20	*"But the overriding principle is the selfishness of individual humans. So, the breeders are trying to maximize their income and their personal well-being. It's not just money, it's about self- interest and greed."*
	7	KIM33	*"I think … with the lion, I think it's just too emotional. So I don't know if you're going to find a middle ground on the lion issue."*
		CLM38	*"I haven't got any trust in the people that's doing the researches for nature conservation on the moment."*
	8	CLM58	*"I would say that … in the same sentence that … green societies or whatever you call them, that's only in it for the money as well."*
		KIM33	*"Born frees and others are generating huge amounts of money because of their campaigns to fight it [captive lion industry]. They are business models. So, basically that's what they are. And so they've got massive vested interests."*
	9	CLM58	*"I'm a farmer …, it was born into me to protect the animals. There's a lot of good guys out there, a lot of good intentioned people. So what a farmer do, he never takes the money, he reinvest everything."*
		CLM03	*"I feel the people are not fair. Give us that opportunity."*
	10	CLM38	*"I wanted to breed the top-quality, good lion in my opinion. That's my passion or what you call it."*
	11	CLM95	*"People that is in the lion business industry, they are mainly businesspeople and they are animal lovers. I see myself as somebody that really loves nature per se and not necessarily an animal. And we are the custodians of all these animals, the wildlife, the nature, the diversity of Africa. We are the custodians of it with little to no say."*
	12	KIF48	*"I'm actually quite a greenie. Just on a personal level, I'm highly opposed to animals like lions living within … a confined area where they cannot behave like a lion."*
	13	CLM60	*"I mean, as far as I'm concerned, the one who just has lions to produce bones is the most reprehensible sort of type of human being. He lacks morality in a true sense of the word. I mean I've been saying it for 20 years. It's really simple. Ban captive breeding."*
	14	KIF29	*"From a conservation point of view the approach is to mimic natural systems as much as possible … and the other thing with … conservationists is to air on the side of caution."*
	15	KIF29	*"But we know that there's a lot of these captive people are slippery customers. [Therefore,] presumably still most people in the small reserve and bigger reserve management are very anti-captive lion breeding."*

Continued

Theme of conservation value appraisal framework	Quote code	Interviewee-ID (*KI…key-informant; CL…captive lion owner/manager; F…female; M…male*)	Quotation
Conservation worldview	16	KIM40	*"The keeping and breeding of these lions in South Africa must be understood within the larger context of the South African wildlife and conservation management model. By giving game animals an economic value, an incentive is created to protect and conserve the wild animals on the owner's land as well as the habitat in which they can thrive."*
	17	KIM20	*"Probably one of the most effective ways of achieving a rational society that looks after biodiversity is reducing the demands within society and that's reducing numbers again. It comes back to: we're doing half for the planet."*
	18	KIM33	*"For me, every model that we've got in Africa has its strong points and its weak points. The South African model: our numbers have increased. But the downside is that you've ended up with intensification as one component of it. The Kenyan model: you've got much more expansive wildlife. You've got your big ecosystems and all that. Their downside is the animal wildlife conflict. They lost a lot of their wildlife. And there is absolutely no way South Africa can put those resources into all of those [rhinos, lions, leopard, …]."*

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Table 3 Quotes from interviews with representatives of the captive lion industry and key-informants illustrating the evaluation criteria (A-H) and appraisal spectrum (1-4) for the conservation value (CV) of captive-bred lions (quote codes A1-H4 referenced in Results in square brackets). Interviewee-ID is indicated within brackets in bold letters after each quote (KI, key-informant; CL, representative of captive lion industry; F, female; M, male)

