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Integrating ethical assessment and media content analysis to explore social conflicts over large carnivores

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A B S T R A C T

Human-Wildlife Conflicts (HWCs) present ethically complex scenarios that intersect social, ecological, and animal welfare considerations. Conflicts are further complicated when extreme events, such as large carnivore attacks on humans, attract intense media attention. Media coverage plays a pivotal role in shaping public risk perception and tolerance toward wildlife, influencing policy decisions. While media content analysis has been applied to HWCs, the representation of stakeholder voices and underlying ethical dimensions in media narratives remains underexplored. To address this, we developed a novel approach integrating ethical assessment and media analysis and tested it on the case of JJ4, a brown bear that fatally attacked a person in Northern Italy. Using the Ethical Matrix (EM), we mapped stakeholders' (both human and non-human) ethically relevant demands and analyzed their portrayal in online media through reported statements. Based on 76 reports and 336 quotes, our findings revealed imbalances in stakeholder representation, with animal rights and welfare advocates dominating the discourse, while others were notably underrepresented, along with their concerns. Media primarily framed the conflict as a clash between public safety and animal welfare, overlooking broader environmental considerations crucial for wildlife management, with the risk of oversimplifying the complexities of HWCs and further exacerbating opinion polarization. These results highlight the need for more pluralistic media portrayals of HWCs that reflect the full scope of ethical considerations and stakeholder perspectives. The integrated approach we adopted provides actionable insights for decision-makers to foster more balanced and informed management strategies.

1. Introduction

Human-Wildlife Conflicts (HWCs) are a pressing challenge for biodiversity conservation (Redpath et al., 2013), and present wildlife managers and decision-makers with ethically complex scenarios. Defined as situations where the presence or behavior of wildlife poses an actual or perceived threat to human interests (IUCN, 2023), HWCs are particularly intense when involving large carnivores (Lamb et al., 2020), especially in human-dominated landscapes experiencing a return of predators after a long absence (Chapron et al., 2014).

While the term HWC highlights direct opposition between humans and wildlife, the most persistent challenges to human-carnivore coexistence often stem from broader, underlying social conflicts among people: disagreements rooted in differing values, interests and attitudes toward wildlife and its management (Madden and McQuinn, 2014; Pooley et al., 2021; Zimmermann et al., 2020). Social tensions tend to become especially pronounced in the aftermath of predator attacks on humans. These events, although still rare, receive extensive media attention (Bombieri et al., 2018, 2023; Nanni et al., 2020) and often trigger polarized debates that extend beyond immediate safety concerns.

Indeed, social conflicts over large carnivores carry deep sociocultural ramifications (Salvatori et al., 2021) and frequently touch on

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contentious ethical issues. Such issues include, for instance, the material and non-material impacts of large carnivores on livelihoods (Braczkowski et al., 2023), public trust in managing authorities (Sjölander-Lindqvist et al., 2015; Treves et al., 2017), the normativity of management policies (Woolaston et al., 2021), and the acceptability of interventions that directly impact animal welfare, such as lethal control (Vantassel, 2008; Vucetich and Nelson, 2017; Warburton and Norton, 2009).

Left unaddressed, social conflicts risk eroding public tolerance for carnivores and undermining the long-term success of conservation efforts (Catalano et al., 2019; Redpath et al., 2013). It is therefore crucial to recognize and engage with the plurality of stakeholder perspectives, in order to reach fairer and more effective conservation decisions (Cortés-Capano et al., 2022; Hovardas, 2018; Marino et al., 2021; Matulis and Moyer, 2017; Salvatori et al., 2020). In this regard, ethical assessment can offer valuable support to decision-makers in identifying potential solutions and guiding conflict mitigation.

Ethical assessment refers to the systematic evaluation of the morally relevant aspects of a given situation. In the context of conservation, it involves considering how different actions or decisions might affect people, animals or the environment (Baard, 2021). In fact, biodiversity conservation often requires navigating three intersecting ethical dimensions: (a) environmental ethics, focusing on the protection of ecosystems and natural processes; (b) animal welfare ethics, concerning the treatment of individual animals; and (c) social ethics, addressing the needs and interests of affected human communities (Biasetti and de Mori, 2020). These dimensions frequently present conflicting demands, requiring trade-offs between priorities. A range of ethical decision-making tools are available to support this process (Biasetti et al., 2023; Moula and Sandin, 2015). By evaluating the demands of all involved stakeholders, and making underlying ethical tensions explicit, ethical assessment can guide the development of more transparent and informed strategies for mitigating social conflicts over wildlife (Biasetti et al., 2021; Biasetti and de Mori, 2021).

However, the success of mitigation strategies may also depend on how conflicts are portrayed in the media. Media coverage of human-predator interactions – particularly of rare, high-profile events such as attacks on humans – can strongly shape public risk perception and attitudes toward carnivore presence (Alexander and Quinn, 2012; Bombieri et al., 2018; Dayer et al., 2019; Gore et al., 2005; Le Busque et al., 2021; Nanni et al., 2024). While media content analysis has been widely used in HWC research, no study has yet explored how the ethical dimensions of these conflicts are portrayed in the media. This gap is significant, as the way these events are framed carries broader ethical implications. For instance, emphasis on certain narratives or stakeholders, can affect how their concerns and legitimacy are perceived by the public (Bergstrom and Bak-Coleman, 2019), while oversimplified framings of complex scenarios risk deepening opinion polarization (Nanni et al., 2024). An ethics-oriented approach to media analysis can therefore offer critical insights into how the complexities of conflicts are constructed by stakeholders, communicated by media and received by the public.

To do this, we developed a novel, integrated approach combining ethical assessment and media content analysis. Our aim was twofold: 1) to identify the ethical demands of all stakeholders – human and non-human - involved in a conflict scenario, by means of the Ethical Matrix (EM); b) to assess how stakeholder demands were portrayed in the media, through a qualitative analysis of stakeholders' statements reported in online articles. The Ethical Matrix (Mepham, 1996) is an analytical tool that provides a comprehensive, pluralistic framework for mapping conflicts, which we employed as a reference for the ensuing media analysis, guiding the coding and interpretation of stakeholder statements. Statements were analyzed to answer three main questions: a) which stakeholder categories obtained more attention in the media?; b) whom or what were they advocating for?; c) which ethical demands were expressed?

In this paper, we applied this approach to a conflict scenario from the Trentino region, in Northern Italy, following the first fatal attack of a brown bear (*Ursus arctos*) on a human since the species' reintroduction. The incident, followed by a culling order for the bear, attracted significant media attention, and sparked intense public debates over carnivore management. As a high-profile case involving a charismatic species, this scenario offered a valuable opportunity to explore the ethical tensions embedded in conflicts over wildlife and how these are portrayed in the media.

