



OPEN ACCESS

EDITED AND REVIEWED BY

John A. Vucetich,
Michigan Technological University,
United States

*CORRESPONDENCE

Stotra Chakrabarti
✉ stotrachakrabarti@gmail.com;
✉ schakrab@macalester.edu

SPECIALTY SECTION

This article was submitted to
Conservation and Restoration Ecology,
a section of the journal
Frontiers in Ecology and Evolution

RECEIVED 26 February 2023

ACCEPTED 16 March 2023

PUBLISHED 14 April 2023

CITATION

Chakrabarti S, Wikenros C, Borg B, Jhala Y and
Bump J (2023) Editorial: New century wolf
conservation and conflict management.
Front. Ecol. Evol. 11:1174661.
doi: 10.3389/fevo.2023.1174661

COPYRIGHT

© 2023 Chakrabarti, Wikenros, Borg, Jhala and
Bump. This is an open-access article distributed
under the terms of the [Creative Commons
Attribution License \(CC BY\)](#). The use,
distribution or reproduction in other forums is
permitted, provided the original author(s) and
the copyright owner(s) are credited and that
the original publication in this journal is cited, in
accordance with accepted academic practice.
No use, distribution or reproduction is
permitted which does not comply with these
terms.

Editorial: New century wolf conservation and conflict management

Stotra Chakrabarti^{1*}, Camilla Wikenros², Bridget Borg³,
Yadvendradev Jhala⁴ and Joseph Bump⁵

¹Macalester College, Saint Paul, MN, United States, ²Swedish University of Agricultural Sciences, Riddarhyttan, Sweden, ³Denali National Park and Preserve, Denali Park, AK, United States, ⁴Wildlife Institute of India, Dehradun, Uttarakhand, India, ⁵University of Minnesota Twin Cities, St. Paul, MN, United States

KEYWORDS

***Canis lupus*, carnivore ecology and behavior, human-wildlife conflict, inclusive science, landscape-level conservation**

Editorial on the Research Topic

New century wolf conservation and conflict management

Introduction

Gray wolves (*Canis lupus*) are among the world's most charismatic, iconic yet feared carnivores (Lopez, 1978). Wolves evoke strong and often polarizing reactions of love and hate, and are involved in intense conservation conflicts (Mech, 2012). What are the keys to wolf conservation? Answering this question is deceptively challenging yet pressing because the legal status and management authority for wolves is shifting in many regions, which creates opportunities and challenges. How can ecology, social sciences, environmental history, and conservation ethics help meet this challenge? Additionally, there is an increasingly complex understanding of the ecological importance of wolves, which contributes to the valuation of wolves, and is a primary rationale for their continued restoration and conservation. How can this understanding contribute to more efficient and effective conflict management?

In this editorial, we revisit information published as contributions to this Special Issue by 86 authors across 18 peer-reviewed articles. We invited submissions to create an article collection focused on 21st century wolf conservation and conflict management. Our goal was to create a forum for relevant discussion around this theme and gather novel open-access studies, enabling readers to be informed about research that makes a difference in sustaining wolf populations and managing wolf-human conflict. Wolves inhabit diverse ecoregions across socio-cultural landscapes that supplied this topic with a unique opportunity to consolidate studies that can provide comparative insights into human-carnivore relationships worldwide. As a consequence, we were especially interested in submissions from authors who represent a diverse and global contribution.

This editorial is a prelude to the Special Issue, organized across geographical scales: Asia, Europe and North America, to provide an overview of the major challenges and resolutions for wolf conservation across the globe. We conclude by discussing geographical and systemic biases to wolf research and the peer-review process that can have serious implications for information dissemination and consequent management of wolves.

Perspectives from Asia

Four articles represented perspectives from Asia, three from the Indian subcontinent and one from Russia.

Poyarkov et al. provided a much-needed overview of wolf research in Russia, covering multiple aspects ranging from population status, predation ecology, behavior to physiology.

India is home to ancient wolf lineages, the Indian and Himalayan wolves, which represent important evolutionary significant units (Sharma et al., 2004; Hennelly et al., 2021). Both these lineages inhabit critical and vulnerable habitats. Jhala et al. show that the Indian wolf typically inhabits open forests, arid and semi-arid grass and scrublands, and agro-pastoral landscapes. Many of these habitats are traditionally considered “wastelands” and thus, Jhala et al. documents loss of prime wolf habitat in the Western and North Western parts of India owing to severe habitat transformation. This is coupled with wolf hybridization with feral dogs and population disjunction from linear infrastructure such as roads. However, Jhala et al. found wolf distribution in areas where they had been previously exterminated or were not found—a source of conservation optimism for the species in India. The species distribution models in Jhala et al. should be used as the “first-cut” for assessing Indian wolf distribution with a need for finer, more intense data for policy decisions at local scales.

