



Understanding the Role of Representations of Human–Leopard Conflict in Mumbai through Media-Content Analysis

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Abstract: *Attempts to minimize the effects of human–wildlife conflict (HWC) on conservation goals require an understanding of the mechanisms by which such conflicts are caused and sustained. This necessitates looking beyond the natural sciences to the human dimensions of wildlife management. Public dissemination of information regarding HWC occurs largely through the mass media. We conducted a content analysis of print media articles on human–leopard conflict in Mumbai, India. We sought to understand the framing of HWC and the changes in media coverage over a 10-year period (2001–2011) during which a large number of attacks on people prior to 2005 were followed by a program of trapping and relocation. After 2005, when there was a decrease in the level of conflict, the tone of English-language media reports changed. The perpetrator framing was over 5 times more likely before 2005, whereas a neutral framing was twice as likely after 2005. English-language and non-English-language print media differed significantly in their framing of HWC and in the kinds of solutions advocated. Our results also suggest the print mass media in Mumbai could be an influential conduit for content that diminishes HWC. These media outlets seem attentive to human–leopard conflict, capable of correcting erroneous perceptions and facilitating mitigation and effective management. We believe better contact and mutual understanding between conservation professionals and the mass media could be an important component of managing HWC. We further suggest that in such interactions conservation professionals need to be aware of cultural and linguistic differences in reporting within the country.*

Keywords: human dimension, human–wildlife conflict, risk communication, Sanjay Gandhi National Park, urban carnivore

Entendiendo el Papel de las Representaciones del Conflicto Humano–Leopardo en Mumbai A Través del Análisis de Contenido de Medios

Resumen.: *Los intentos para minimizar los efectos del conflicto humanos–vida silvestre (CHVS) sobre las metas de conservación requieren del entendimiento de los mecanismos que causan tales conflictos y su persistencia. Esto obliga a mirar más allá de las ciencias naturales y considerar las dimensiones humanas del manejo de vida silvestre. La divulgación pública de información con respecto al CHVS ocurre generalmente a través de los medios de comunicación. Realizamos un análisis del contenido de artículos sobre el conflicto humanos–leopardo de Mumbai, India en medios impresos. Buscamos entender la conceptualización del CHVS y los cambios en la cobertura de los medios a lo largo de un periodo de diez años (2001–2011) durante el cual un gran número de ataques hacia personas previos a 2005 fueron seguidos por un programa de captura y reubicación. Después de 2005, cuando hubo una disminución en el nivel de conflicto, el tono de los reportajes de los medios en inglés cambió. La conceptualización del causante fue más de 5 veces más probable*

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antes de 2005, mientras que la conceptualización neutral fue dos veces más probable después de 2005. Los medios impresos, tanto en inglés como en otros idiomas, diferían significativamente en la conceptualización del CHVS y en el tipo de soluciones promovidas. Nuestros resultados sugieren que los medios impresos en Mumbai podrían ser un conducto influyente para contenidos que disminuyen el CHVS. Estos medios parecen estar atentos al conflicto humano-leopardo, siendo capaces de corregir percepciones erróneas y facilitar la mitigación y el manejo efectivo. Creemos que un mejor contacto y entendimiento mutuo entre los profesionales de la conservación y los medios de comunicación podría ser un importante componente para el manejo del CHVS. Sugerimos que en tales interacciones los profesionales de la conservación necesitan estar al tanto de las diferencias culturales y lingüísticas en los reportajes dentro del país.

Palabras Clave: carnívoro urbano, comunicación de riesgo, conflicto humanos-vida silvestre, dimensión humana, Parque Nacional Sanjay Gandhi

Introduction

An increasing number of studies document human-wildlife conflict (HWC) in human-dominated landscapes (e.g., Bagchi & Mishra 2006; Gehrt et al. 2010; Loveridge et al. 2010). The presence of carnivores and consequent HWC is not limited to edges of protected areas or rural landscapes. Opportunistic carnivores occur in semiurban and suburban environments (e.g., Moyer et al. 2008; Murphy & Macdonald 2010; Gehrt et al. 2011) and outside protected areas (e.g., Jhala et al. 2009; Singh et al. 2010; Athreya et al. 2011).