	1: No Conservation Value	2: Potential Conservation Value	3: Limited Conservation Value	4: Existing Conservation Value
A: Genetics	A1 (3KI|1CL) *"Are the activities of the lion breeders maintaining heterozygosity and the answer is no, because they're in-breeding. Also, selective breeding, exactly the same, very rapid decline in heterozygosity, high risk of fixing alleles…. big mane versus small mane alleles. And then out breeding where they don't care where the hell their lions come from. All of these lead to loss of heterozygosity. And are they maintaining viable populations and the answer is no. They're not managed as a meta-population."* **(KIM20)**	A2 (9KI) *'"The breeders will say they've got some genes that don't exist in the wild anymore. And then the purest conservationist would say well they're just all bad because they've been doing all sorts of things and breeding. But we don't have any evidence either way."* **(KIF59)** *"That continuum between inbreeding and outbreeding. The categorical answer right now is, we don't quite know yet and that's because we don't have these lion genomes to scrutinize*	A3 (1CL) *"Where you do have a problem is the unethical breeding of lions (mainly in SA) where lions are bred for size, manes and so on. So the breeders mingle genetic material to get the morphological attributes that appeal to a hunter."* **(CLM15)**	A4 (10CL) *"The interesting thing is that the one thing we are probably accused of most is inbreeding. We've got scientific proof that our animals are more genetically diverse than those in the Kruger Park, the wild populations."* **(CLM49)**
B: Reintroductions	B1 (5KI|1CL) *"There is no known way of successfully reintrocuding a captive lion. It might hunt and survive but will it have all the social knowledge to survive when there is a wild pride?"* **(KIF29)**	B2 (2KI|3CL) *"At the moment the industry because of the pressure saying they've got no conservation value have taken captive lions and have put them into extensive systems. But, I think there is still a lot of work to be done in the captive industry to see whether they have a conservation value as far as eco-system and the "being a functional lion in the system" is concerned."* **(KIF73)**	B3 (2KI|1CL) *"My sense is that you're not going to get a huge value from inserting animals into the wild from captive-bred lions. For a couple of reasons. One, is because it's a really difficult thing to do properly and to make sure that they integrated into wild populations. And secondly, … it seems that you could do it from other stocks."* **(KIM33)** *"The guys have proven it. You know, they have put lions in game reserves where there are no other lions and they've done well. But, put a lion in a system like Kruger National Park where there's exisiting lion popula-tions and existing social structures and the prey are accustomed to co-exist … these lions are likely to die."* **(KIF73)**	B4 (1KI|8CL) *"We released five lions in the end of 2016. … They were released after six weeks [in a boma] and three months later they gave birth to 14 cubs born on 22,000 hectares. They need proper habitat that's looked after, no human conflict, and they need prey. That's all they need."* **(KIM28)**
C: Safety-Net Population	C1 (4KI|1CL) *"Whereas the scenario where we suddenly end up with no wild lions and available suitable habitat would never exist because we'd always have pockets of wild lions … and relocate from the habitat it's in."* **(CLM60)**	C2 (2KI) *"But if farmers want it, I suppose they've got a point. It is a reserved gene pool and because it's only been around for 20 years there probably hasn't been enough time for super, weak genetics to propagate. We probably could use them as a reserve gene pool but the chances that we'll get to that situation one day is just, is highly unlikely. … I don't see wild lion populations completely disappearing. I see them stabilising in the next 100 years and then improving in the next 200 to 300 years."* **(KIM62)**	C3 (1KI|1CL) *"There's limited scope for the re-introduction of captive lions into the wild. So, there's going to be a couple of places that's going to take these guys away and they might be able to send it out to a couple of other countries, a couple of lions - but then it's saturated."* **(KIF73)** *"A lion falls under natural, renewable resources. It's extremely renewable because it breeds like a rabbit."* **(CLM97)**	C4 (2KI|6CL) *"We maintain a studbook on all lions so that their origin and genetics is known. If there was an event that decimated lions suddenly we could help repopulate."* **(CLM15)** *"It makes no sense to only take care of the ones in the wild because maybe those won't even survive in the next few years. So, we have to use the animals that are in the wild and the animals that are inside … those are valid animals that belong to the same species."* **(KIF02)**