1.1. Human-brown bear conflicts in the Italian Alps and the JJ4 case

The brown bear (*Ursus arctos*) population of Northern Italy is almost entirely located within the territory of the Autonomous Province of Trento (henceforth: Trentino), in the Central-Eastern Alps. Historically, brown bears were abundant in the Alps, but were driven near extinction by the 20th century due to deforestation, land conversion, and human persecution. By 1997, only a handful of individuals remained in the Central Alps (Dupré et al., 1998; Mustoni et al., 2003; Tosi et al., 2015). In response, the Adamello Brenta Natural Park launched the reintroduction project "Life Ursus" (LIFE96 NAT/IT/003152). Ten brown bears were translocated from Slovenia between 1999 and 2002. Since then, the population has seen significant growth, reaching an estimated 98 individuals in 2023 (Groff et al., 2024).

While ecologically successful, and despite the initial public support (Mustoni et al., 2003), the reintroduction was followed by significant challenges, as the growing bear population led to an increase in human-bear conflicts and a significant erosion of social tolerance of bear presence. A considerable portion of incidents, with direct attacks on humans remaining relatively rare, were attributed to a small number of individuals, classified as "problem bears" under the Action Plan for the Interregional Conservation of Brown Bear in the Central Eastern Alps (known as "PACOBACE"; AA.VV., 2010). PACOBACE provides a management framework for addressing such bears, outlining measures based on the frequency and severity of dangerous or damaging behaviors ranging from monitoring and aversive conditioning to permanent removal through culling or captivity (AA.VV., 2010). However, as brown bears are strictly protected under Italian law and the EU Habitats Directive (Council Directive 92/43/EEC of 21 May 1992, Annex IV), capturing and culling require institutional procedures involving regional authorities, the Ministry of Environment, and its technical consulting body, ISPRA (Superior Institute for Environmental Protection and Research).

Between 2014 and 2023, Trentino reported seven aggressive encounters involving brown bears, none resulting in human fatalities (De Vivo, 2023; Groff et al., 2024). However, on April 5th, 2023, JJ4, a female born in 2006, fatally attacked a 26-year-old resident who was jogging in the forest near Caldes (Trento). Also referred to as "Gaia" in public discussions, JJ4 had already been involved in two previous aggressive episodes in 2020 and 2022. Culling orders were issued on both occasions, but were suspended following legal appeals from animal rights organizations (Groff et al., 2023).

After the fatal 2023 incident, which marked the first human casualty caused by a brown bear in Trentino since the species' reintroduction, JJ4 was identified as responsible through genetic analysis, and authorities promptly issued a culling order, proceeding to capture and place JJ4 in captivity. However, the event sparked intense protests and legal appeals, leading to the suspension of the culling order. At the time of writing, JJ4 remains in captivity, with plans underway to transfer the animal to a wildlife sanctuary abroad.

2. Materials and methods

2.1. Ethical matrix

To explore the ethical dimensions of the conflict surrounding the JJ4

case, we used the Ethical Matrix (EM) as a guiding analytical framework. Originally developed in the context of food ethics (Mepham, 1996), the EM supports ethical reflection and decision-making in complex scenarios by systematically mapping the demands of all affected stakeholders and helping to identify potentially conflicting ones. Stakeholder demands are expressed in relation to three general ethical principles – Well-being, Autonomy and Fairness –, reflecting a principlist and pluralistic approach to bioethics and common morality (Beauchamp and Childress, 2019; Hinman, 2007).

In this study, we used a version of the EM specifically tailored for biodiversity conservation (Biasetti and de Mori, 2021), which includes three stakeholder classes: (a) *Individual non-human animals,* (b) *Ecological entities* and (c) *People*. This version of the EM is particularly suited to address wildlife-related conflicts like the JJ4 case, as it allows to evaluate concerns related to both human and non-human stakeholders, incorporating concerns related to animal welfare, environmental and social ethics.

Visually, the EM is structured as a table, with each row representing a stakeholder and each column corresponding to one of the three general ethical principles. Each cell of the EM contains the prima facie ethical demands of a stakeholder – that is, demands that are ethically relevant and justified "at face value", even if they may later be overridden by stronger, competing concerns or considerations. The demands listed in the EM are not absolute claims, but serve as a starting point for identifying ethical tensions and possible trade-offs.

We developed an EM using a top-down approach, following the method described in Biasetti and de Mori (2021), consisting of three steps: (1) gathering information, (2) identifying relevant stakeholders, and (2) defining their demands within the context of human-carnivore coexistence, according to the three ethical principles of the EM.

First, we conducted a review of multiple information sources, including scientific literature, policy documents, reports and public surveys. These sources formed the knowledge base regarding current brown bear conservation and management policies, human-brown bear interactions in Trentino, and general public attitudes in the region.

Based on this review, we identified thirteen stakeholder categories as relevant to the JJ4 case, belonging to three stakeholder classes: one *Individual Animal*, three *Ecological entities*, and nine human stakeholder categories (*People*).

The *Individual Animal* class includes the brown bear JJ4, as the subject directly affected by the removal order, contributing to the ethical dimension of animal welfare.

The three *Ecological entities* included in the EM allow to capture environmental value (Soulé, 1985): (1) Biodiversity, understood as the network of living organisms of Trentino and their ecological relationships, (2) the brown bear species (*Ursus arctos*) and (3) the brown bear population of Trentino, resulting from the reintroduction. The distinction between brown bear species and population reflects the European approach to large carnivore conservation, which emphasizes population-level management (Linnell et al., 2008; Swenson et al., 2000; Zedrosser et al., 2001).

Nine stakeholder categories were included in the *People* class of the EM, reflecting the range of human actors directly or indirectly involved in or affected by conflicts surrounding large carnivores (Grossmann et al., 2020): (1) Residents, (2) Farmers, livestock breeders and beekeepers, (3) Hunters, (4) Tourists and recreationists, (5) Politicians and authorities of Trentino, (6) Central government representatives, (7) Conservation biologists and wildlife managers, (8) Veterinarians, and (9) Animal rights and welfare advocates. Further detail and justification for the inclusion of each category in the EM can be found in Appendix A.

Finally, for each stakeholder included in the EM, we defined prima facie ethical demands according to the principles of Well-being, Autonomy, and Fairness. The final top-down EM then functioned as a guiding framework to analyze how stakeholders and their demands were represented in the media coverage of the JJ4 case.