Conventionally seen to result from competition between people and wildlife over resources, HWC is now understood to be affected by peoples' perceptions of what level of interaction is acceptable (Madden 2004; Dickman 2010; Peterson et al. 2010). Perceptions of conflict may be as important as the ecology of the species in determining the levels of persecution (Madden 2004; Peterson et al. 2010), and results of some studies show that the media has an effect on public perceptions of acceptable risk posed by the presence of wild animals (e.g., Gore et al. 2005; Gore & Knuth 2009; McQuail 2010).

Sanjay Gandhi National Park (SGNP), in the Indian metropolis of Mumbai was the site of a spate of HWC events involving the park's leopard (*Panthera pardus*) population (42 in 2001) (unpublished Forest Department records). The park boundary abuts residential areas of Mumbai, where human population density is among the highest on Earth (nearly 30,900 persons/km²) (Demographia 2012). From 2002 to 2004, 84 leopard attacks resulting in death or injury to people took place in the vicinity of the park (BNHS 2009; unpublished Forest Department records). No ecological study on SGNP leopards has been undertaken since 1998, although preliminary diet studies have been conducted (Edgaonkar & Chellam 2002; BNHS 2009). Despite this, the factors underlying the rise in leopard attacks on humans remain unknown. The Forest Department tried to manage this conflict by capturing leopards and translocating them either back into SGNP or to parks nearby. Eighty-four leopard attacks in the state capital inevitably

attracted considerable media and public attention and arguably aggravated negative attitudes toward the species (Riley & Decker 2000; but see Gore et al. [2005] for a counterexample).

We used formal content analysis to understand the nature of media reporting on human-leopard interactions in Mumbai from 2001 to 2011. We examined the differences in media framing and content of leopard-related stories between regional and English-language daily newspapers and compared the changes in coverage before and following a peak in human-leopard conflict in 2005.

Methods

We obtained data on reported attacks on humans by leopards in the SGNP and on captures and releases of leopards from Forest Department records. We followed the content-analysis methods and principles of Krippendorff (2004) and Riffe et al. (2005). In databases of media articles, we searched for the keyword *leopard* (following, e.g., Jacobson et al. [2011] or Siemer et al. [2007]).

We searched the archives of the Mumbai editions of the 3 leading newspapers (Indian Readership Survey 2011): *Times of India* (TOI), an English-language daily; *Maharashtra Times* (MT), a Marathi-language daily; and *Mumbai Samachar* (MS), a Gujarati-language daily. The first author (S.B.) translated news from the regional dailies (RD) (MT and MS) for the purpose of analysis.

We located articles published in TOI from 2000 to 2011 (articles prior to 2000 were not digitized), in MT from 2003 to 2011 (articles prior to 2003 were not digitized), and in MS from 2002 to 2011. The MS archives existed only as hard copies. Consequently, whenever a leopard-related story was located in TOI, the MS archives were searched manually around the relevant date to locate articles. For the TOI and MT, we excluded articles that did not refer to leopards in Mumbai. In all, 140 articles from TOI, 25 from MT, and 22 from MS were used in our analyses.

Following Krippendorff (2004), we coded articles into different categories via multiple parameters to assess the tone and motive of the article (Hsieh & Shannon 2005).

Table 1. Coding typology for analyzing the news articles on human–leopard conflict in Mumbai.