Continued

	1: No Conservation Value	2: Potential Conservation Value	3: Limited Conservation Value	4: Existing Conservation Value
D: Habitat Protection	D1 (3KI|1CL) *"So, is a 1000 hectares effective conservation of habitat? And the answer is probably no. They would need to scale this up to 100 000 hectares, to really start making a difference for the other biodiversity, let alone for lion populations."* **(KIM20)**	D2 (2KI) *"The lion is, I think, one of the most expensive hunts and just releasing a lion every now and then, is probably allowing that land to stay like it is and not be converted to a cattle farm or whatever. There's no evidence yet."* **(KIF59)**	D3 (1KI) *"What's less clear is that whole group of 250 odd ... that are kind of involved in captive breeding and canned or captive lion hunting, ... which of those actually have some bigger estate and actually contribute to lion conservation, and which of them are really just breeding facilities for captive breeding?"* **(KIM33)**	D4 (1KI|5CL) *"No one is putting more land out there for conservation. That's why there is a privately industry and we as ranchers, we are trying to do it."* **(CLM03)**
E: Wild Population Buffer	E1 (4KI|2CL) *"There's always going to be a market for the wild product. So the wild product always has a higher value, so there's always going to be pressure on the wild product. The more we supply the demand of the buying market, the more sophisticated that buying market is going to become."* **(KIM11)**	E2 (3KI) *"The reality is, we know that there's a demand … and we know that the captive-bred lions have been meeting that demand. The big un-known is if you had to stop the supply, is the demand just going to disappear? I think if we can show that the demand is being met largely from the captive-bred lion and it's stopping people ... getting bones from other sources, then that would be a conservation value."* **(KIM33)**	E3 (2KI) *"I don't agree with [captive-bred hunting] but if you have to shoot a lion, I would rather have a canned lion hunted. [But] China has got billions of people there and ... we can export a hundred thousand lions a month, they'll absorb it in a heartbeat."* **(CLM93)**	E4 (2KI|10CL) *"If they're close it up, it's going to be going to the black market. Then you have no control over it… If the thing is regulated and is going through the right channels and it's controlled in a controlled environment, you can see that it's done humanely."* **(CLM58)**
F: Research	F1 (1KI|1CL) *"Research, firstly, um, at this point in time there's, there's really no need. Physical research that hasn't been undertaken that still needs to be done. We don't need to discover anything about lions that we don't already know."* **(CLM60)** *"You want to do any genetic studies or studies on any diseases, go and study your wild lion populations."* **(KIM20)**	F2 (2KI) *"Maybe those facilities can somehow be linked to say the zoo or something to further improve their conservation value."* **(KIF29)**	F3 (1KI) *"I have no doubt that they can contribute to research, but do we need them for research?"* **(KIF73)**	F4 (2KI|2CL) *"In the wild is that you need a lot of researchers to do the same kind of work that I have been doing. I've been collecting blood samples and vaginal smears, pictures of the back quarters every day or every two days and now I've got a huge pool of samples to analyse and to say, "Listen, this is how lions work day by day." This was something impossible if these animals were not in these facilities."* **(KIF02)**
G: Raising Conservation Awareness	G1 (1CL) *"If you want to educate a guy on a lion go to the wild, go to Kruger Park ... You don't educate a guy by walking on a leash with a lion."* **(CLM97)**	G2 (3KI) *"I honestly don't think that many of these facilities has an educational value. I think they potentially could have in doing things the right way. Touching, feeling is extremely valuable to humans. Those type of things sink in deeper than a story I tell you about an animal. But then we also have got to take that into the bigger perspective and when we do these things, not to sell the western love of Simba, the lion … and actually understanding the role of predators in a system."* **(KIF73)**	G3 (1CL) *"That's a very difficult one. People who will probably never get the opportunity to see a lion in the wild can come here and see what a lion looks like. It all boils down to semantics of what is the actual message that having an animal in captivity gives. My education messages is basically: look how horrible our species is to animals."* **(CLM60)**	G4 (3CL) *"What we are trying to achieve is … we are looking to educate the next generation and the importance there is of conservation of wildlife … because Africa is so unique with the different kinds of wildlife. We need to teach the next generation that they can actually co-exist with our wildlife."* **(CLM19)**
H: Conservation Funds	H1	H2 (1KI|1CL) *"What those people are doing is not conservation. It's a financial enterprise. So, some of that money can be channelled towards real conservation endeavours. Then I might be a lot more comfortable with it. It would mean that the work that they do finally does actually have real conservation value."* **(KIM62)**	H3 (1KI) *"If I had to put a conservation value on it, it would be bringing revenue into the country. Bringing revenue into the country and hopefully some of that revenue gets channelled back into conservation."* **(KIM11)**	H4 (1KI|6CL) *"But I think the biggest one and we're working with government to implement it … that money goes to the conservation fund and use that money to … look after the wild animals or put lions back in Africa in reserves or something like that."* **(CLM13)**