2.2. Media content analysis

2.2.1. Data collection

Online media articles related to the JJ4 case were retrieved from Google News, following established methodologies for media content analysis (Mammola et al., 2022; Nanni et al., 2020, 2024). Articles published between April 5th, 2023 and September 30th, 2023 were collected via Google Chrome Advanced search by: (a) employing the keywords "*Orso* OR *JJ4* OR *Gaia*" ("Orso" meaning "Bear" in Italian), (b) using incognito mode to minimize search bias, (c) breaking down searches by month; and (d) collecting all results from the first 15 pages (10 results per page). For each retrieved report, we collected the (a) URL, (b) Title, (c) Date of publication and (d) Source name.

The present analysis focused exclusively on direct statements made by stakeholders in online media reports, to minimize the influence of article authors' interpretations. Title and full text of each article were screened for explicit references to the JJ4 case ("Rel", relevant) and for presence of direct quotations ("Rel + Quote"). Direct quotations were defined as text enclosed in quotation marks and attributed to a specific speaker. Only textual content of articles was analyzed, excluding embedded videos or images, social media content, aggregated news feeds containing multiple reports, or inaccessible reports (e.g. paywalled or in languages other than Italian). The final dataset (Appendix B) was reviewed by three authors, to assess consistency in report classification.

2.2.2. Stakeholder representation

Stakeholder representation was measured by recording the presence (1) or absence (0) of direct statements made by members of each category in retrieved "Rel + Quote" reports. For each article, all quotes were collected, reporting the speaker's name, role and/or affiliation, when available, and assigned to one of the nine human stakeholder categories defined in the EM. Additional categories were created to account for statements by people or institutions not included as stakeholders in the EM: 'Other politicians' (political figures not affiliated with the Italian government or Trentino's administration); 'Others' (individuals not fitting into any predefined stakeholder group); 'TAR' (judicial rulings issued by bodies such as the Regional Administrative Court or the Council of State). To assess heterogeneity in stakeholder representation, the number of distinct categories quoted in each report was counted. The dataset (Appendix B) was reviewed by three authors to ensure consistent stakeholder classification.

2.2.3. Qualitative analysis of stakeholder quotes

Once the "Rel + Quote" articles were selected, their textual content was saved as a .docx file and uploaded to Atlas.ti 24.1.0 (Mac OSx) for qualitative analysis of stakeholder quotes. We applied a deductive, concept-driven coding approach (Gibbs, 2012) guided by the top-down Ethical Matrix developed for the JJ4 case. Following multiple rounds of independent coding and group discussions among five authors to achieve consensus (Saldaña, 2021), a codebook was developed, providing code definitions and application guidelines (Appendix C).

Each quote was assigned codes from three code groups to describe: (1) the speaker's category (S-Stakeholder group); (2) the stakeholder being advocated for (R-Stakeholder group); (3) ethical demands (Well-being, Autonomy, Fairness) expressed on behalf of the R-Stakeholder.

Non-human stakeholders were only included in the R-Stakeholder code group. The code "R-General" was applied to quotes advocating for general societal interests rather than for a specific R-Stakeholder. Quotes with multiple ethical demands for different R-Stakeholder were segmented and coded separately, to ensure clear links between R-Stakeholders and ethical demands. Ethical demands were labeled using W for Well-being, A for Autonomy, and F for Fairness, with numerical identifiers for different stakeholder classes (1 for *Individual animal*, 2 for *Ecological entities*, 3 for *People*).

R-Stakeholder code groundedness (gr) was used to measure how frequently stakeholders were advocated for. A co-occurrence analysis of

S-Stakeholder and R-Stakeholder codes was conducted to identify which groups were speaking on behalf of whom, defining co-occurrences (Co-Oc) as instances where both codes appeared within the same coding segment ("AND" logic). Additionally, we examined the co-occurrences between R-Stakeholder and ethical demand codes, representing the moral considerations most commonly invoked in support of each stakeholder, and created smart codes for each R-Stakeholder/Ethics code combination. Smart codes were then analyzed for co-occurrence with S-Stakeholders to identify which groups most frequently invoked specific moral considerations in support of specific R-Stakeholders. Finally, low-frequency ethical demands were also identified.

3. Results

3.1. Ethical matrix

Table 1 presents a simplified version of the EM concerning the JJ4 conflict scenario, with human stakeholders grouped under the general *People* class. The complete EM, with a breakdown of demands for each human stakeholder group, is provided in Appendix A, along with the list of consulted sources of information.

JJ4, the bear directly affected by the removal order, was included as a stakeholder under the *Individual Animal* class. As shown in Table 1, JJ4's Well-being (W1) and Autonomy (A1) demands reflect core concerns related to animal welfare, embracing health and functioning, affective states, and freedom to express species-specific behaviors (Fraser et al., 1997; Reimert et al., 2023). Fairness (F1) entails the equal moral consideration of the individual in relation to other conspecifics, requiring that JJ4 be treated similarly to other bears regardless of its classification as a "problem animal." This demand reflects the principle that individual wild animals possess intrinsic moral worth and should not be excluded from fair treatment based on human-imposed labels (Sandler, 2012).

Regarding *Ecological entities*, Well-being demands (W2) coincide with environmental conservation goals: ensuring population viability, fostering connectivity, and protecting biodiversity at all taxonomic levels. Autonomy (A2) refers to the ability of ecosystems and species to function naturally, without human interference. Fairness (F2) entails impartial respect for the intrinsic value of ecological entities, regardless of their different symbolic, aesthetic, or instrumental significance to humans (Colléony et al., 2017).

The *People* class in Table 1 presents relevant societal considerations that may be demanded by human stakeholders concerning large carnivore presence. Well-being demands (W3) encompass concerns for physical safety, psychological well-being, economic security, and socio-cultural welfare (Robinson, 2011; IPBES, 2019). Autonomy (A3) includes freedom of choice, movement, expression, and self-determination at the personal, community, or professional level, as well as access to information necessary to exercise that self-determination. Fairness (F3) refers to equitable treatment of all stakeholders, avoiding biases based on group identity, individual differences, or political partisanship. It also includes trust in the institutions responsible for wildlife management, with demands for transparency, accountability, and responsiveness. Additionally, demands under both Autonomy and Fairness incorporate the concept of the rule of law (Rawls, 1971): while laws and regulations frame the boundaries of individual and collective action (Autonomy), they also underpin expectations for procedural justice and fair distribution of rights and responsibilities (Fairness). A detailed breakdown of the ethical demands relative to each human stakeholder group is provided in Appendix A.

3.2. Media content analysis

3.2.1. Data records

Among 267 retrieved online reports, 76 articles (28.5 %) were included in the analysis for directly mentioning JJ4 and featuring

Table 1
Simplified Ethical Matrix of the human-brown bear conflict surrounding the JJ4 case.