<i>Framing</i>	<i>Story topic</i>
Overall	
episodic	event based, covers a particular incident
thematic	refers to a particular event but is set in a broader context
Headline	
man-eater	portrays the leopard as intentionally killing or attacking humans (e.g., “Big Cat Strikes Again, Kills Mulund Lawyer,” “Leopard Rips Apart a Man and a Woman in Malad Forest,” “Three Bloodthirsty Leopards Trapped”)
pest	highlights repercussions of leopard entering the city (e.g., “Leopard Takes Away the ‘Mood’ of IITians,” “Leopard Cub Terrorizes Bhandup Residents”)
mitigation	specifically reports or discusses conflict mitigation (e.g., “Caged Leopards To Go in Rehab Centres,” “Forest Secy [sic] Orders Probe into Trapping of Panther”)
neutral	provides information without being excessively value laden (e.g., “Look Who Came Visiting,” “Leopard Trapped in IIT Campus”)
victim	presents the leopard as a victim of human activities (e.g., “Whose Responsibility Is It To Protect These Hapless Creatures of the Forest?,” “Man Enters the Jungle, Leopard Enters the City”)
positive	presents the leopard as an integral part of the ecosystem, outlining either its role as the apex predator or describing the leopard as a flagship species (e.g., “Animal Charm”)
other	overlap of 2 frames (e.g., victim-neutral frame title—“Aarey Drama, Leopard Rescued from Tunnel”)
Dominant	
victim	presents the leopard as a victim of human activities in words that elicit sympathy for the animal
perpetrator	presents the leopard as the one inflicting harm or causing menace in words that suit such a description
victim-perpetrator	fits neither the victim nor the perpetrator frame
neutral	provides information about the animal or the incident through use of value-neutral words, supports neither humans nor the leopard

We coded articles as being predominantly episodic (event driven) or thematic (issue oriented). Episodic articles described a particular event, whereas thematic articles were analytical in nature. We used 5 categories to classify the title (as proxy for the content of the article [Dor 2003]). These categories were nested in the victim-perpetrator framework (Muter et al. 2009), in which a victim is defined as “an entity that receives some sort of harm or negative effect” and a perpetrator as “an entity that inflicts harm or a negative effect.” We also coded articles by type of interaction (leopard attack on a human, death or injury of a leopard, death of a pet or livestock, no attack) and by proposed causes and solutions of HWC. These categories evolved during coding on the basis of principles of grounded theory (Corbin & Strauss 1990) (coding typology in Table 1). We determined intercoder reliability via percentage agreement (Krippendorff 2004). Thirty articles (10 from each daily) were coded twice—once by one of us (S.B.) and a second time by a student trained in coding. There was 80% agreement between the 2 coders, which we considered sufficient (Krippendorff 2004; Riffe et al. 2005).

Data from the 2 RD were combined owing to the small sample size for both newspapers. Differences in the frequency of framings and content across comparisons of interest were assessed with χ^2 tests under the null assumption of identical frequency distributions and with significance determined from 20,000 resamples of the data without replacement (Manly 1996). Where the expected frequency of a factor under the null hypothesis was less than or equal to 5, we used Fisher’s ex-

act test (Crawley 2002), again with significance determined by resampling. We carried out all analyses in the statistical environment R (version 2.13.0) (R Core Team 2012).

We supplemented our quantitative analyses of media content with semistructured interviews of 17 key informants, who we selected opportunistically to further explore aspects of our findings as they occurred. The key informants were media personnel, forest officials, conservation scientists, and people or families of people who had been injured or had died in a leopard attack. The discussions in these interviews centered on human–leopard conflict in the city and the nature of and the role played by Mumbai’s mass media.

Results

Content comparisons and their associated tests showed that thematic articles (i.e., stories that refer to a particular event but are set in a broader framework) contained more discussion of causes and solutions of HWC and were more frequent in TOI than RD ($\chi^2 = 8.073$, $p = 0.0049$, odds ratio 2.65) (Table 2). Episodic content (i.e., event-based stories covering a particular incident) that was more prevalent in the RD was not predominantly about attacks on people: only 25% of such content covered attacks. Many episodic articles classified as “no attack” were often (nearly 60%) about negative consequences of an incidence of HWC (e.g., “widespread panic”; reporting on trapping and relocation).