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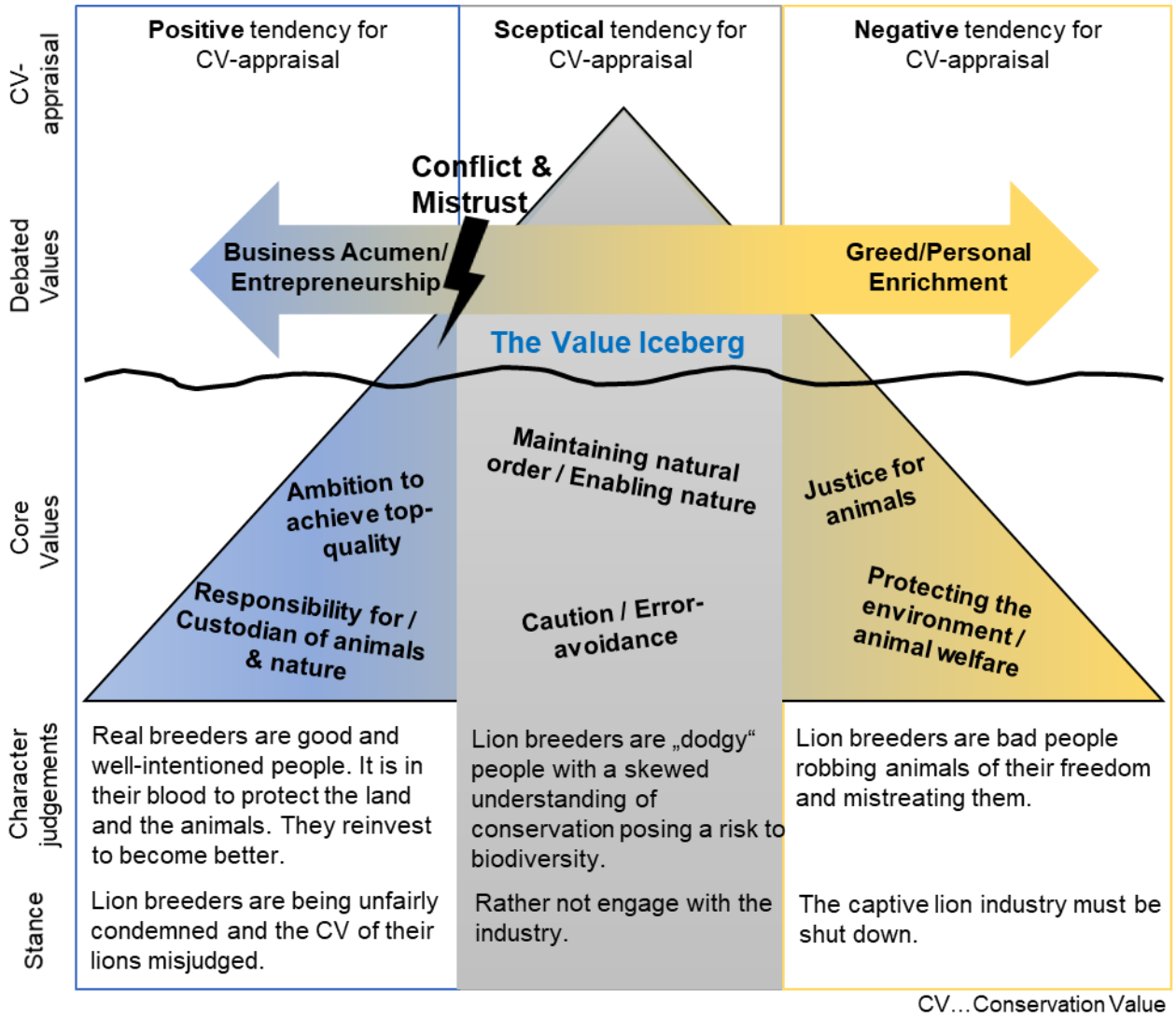