Respect for:	Well-Being	Autonomy	Fairness
Individual animal (JJ4)	**W1: Animal Welfare** *Health and functioning Allowance of positive affective states and avoidance of negative ones, such as pain and distress.*	**A1: Freedom to express species-specific behavior.** *Living a natural life; using natural habitats without human disturbance; rearing and protecting cubs against perceived threats.*	**F1: Fair treatment of individual animals** *with respect to management decisions. Being valued equally as other conspecifics, regardless of past behaviors and human interests.*
Ecological entities	**W2: Conservation**	**A2: Freedom from human intervention**	**F2: Fair treatment of ecological entities**
Biodiversity	*Conservation of richness and variety at all taxonomic levels in Trentino, including brown bears as a keystone species.*	*Allowing natural processes to occur as they would without human influence.*	*Fair treatment of ecological entities: respect for the worth of every component, regardless of instrumental or symbolic values.*
Ursus arctos (Species)	*Conservation of the species: guaranteeing viability and connectivity among all bear populations.*	*Ability to persist and evolve naturally over time, without human interference in its ecological or evolutionary processes.*	*Respect for the existence value of the species, as well as its ecological significance.*
Brown Bear population of Trentino	*Conservation of the population: management interventions should not compromise the population's viability and stability.*	*Allowance of natural demographic processes* (e.g. *reproduction and mortality) and habitat use; performing its ecological role in Trentino's ecosystem without human management interventions.*	*Fair treatment of ecological entities: respect for the existence value of the population.*
People: *Residents; Farmers, Livestock breeders, Beekeepers; Hunters; Tourists and recreationists; Conservation biologists and wildlife managers; Veterinarians; Trentino politicians; Government representatives; Animal rights and welfare advocates*	**W3.1: Psycho-physical Well-Being** *W3.1.1: Living in a safe and secure environment, free from threats to physical health. W3.1.2: Opportunities to live positive, significant experiences and emotions. W3.1.3: Avoiding negative experiences and emotions, like wildlife-related incidents, or dangerous encounters with carnivores.*	**A3.1: Freedom of action** *A3.1.1: Freedom of action and self-determination, including use of the landscape to carry out desired activities* (e.g. *recreational). A3.1.2: Freedom to carry out one's own professional tasks and duties without excessive restrictions, under the rule of law. A3.1.3: Freedom to uphold traditions and cultural practices.*	**F3.1: Fair and equal treatment** *F3.1: Fair and equal treatment of every person, regardless of status or background. Fair distribution of costs and benefits of policies, especially in relation to large carnivore presence.*
	W3.2: Economic welfare:	**A3.2: Freedom of expression:** *to express feelings,*	**F3.2: Accountability:** *Guaranteeing fair*

(continued on next page)

Table 1 (*continued*)

Respect for:	Well-Being	Autonomy	Fairness
	safeguarding livelihoods, ensuring protection of economic activities and sources of income.	*opinions and concerns openly.*	*assumption and distribution of responsibilities.*
	W3.3: Socio-Cultural welfare *W3.3.1: Sense of identity, pride and belonging to one's own community and traditions. W3.3.2: Recognizing and preserving the cultural significance and flourishing value of nature. Sense of non-material well-being coming through interactions with nature.*	**A3.3: Freedom of information:** *being able to access clear, reliable information for making informed decisions and exercising self-determination.*	**F3.3: Application of laws and guidelines,** *ensuring they are consistently applied and enforced.*
		A3.4: Rule of law in human-large carnivore coexistence *A3.4.1: Clear, accessible and agreed-upon laws and guidelines for wildlife management. A3.4.2: Efficient and competent management of large carnivore presence in cohabitation with human endeavors.*	**F3.4: Fair Information:** *right to access transparent and accurate information for informed decision-making.*
			F3.5: Representation and involvement: *right to be represented and actively involved in decision-making processes.*

quotations from stakeholders ("Rel + Quote") (Appendix B, Table B.1). Over half of collected articles were unrelated ($n = 148$), while others were excluded due to paywalls ($n = 3$), being in non-Italian languages (n = 4) or presenting aggregated news streams (n = 2). Most JJ4-related articles were published in April ($n = 43$) and May 2023 ($n = 27$), with a sharp decline in media coverage over time. However, June and July 2023 featured a relatively higher proportion of "Rel + Quote" articles compared to the total retrieved in those months (Appendix B).

3.2.2. Stakeholder representation

A total of 336 quotes were collected from the 76 "Rel + Quote" articles, with stakeholder representation varying considerably across categories (Fig. 1). Animal rights and welfare advocates were the most cited, with quotes reported in 42 articles (55.3 % of "Rel + Quote" reports), followed by Trentino politicians (18 articles, 23.7 %), and residents (13 articles, 13.3 %). Government representatives appeared in 6 reports (7.9 %), including statements from both the current and former Ministers for the Environment. Conservation biologists and wildlife managers appeared with 38 quotes across 10 articles (13.2 %). Additionally, 4 articles (5.3 %) cited judicial rulings from the Regional Administrative Court (TAR) or the Council of State. Tourists and recreationists were quoted in only 2 reports (2.6 %), while no quotes from hunters or farmers were found in the dataset.

In terms of stakeholder heterogeneity, most "Rel + Quote" reports ($n = 44$, 57.9 %) featured quotes from only one stakeholder category; 22 (28.9 %) articles included two categories and 8 (10.5 %) featured three. Only 2 articles (2.6 %) presented quotes from four different categories, offering the broadest range of stakeholder voices.

3.2.3. Qualitative analysis of stakeholder quotes

The codebook for the qualitative analysis in Atlas.ti, derived from the top-down EM, included 55 codes (Appendix C). The results of the coding process are reported in Appendix D. Across the 76 "Rel + Quote" articles, 2028 code applications were recorded; all codes were used at least once except for S-Farmers, S-Hunters, and R-Hunters. Among the Ethical code groups, Fairness was the most frequently used, with 344 applications, followed by Autonomy (299) and Well-being (240).

R-Individual bear (JJ4) emerged as the most frequently advocated-for stakeholder, receiving 128 mentions (23.1 % of 555 R-Stakeholder codings) (Fig. 2). The demand for fair treatment (F1) of JJ4 was the most frequently cited overall with 80 mentions (Table 2); concerns for JJ4's well-being (W1) and behavioral freedom (A1) were also frequently raised. S-Animal rights and welfare advocates voiced 62.5 % of all R-Individual bear mentions (Fig. 3).

Compared to the *Individual animal*, *Ecological entities* (R-Biodiversity, R-Bear species, and R-Bear population), received fewer mentions (gr = 51, 9.2 %). The most frequent demands related to this class focused on the fair treatment of biodiversity (F2, gr = 17) and the conservation of the brown bear population (W2, gr = 15).