Table 2. Frame and content analysis of articles pertaining to human–leopard conflict reported in Mumbai editions of 3 daily newspapers.^a

<i>Difference in article frequency^a</i>	<i>Categories compared</i>	<i>p (by randomization; df not meaningful)</i>	<i>χ²^b</i>
Framing type—thematic vs. episodic	TOI & MT/MS	0.0049	8.073
Headline framing—negative, neutral, or positive	TOI & MT/MS	0.1077	
HWC interaction type	TOI & MT/MS	0.2042	
Attribution of HWC cause	TOI & MT/MS	0.912	1.2267
Suggested solution to HWC	TOI & MT/MS	0.00255	
Any suggested solution to HWC (TOI)	episodic vs. thematic coverage	0.0001	19.85
Any suggested solution to HWC (MT/MS)	episodic vs. thematic coverage	0.0041	8.7589
Change in leopard framing (from perpetrator to neutral to victim) in TOI	pre-2005 & post-2005 (inc)	<0.0001	
Change in leopard framing (from perpetrator to neutral to victim) in MT/MS	pre-2005 & post-2005 (inc)	0.135	

^aAbbreviations: HWC, human-wildlife conflict; TOI, Times of India; MT, Maharashtra Times; MS, Mumbai Samachar; inc, inclusive.

^bThe χ^2 testing on raw article counts was replaced by Fisher's exact tests (blanks in column) when the expected frequency of any category (under the null hypothesis of no association) was ≤ 5 .

Headline framings (Table 1) did not differ between TOI and RD and tended towards frequent neutral framings of HWC, which comprised around 40% of articles. Content of thematic articles differed significantly from episodic articles. Thematic articles discussed causes and solutions of HWC significantly more than episodic articles. This was true for both TOI ($\chi^2 = 19.85$, $p = 0.0001$, odds ratio 4.37) and the RD ($\chi^2 = 8.76$, $p = 0.004$, odds ratio 9.5). Where causes were attributed, in both TOI and RD habitat loss (including encroachment, land-grabbing, and development activities, such as quarrying) was identified as the main reason for increasing HWC in all 3 dailies. The second- and third-most cited reasons were presence of dogs and garbage and loss of wild prey, respectively.

Although cause was attributed with similar frequency, the nature of solutions suggested differed significantly between TOI and RD (Fisher's exact test, $p = 0.0026$). The TOI favored several solutions that were never suggested in the RD, including removal of encroaching settlements (mentioned 18 times) and the removal of garbage from the area (10 times). Solutions favored in the RD included supplemental feeding with domestic animals (odds ratio 12.2), trapping of leopards (odds ratio 2.26), and erecting barriers (odds ratio 2.17). A post hoc strict randomization test in which the observed number of articles from the TOI and from RD were randomized across solutions with equal probability and the observed differences in solution frequency compared with the randomized differences showed the proposal for supplemental feeding was significantly overrepresented in the RD ($p \leq 0.0001$).

The intensification of trapping and relocation after the peak in leopard attacks in 2004 (Fig. 1) was followed by (but did not necessarily cause) a reduction in attacks and in the frequency of media articles concerning leopards (Fig. 2). Individual leopards were not marked; multiple trappings of the same leopard in the data we examined

could not be excluded. Comparison of framing frequencies before and after 2005 showed a significant change in the dominant framing by the TOI (Fisher's exact test, $p = 0.00005$); the frequency of the use of the perpetrator frame decreased (odds ratio: 5.6) and use of neutral framing increased (odds ratio 2.07). The same qualitative pattern was observed in RD, although the difference was not significant.

Discussion

Human-wildlife conflict is a major challenge to conservation, and among the most emotive issues is attack on humans by big cats (Loveridge et al. 2010). These attacks prompt intense media scrutiny, and media framing of such issues can affect public attitudes as well as reflect them (e.g., Uscinski 2009; Antilla 2010; McQuail 2010). The media is believed to play an agenda-setting role when it highlights certain issues and issue attributes (McCombs & Shaw 1972; Scheufele 1999). McCombs (2006) suggests public perceptions of risk are substantially influenced by the media and can result in overestimation of danger, social amplification of risk, and creation of stigma. Thus, the media is not only a primary provider of information, but also has the power to affect interpretation of the information and can potentially (but not always [e.g., Gore et al. 2005]) affect conflict mitigation.