Fig. 2 Stakeholder values resulting in contrasting character judgements of lion breeders, which are transferred to captive-bred lions and lead to positive, sceptical or negative tendencies when assessing their conservation value

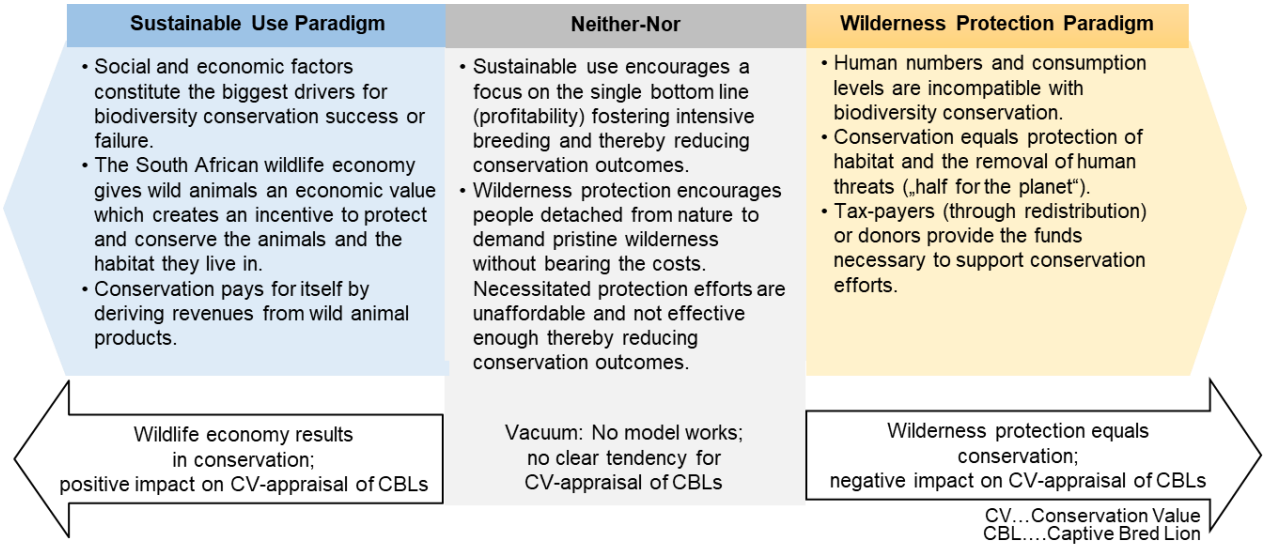

Fig. 3 Conservation worldviews relevant in the case of captive-bred lions leading to positive, scattered or negative tendencies when assessing their conservation value