Considerations of general societal interest (R-General) appeared in 165 instances (29.7 %), especially regarding competent management of brown bear presence (A3.4.2, gr = 70), institutional accountability (F3.2, gr = 63) and coherent application of laws and guidelines (F3.3, gr = 42).

Human stakeholder groups included in the EM (*People*) were referenced a total of 194 times (35.0 %), alongside 14 mentions for R-Others and 3 for R-Other politicians. When discussing specific human categories, all speakers primarily advocated for their own interests, emphasizing self-referred demands.

This trend was particularly evident for Animal rights and welfare advocates, the most vocal stakeholder category: out of the 78 references to human stakeholders, 55 were self-referred, especially centered on their freedom of action (A3.1.1, gr = 41). This made them the group with the most space to voice their own demands. In contrast, they were advocated for by others only 4 times (6.8 %) (Fig. 3). Nonetheless, Animal rights and welfare advocates primarily promoted JJ4's demands (80 mentions), while 26 of their statements were directed toward *Ecological entities*.

Trentino politicians mostly made self-referred demands, accounting for 21 out of 28 R-Trentino politicians mentions, while rarely addressing concerns for JJ4 (gr = 1) or *Ecological entities* (gr = 0). Similar to Conservation biologists, Trentino politicians emphasized their own professional autonomy (A3.1.2), highlighting the need for independence in decision-making and wildlife management.

Among *People*, Residents were the most frequently advocated-for category, receiving 63 mentions from 8 stakeholder groups, and including 26 self-references. Their demands often centered on their own emotional Well-being (W3.1.3, gr = 26) and fair treatment (F3.1, gr = 21). As speakers, Residents also addressed R-General (gr = 15) and R-Individual bear (gr = 4) considerations.

Conservation biologists and wildlife managers made 11 self-referred mentions (50 % of references for this category) and 18 R-General considerations. Unlike Animal rights and welfare advocates, this category focused more on *Ecological entities* (gr = 13) than on R-Individual bear (gr = 10), and was the most vocal in advocating for *Ursus arctos* as a species (gr = 7).

Veterinarians were advocated for 5 times, mostly self-referred (gr = 4), and primarily voiced R-General concerns (gr = 12), followed by R-Individual bear (gr = 10) and *Ecological entities* (gr = 6). Government representatives made 8 self-references and 5 mentions for JJ4, nearly all attributed to the former Minister. Tourists only voiced their own demands. Hunters were entirely absent from the debate, receiving no advocacy in the media, while Farmers were minimally represented (1

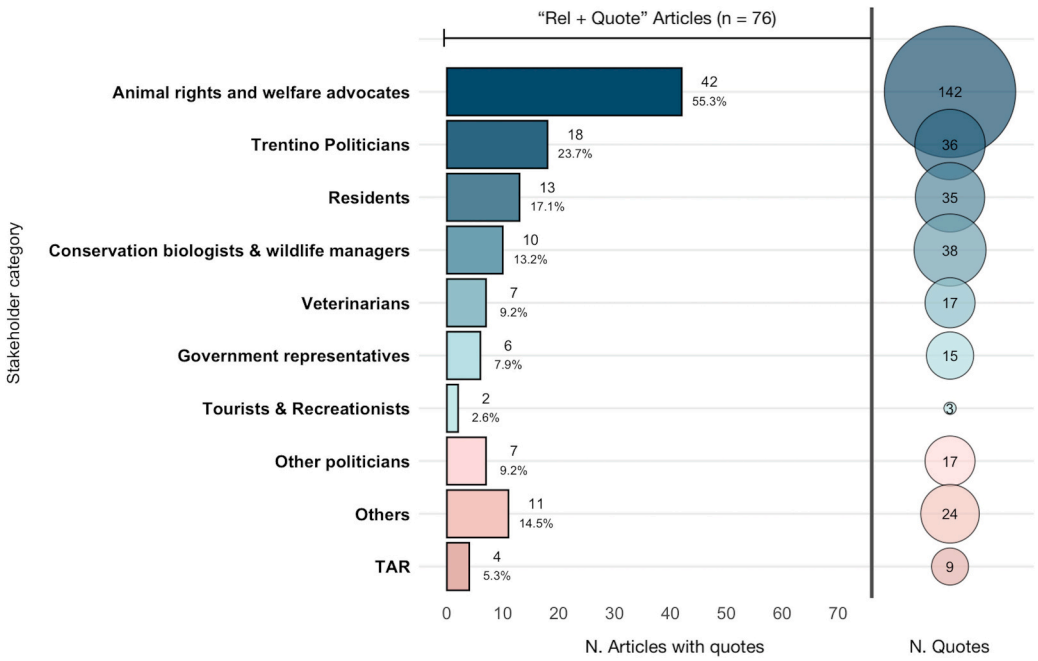

Fig. 1. Stakeholder representation in the media. Bar plot showing the number and percentage of articles concerning the JJ4 case that include statements ("Rel + Quote") for each stakeholder category. Categories highlighted in pink indicate groups that were not included as stakeholders in the Ethical Matrix but emerged as speakers in the media analysis. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

mention by S-Other politicians). An overview of the complex network of stakeholder mentions can be found in Appendix E, with lines showing the frequency of interactions between different stakeholder categories.

The least frequent ethical demands (gr < 10) were all related to Well-being: demands for individual animal's positive affective states (W1.2, gr = 3), human socio-cultural welfare (W3.3.1, gr = 3; W3.3.2, gr = 8), economic welfare (W2.1, gr = 3) and psychological well-being by living meaningful experiences (W3.1.2, gr = 9).

4. Discussion

Social conflicts over wildlife, particularly those involving large carnivores, present ethically complex challenges for conservation, intersecting social, ecological, and animal welfare concerns. The fatal attack that occurred in Trentino in April 2023 and the ensuing public reaction exemplify this complexity. Mitigating these conflicts requires navigating competing demands in highly sensitive and polarized contexts. Yet, these tensions are not always fully acknowledged in public debates, especially when shaped by media narratives that tend to simplify complex scenarios and reinforce polarized framings. Poorly nuanced reporting of these events risks oversimplifying conflict dynamics and neglecting key ethical considerations.

To address this issue, we applied a novel, integrated approach combining ethical assessment and media content analysis to the JJ4 case. Using the overview provided by the EM, we were able to map the full spectrum of ethically relevant demands at stake and explore which voices and considerations were amplified or overlooked in public discourse, as reported by online media.