Even though researchers are not in complete agreement on the extent of media influence on people, the fact that they have the potential to amplify perceptions of risk creates an inflammatory situation for HWC. A media portrayal of the leopard as attacker could have significant influence on public attitudes because most people are likely to derive information on wildlife from the media rather than from direct experience or professionally evaluated evidence (Barua et al. 2010; Allgaier 2011; Jacobson et al. 2011).

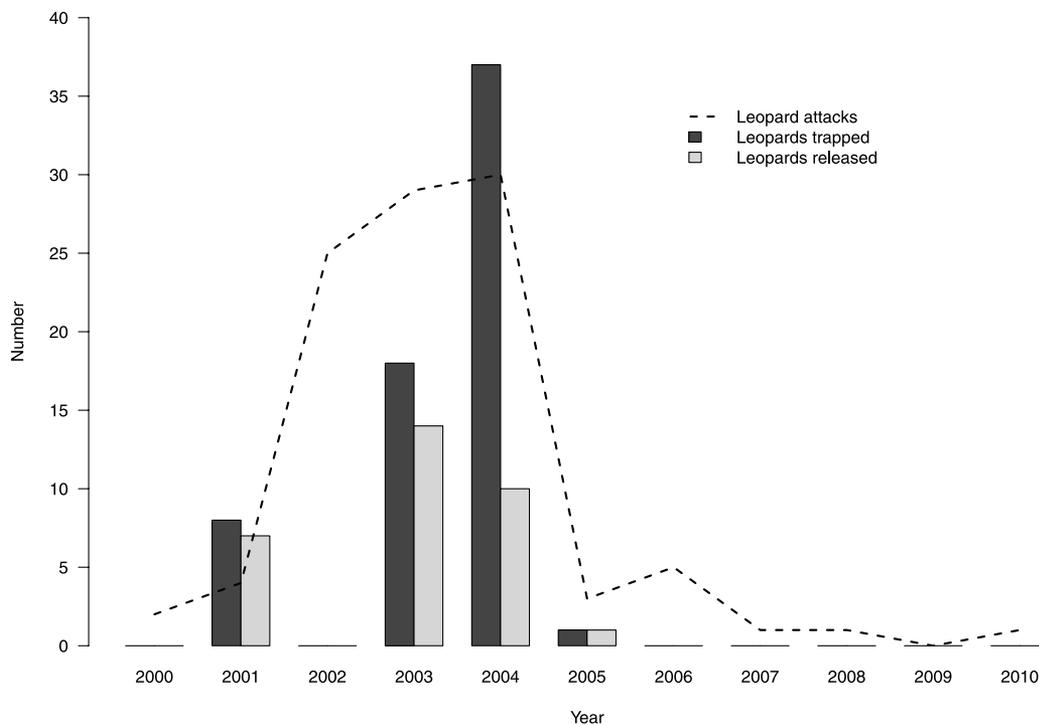


Figure 1. Reported leopard attacks ($n = 101$), trappings ($n = 56$), and relocations ($n = 25$) over the study period.

Our findings indicate media attention to the issue was highest when the highest number of leopard attacks on humans was recorded (i.e., 2004). Despite the media's reputed preference for negative and dramatic stories (Muter et al. 2009), however, we found a preponderance of neutral headlines and framings throughout the peak period of attacks. This neutral content increased after the decline of attacks in 2005. In the TOI the frequency of the leopard-as-perpetrator frame decreased significantly. This might have been caused by a decline in event-led episodic reporting, but could also have been a result of increased interactions between conservation scientists,

wildlife managers, and the media in Mumbai at the height of the 2004 peak in attacks. A TOI reporter we interviewed said, "Now media awareness has increased—we are more cautious about how to deal with the leopard issue. Before 2005 the leopard was presented as a villain but after 2005, if you read the articles, the media started to give the leopard a very different color. So there has been a lot of change. Media has grown up in Mumbai and they are becoming sensitive to the leopards."