4.1. Ethical dimensions of the JJ4 conflict

The EM proved especially valuable for clarifying the ethical dimensions of the JJ4 case. By accommodating a plurality of demands coming from diverse stakeholders, from a single wild bear to ecosystems and governmental institutions, the tensions between them become more visible. By mapping these demands, it is possible to highlight which ones are prioritized by management policies, which are constrained, and what trade-offs different decisions entail.

For instance, in the JJ4 case, the EM illuminated what is ethically at stake for the individual bear and which demands are being addressed by management. The permanent removal of bears following repeated damages or attacks, as mandated by Trentino's management policy, prioritizes public safety (W3) and the long-term conservation of the bear population (W2) over the well-being of individual animals (W1). Indeed, this approach also conflicts with the principle of equal treatment of JJ4 (F1), as the individual is singled out based on its designation as a "problem" individual from a human perspective. Additionally, it could be argued that JJ4 exhibited natural, species-specific behavior (A1): evidence suggests that the incident occurred in the presence of cubs (Groff et al., 2024), a context known to elicit protective aggression in female brown bears (Bombieri et al., 2023; Sahlén et al., 2015). Choosing between culling and long-term captivity also raises serious welfare concerns, as wild adult bears often struggle to adapt to confinement (Cattet et al., 2008). Nonetheless, management interventions like targeted removal are often framed as a necessary "social pact" with local communities, aimed at safeguarding public interests while improving species tolerance and promoting long-term population survival (AA.VV., 2010; Tosi et al., 2015).

The EM also highlighted ethical tensions surrounding the Well-being and Autonomy of *Ecological entities*, such as the brown bear population. Respecting ecological Autonomy (A2) ideally means letting ecosystems function without human interference. Yet, in densely populated regions like the Alps, a purely hands-off approach to conservation is rarely feasible, and active management is required to mitigate risks for people and wildlife (Chapron et al., 2014). The reintroduction of brown bears, a keystone species (Linnell et al., 2000; Miller et al., 2001), exemplifies this tension. While this deliberate human intervention advanced key conservation goals – restoring ecological balance and supporting *Ursus arctos* conservation at the European level (Mustoni et al., 2003; Tosi et al., 2015) –, the human-dominated context in which it took place requires ongoing management, ultimately limiting the full Autonomy of the bear population.

Finally, although grouped under the general *People* class in Table 1, the EM can also help distinguish individual stakeholder groups' diverse

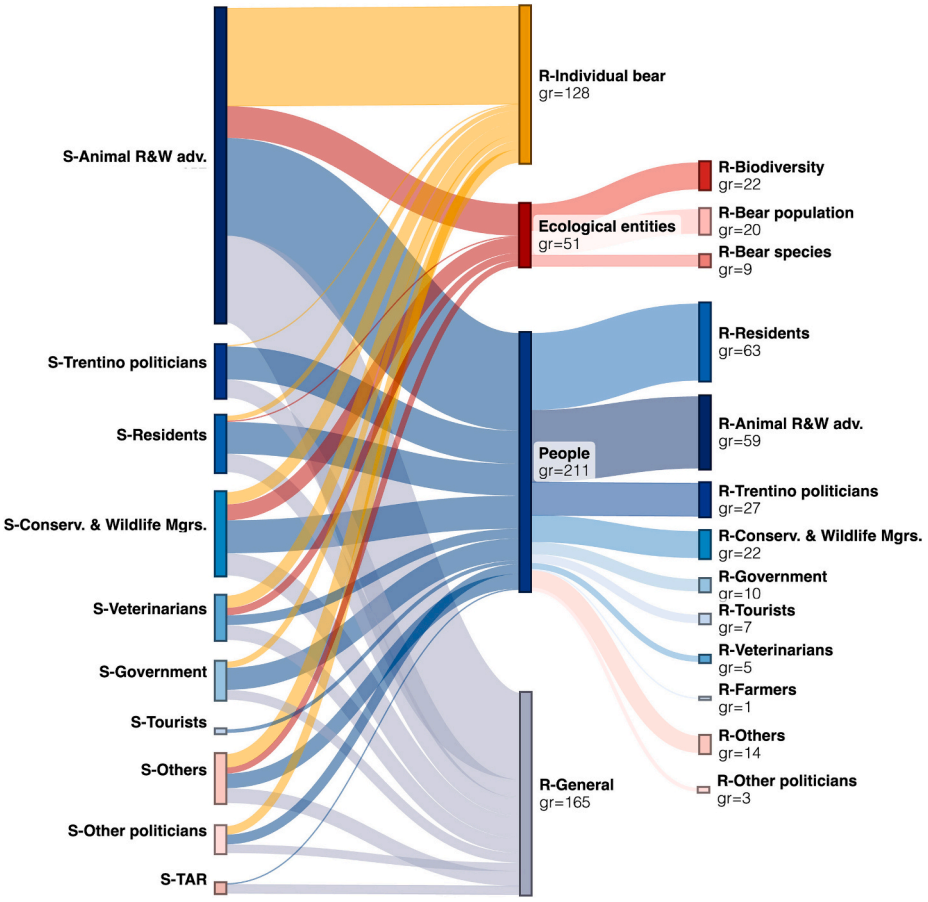

Fig. 2. Flow of mentions between speakers and referred stakeholders in JJ4-related articles. Sankey diagram based on the code co-occurrence analysis on Atlas.ti. Flow width reflects the frequency of co-occurrence between speakers and referred stakeholder class – i.e., how often a given stakeholder spoke about a certain class. Code groundedness (gr) represents the number of mentions for each stakeholder class and specific referred stakeholder categories (R-Stakeholders). Two central nodes – *People* (blue) and *Ecological entities* (red) – aggregate multiple R-Stakeholders of the same class, while the *Individual Animal* class (yellow) only includes R-Individual bear, thus not branching into further groups. An additional node, R-General (grey), represents broader societal considerations not directed at a specific stakeholder. Nodes and flows highlighted in pink indicate groups that were not included as stakeholders in the Ethical Matrix, but emerging as speakers or referred stakeholders in the media analysis. Hunters are not represented as they were neither present as speakers nor as referred stakeholders. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

value orientations and demands, enabling a clear identification of shared and divergent priorities. For instance, residents may emphasize safety and peace of mind in their local environment (W3.1), farmers may prioritize safeguarding their livelihoods (W3.2), tourists may value freedom of access to nature (A3.1.1), and wildlife professionals may seek autonomy in applying their expertise (A3.1.2). Some demands, such as competent carnivore management (A3.4) or accountability for past decisions (F3.2), may be shared across groups, but might stem from different concerns: some grounded in anthropocentric perspectives, others in more biocentric or ecocentric ones (e.g., respect of the intrinsic value of animals and nature; Zafra-Calvo et al., 2020).

4.2. Stakeholder representation in the media

The media content analysis driven by the EM revealed an unbalanced and incomplete representation of stakeholder voices in the JJ4 case. Animal rights and welfare advocates dominated the discourse, while other groups, such as farmers, livestock breeders, and hunters, were almost entirely absent. Most articles reported statements made by only one or two stakeholder categories, resulting in low heterogeneity of perspectives.

The observed unequal visibility of stakeholders in the media carries ethical implications: stakeholders with stronger media presence can disproportionately influence public perspectives and policy agendas (Bergstrom and Bak-Coleman, 2019), while underrepresented groups may see their concerns marginalized or overlooked. If an Ethical Matrix were constructed solely based on media sources, the resulting picture of the conflict would likely be incomplete and skewed toward dominant narratives.

The observed disparities may stem in part from differences in stakeholders' ability to mobilize and engage in media advocacy. In the JJ4 case, national animal rights and welfare organizations successfully amplified their voices through legal actions and public demonstrations, gaining significant space in the media. At the same time, the nature of the conflict may have also shaped the dynamics of stakeholder representation. In cases like this one, with evident implications for human safety and animal welfare, groups like farmers and hunters may be sidelined, whereas they might be more involved and represented in the media in other conflict scenarios (e.g., cases involving livestock predation or hunting restrictions).

These findings highlight the need for a more pluralistic and balanced representation of stakeholder perspectives in the media portrayal of HWCs. Ensuring that all affected groups are adequately represented in public discourse is an essential step to reduce social tensions surrounding wildlife impacts (Nanni et al., 2024; Sabatier and Huveneers, 2018).

Table 2
Most frequent ethical demands voiced by stakeholders in the media coverage of the JJ4 case. This table presents the 15 most frequent ethical demands emerging from the code co-occurrence analysis ("AND" logic) conducted in Atlas.ti. Each Ethical x R-Stakeholder code combination corresponds to a specific cell of the Ethical Matrix that is, an ethical demand expressed in relation to a stakeholder group. The corresponding co-occurrence (Co-Oc) values indicate how often each combination appeared in the dataset. For each Ethical x R-Stakeholder combination, the table also identifies the speakers (S-Stakeholders) who most frequently expressed the demands, and how frequently they did so (Co-Oc).

Ethical code	R-Stakeholder code	Co-Oc	S-Stakeholder code	Co-Oc
F1: Fair treatment of individual animals	R-Individual bear	80	S-Animal rights and welfare advocates	56
A3.4.2: Competent management	R-General	70	S-Animal rights and welfare advocates	35
F3.2: Accountability	R-General	63	S-Animal rights and welfare advocates	34
F3.3: Application of law	R-General	42	S-Animal rights and welfare advocates	17
A3.1.1: Freedom of action	R-Animal rights and welfare advocates	41	S-Animal rights and welfare advocates	37
W1.3: Animal welfare - Negative	R-Individual bear	40	S-Animal rights and welfare advocates	27
W1.1: Animal welfare - health and functioning	R-Individual bear	37	S-Animal rights and welfare advocates	18
A1: Behavioral freedom	R-Individual bear	27	S-Animal rights and welfare advocates	14
W3.1.3: Avoiding negative experiences	R-Residents	26	S-Residents	12
W3.1.3: Avoiding negative experiences	R-General	26	S-Animal rights and welfare advocates	9
F3.4: Information transparency	R-General	23	S-Animal rights and welfare advocates	11
W3.1.1: Wellbeing as Safety	R-General	23	S-Trentino politicians	6
F3.1: Fair treatment	R-Residents	21	S-Residents	13
A3.1.2: Professional duties	R-Trentino politicians	21	S-Trentino politicians	19
A3.1.2: Professional duties	R-Conservation biologists & Wildlife managers	17	S-Conservation biologists & Wildlife managers	9

4.3. Ethical demands and patterns of advocacy in the media

Concerning the representation of ethical dimensions, media coverage of the JJ4 case primarily emphasized individual animal welfare and societal issues, while broader ecological considerations underpinning brown bear conservation and management received limited attention. Conservation biologists and wildlife managers, arguably the most qualified to communicate the ecological rationale behind management actions, were only sporadically quoted in the media. As a result, the debate around the removal of "problem bears" like JJ4 was largely portrayed as a zero-sum conflict between individual animal welfare and human safety. This reductive framing can have relevant implications on how the public perceives and understands conflicts over wildlife: such gaps in media discourse risk deepening opinion polarization and undermining support for conservation policies (Nanni et al., 2024). Ensuring that ecological considerations are communicated more clearly and consistently is therefore essential to foster a greater public understanding of the trade-offs involved in managing wildlife impacts. Acknowledging these aspects can offer a more solid foundation for informed, constructive, and less polarized public debates.

The focus on JJ4's Fairness and Well-being demands can be attributed to the dominance of animal rights and welfare advocates in the media, as well as the emotional resonance of a case involving a named, well-known individual of a charismatic species (Costello et al., 2023). It also aligns with the rising influence of mutualistic value orientations in Western societies (Manfredo et al., 2020). This societal shift increasingly challenges traditional conservation practices, rooted in utilitarian reasoning and population-level considerations, sometimes at the expense of individual animal welfare (Hampton et al., 2019; Larriera, 2022).

Most quotes addressing human well-being framed bears as threats to physical safety or psychological comfort, a logical focus in the aftermath of a fatal attack. In contrast, positive contributions of brown bears to human well-being (W3.1.2), as well as the potential economic (W3.2), socio-cultural (W3.3), and ecological (W2) benefits of the species, were the least emphasized. This imbalance is especially striking given the species' ecological, symbolic, and totemic significance (Tattoni et al., 2024), suggesting that the value of brown bears has not been broadly internalized by the public since their reintroduction, despite efforts to promote them (Passoni et al., 2024; Tattoni et al., 2017).