Areas of high biological diversity often also contain high linguistic diversity (Gorenflo et al. 2012). Examining the content of media coverage of HWC in only one language when many are in common local use raises the possibility that different processes are occurring in different media outlets but are being missed, perhaps with important implications. For example, thematic coverage was more frequent in the English language TOI than in RD. The thematic articles in TOI appeared to suggest an emerging understanding of, and fundamental interest in, wildlife issues and the ecological processes relevant to them, perhaps because it has the financial resources to employ specialist reporters (as suggested by an interviewee).

The philosophies of reporters, editors, and owners may also substantially affect media coverage (Shoemaker & Reese 1996). One of our more informative findings was the difference in frequency between the TOI and RD in suggested solutions to HWC. One possible interpretation of the distribution of solutions across the newspapers is that solutions of the genre proposed predominantly

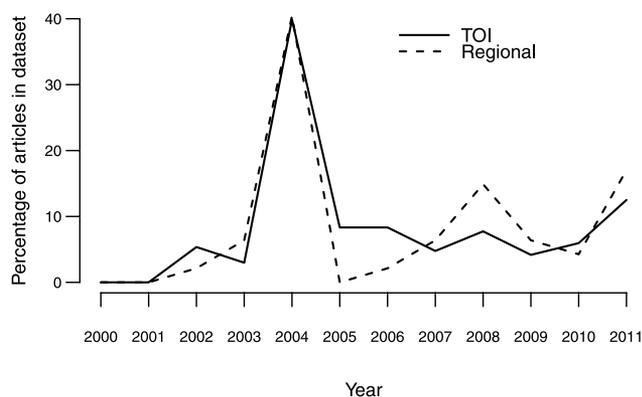


Figure 2. Articles published on leopards in regional dailies ($n = 47$) and Times of India (TOI) ($n = 140$) from 2000 to 2011.

by the TOI imply fault attributed to people (unusually high frequency of suggested removal of settlements in marginal park areas and unusually few suggestions of buffer zones), whereas solutions predominating the RD were more focused on preventing leopards from leaving the park (buffer zones, barriers, supplemental feeding). From our data, we could not determine the reason for solution frequencies differing significantly between English-language and regional newspapers. One possibility is that socioeconomic status, privilege, and personal preferences of readers and producers of news determine in part the attribution of fault to people or to leopards and are therefore reflected in the proposed solutions.

None of the suggested causes of or solutions to HWC in any of the newspapers was supported by evidence. The last ecological study on leopards in SGNP was carried out in 1998, before the spurt of attacks. One of the interviewees suggested that both indiscriminate translocation of "problem" leopards to areas beyond the park and the release of leopards from outside the region into the park occurred throughout the period (i.e., 2002–2004). Such actions have been demonstrated to perpetuate human-leopard conflict in Junnar, Maharashtra (Athreya et al. 2011). The attribution of HWC causes across both the TOI and RD were (in order of frequency) habitat loss, presence of dogs and garbage at the periphery of the park, loss of wild prey, lack of a boundary wall to the park, and other factors. Few (10%) media articles mentioned thorough research and monitoring as essential.

We found that media presentations of HWC differed between the TOI and RD groups, but in both cases despite a large number of attacks on people the framing and content of the coverage was usually more neutral than negative. Different media outlets, in this case defined by language but perhaps reflecting readership and editors with different perspectives and socioeconomic standing, have different levels of exploratory and thematic content and may attribute cause and suggest solutions differently. The level of evidence-based reporting for anything other than episodic, event-driven articles was very low in all cases.

Thus, we suggest that in seeking to influence public attitudes by interaction with the media, conservation professionals and managers should formulate communication strategies that are responsive to the societal and linguistic nature of the media outlets themselves. Furthermore, provision of information on ecological mechanisms and management actions may increase the likelihood that causes and solutions to HWC are accurately attributed and portrayed.

In India print media is still an important means of mass communication; the readership is arguably increasing as literacy is increasing. Newspapers are thus potential conduits for conservation education that can reach a very large audience. Entering the public arena necessitates cultural awareness, a clear understanding of the bound-

ary between evidence and advocacy, the importance of transparency and, for media and conservation professionals alike, respect for scientific evidence.

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