Notably, our analysis revealed widespread calls for more transparency (F3.4), accountability (F3.2), competence (A3.4.2), and consistent application of laws (F3.3) in the management of human-brown bear coexistence in Trentino. These demands were voiced by diverse stakeholders, reflecting not only dissatisfaction with specific decisions but also a deeper erosion of public trust in managing

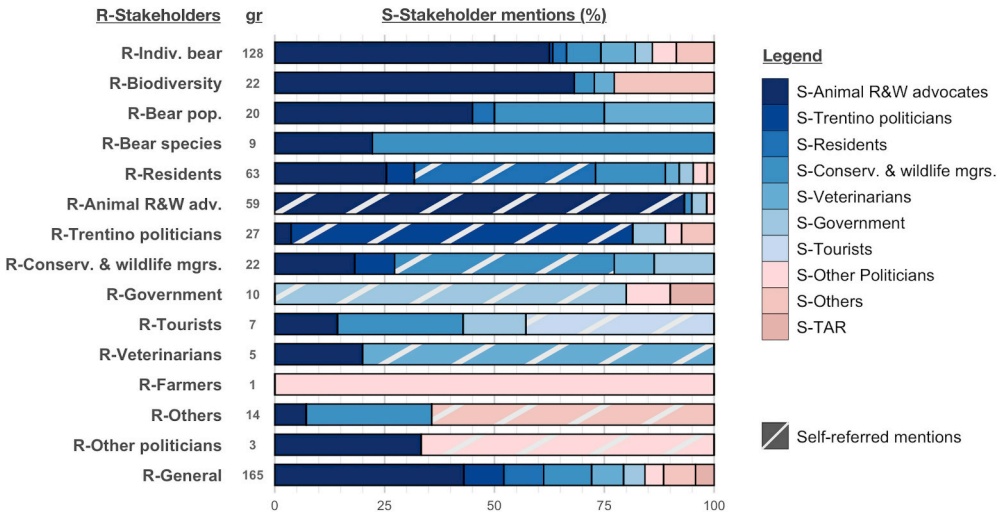

Fig. 3. Distribution of S-Stakeholder mentions for each R-Stakeholder in media coverage of the JJ4 case. The stacked bar plot shows the proportion of mentions attributed to each speaker stakeholder (S-Stakeholder) category over the total mentions received by each referred stakeholder (R-Stakeholder), based on a qualitative analysis of stakeholder statements conducted in Atlas.ti. The total number of mentions of each R-Stakeholder (Groundedness, gr) is shown on the left. Bars with diagonal lines represent self-referred mentions, where stakeholder groups advocate on behalf of themselves. Categories highlighted in pink indicate groups that were not included as stakeholders in the Ethical Matrix but emerged as S- or R-Stakeholders in the media analysis. Hunters are not represented as they were neither present as speakers nor as referred stakeholders. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

authorities. Low trust in institutions is a recurring theme in social conflicts involving large carnivores (Salvatori et al., 2021; Sjölander-Lindqvist et al., 2015). Besides, in this case, demands for accountability hold particular weight, as the bear population of Trentino was deliberately reintroduced through a publicly supported initiative. Wildlife reintroductions indeed accentuate the moral responsibility of authorities to manage the long-term consequences of such efforts (IUCN, 2013; Lee et al., 2021), which perceived or actual failures may strongly undermine public trust.

The interpretation of institutional shortcomings varied among stakeholders. Some criticized the lack of timely and appropriate interventions in the past (i.e., JJ4 was already involved in two attacks before 2023). Others emphasized failures in public education and preventive efforts to support coexistence, describing JJ4's removal as an "unfair punishment" on the animal for failures attributable to human responsibility.

Human-carnivore coexistence does not imply the absence of risks for either people or wildlife, but requires that risks be acknowledged, communicated, and managed within tolerable levels (Pooley et al., 2021; Venumière-Lefebvre et al., 2022). This, in turn, depends largely on the preparedness and perceived legitimacy of those responsible for wildlife management. Several studies and official reports related to the reintroduction of bears in Trentino (Groff et al., 2024; Mustoni et al., 2003; Passoni et al., 2024; Tosi et al., 2015; Tattoni et al., 2017) had already emphasized that long-term success would depend on sustained monitoring, public engagement, and active management of "problem" individuals. However, as highlighted by the debates surrounding the JJ4 case, it could be that these efforts were not sustained or proved insufficiently effective over time, likely contributing to a sense of institutional unpreparedness and a gradual erosion of public trust. Combined with the increasing presence of bears and related impacts, these shortcomings may have contributed to declining tolerance and support for brown bear presence in the region.

4.4. Limitations and future developments

While this study offers valuable insights, certain limitations warrant caution in interpreting the results. First, in the report collection, the inclusion of the keyword "Gaia" – proper name for JJ4 used primarily by animal rights and welfare advocates – may have inflated their visibility in the retrieved articles. Second, excluding social media ensured a focus on more formal news sources, but may have overlooked relevant public sentiments and informal narratives, potentially less affected by organized advocacy capacities. Third, focusing on a single, high-profile event involving a charismatic species may have amplified biases inherent in media coverage of conflicts with large carnivores (Bombieri et al., 2018).

Future studies can implement this methodology to explore scenarios involving different species, regions, or longer time frames. Comparative analyses using this methodology could also reveal how ethical concerns surrounding wildlife and stakeholder visibility shift across different settings.

Finally, stakeholder demands in this study were defined through a top-down approach, based on relevant literature. However, the content of the EM could be validated and complemented through a bottom-up approach – e.g., via interviews or surveys – providing a more grounded understanding of stakeholders' orientations and concerns. By doing so, the EM could serve as a powerful tool for participatory processes in conservation, aligning with stakeholder demands for transparency, representation, and trust in conservation governance (Hovardas, 2018; Marino et al., 2021; Marino et al., 2024; Salvatori et al., 2020).

5. Conclusions

This study presents the first integrated application of ethical assessment and media content analysis to explore social conflicts over wildlife. By means of the Ethical Matrix, we were able to map the ethically relevant aspects of a high-case conflict scenario involving a large carnivore species, and to highlight how these were represented or neglected in public discourse. Our findings highlight the value of structured tools like the Ethical Matrix to navigate complex scenarios, supporting more transparent and inclusive decision-making processes in biodiversity conservation. Moreover, results underscore the importance of a more pluralistic media representation of stakeholder voices in the portrayal of HWCs. Integrated approaches that acknowledge ethical pluralism can help ensure that all relevant perspectives and values are recognized, leaving no voice – human or non-human – unheard in the effort to transform current conflicts into future coexistence.

CRediT authorship contribution statement

Simone Basile: Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Investigation, Formal analysis, Data curation. **Elena Mercugliano:** Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Data curation, Validation. **Sally Carraro:** Writing – review & editing, Investigation, Data curation. **Pierfrancesco Biasetti:** Methodology, Conceptualization, Writing – review & editing. **Giulia Mascarello:** Writing – review & editing, Visualization, Methodology. **Anna Pinto:** Writing – review & editing, Methodology, Investigation. **Marco Zago:** Writing – review & editing, Methodology, Investigation. **Veronica Nanni:** Writing – review & editing, Methodology. **Steven Seet:** Writing – review & editing. **Roberto Guadagnini:** Writing – review & editing. **Barbara de Mori:** Writing – review & editing, Supervision, Project administration, Methodology, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.biocon.2025.111342.

Data availability

We uploaded the complete dataset as supplementary material in Appendix B, making all the data available, and the results of the analysis in Appendix D.

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