Apart from habitat transformation, the major threat to wolves in India is their reliance on domestic livestock as a major food source, as shown by all the 3 contributions from the Indian subcontinent. Mahajan et al. records livestock depredation probability of Indian wolf to be very high. They found that shepherds wield negative and hostile feelings towards wolves owing to such losses, and ensuing retaliatory killings severely threaten the wolves. Mahajan et al. suggests that appropriate and prompt monetary compensation for livestock-depredation as well as raising awareness about wolves through education and sensitization can alleviate such conservation concerns.

Sonam et al. address retaliatory killing of wolves with some hope, especially in trans-Himalayas wherein they discuss a community level conservation initiative. In this specific region, pastoralists traditionally use hunting pits (*shandongs*) to bait, capture, and kill wolves that prey on their livestock. Through an extensive survey, Sonam et al. identified multiple such pits and by working with the community as well as religious leaders of the area, have been successful in neutralizing some of the pits. Furthermore, this project has been successful in consecrating the pits by building Buddhist *stupas* near them, thereby providing some levels of socio-cultural insurance against wolf-killing practices. However, Sonam et al. warns that the neutralization of *shandongs* alone could be counterproductive by facilitating more livestock predation by wolves. The authors propose a combination of neutralizing efforts with other strategies that mitigate negative human-wolf interactions and promote coexistence. The future of wolves in Asia thus hangs in a delicate balance wherein their proximity to humans is a boon (food source) and a bane (habitat alteration, direct persecution, and hybridization with human commensals such as feral dogs).

Perspectives from Europe

Seven articles in this collection were from European studies, consolidating topical diversity and breadth of foci. Studies ranged from understanding depredation patterns in areas with recolonizing wolves to responses of humans towards wolves and vice-versa, and dialogues related to wolf-conflict management.

Wolves are re-colonizing many agricultural and livestock dominated areas in Europe, leading to potential and realized conservation conflicts arising from depredation, as well as multiple management disparities. Ordiz et al. reviewed current management policies, implications and fallacies encompassing wolf conservation in Spain, and provided a roadmap for effective conservation. Mayer et al. showed that depredation of sheep in Denmark mainly occurred by dispersing wolves in areas with low availability of ungulate prey and high densities of sheep. Khorozyan and Heurich showed that sheep density was an important factor explaining losses to wolves in Germany, and that the number of adult wolves did not affect sheep losses while the expansion of the wolf population did. Both these studies suggested that lethal management will not be an efficient method to decrease depredation events and suggest non-lethal interventions.

Flykt et al. expanded upon the concept of the “landscape of fear” to describe how wolf presence in livestock areas can elicit stress responses from livestock owners themselves, creating a “landscape of stress”. The paper lays out a framework based on physiological research to provide a detailed description of the domains of stress response reported by sheep breeders in Sweden.

The recolonization of wolves in Denmark during the last decade after 200 years of absence has caused conflicts over wolf management. Hansen et al. conducted a social experiment with citizens living in or nearby the first wolf territory established in 2012. The focus of the project was to promote dialogue and joint fact-finding to create constructive communication about wolf management using a few rules regarding the form of the communication that the participants agreed upon. This dialogue method can be used as a tool when managing other wildlife conservation conflicts.

People who share space with carnivores often experience fear of encountering them, while carnivores can often be shy about human presence. Eriksen et al. developed a standardized protocol for evaluating the response of GPS-collared wolves to close encounters with humans, allowing the study of wolf responses to humans in relation to different wolf, anthropogenic, and environmental factors. Increased knowledge of wolf behavior when meeting people can help to demystify the relationship between wolves and humans in shared landscapes. This protocol was tested in a pilot study in four wolf territories in Scandinavia (Versluijs et al.), with results showing that wolves invariably avoided humans. The majority of the wolves fled when approached by humans and no wolves were observed or heard during the trials. Further approach trials within and between different wolf populations are needed to draw general conclusions of wolf behavior towards approaching humans and may improve coexistence between wolves and humans.

Perspectives from North America

Seven articles in this collection were from North American studies, with four focused on wolf ecology, two related to human attitudes towards wolves and a perspective article describing a Native American relationship with wolves.

Protected areas such as National Parks in North America provide insight into wolf ecology in areas with relatively low human impacts. In their analysis of long-term data from Isle Royale National Park, [Hoy et al.](#) presents results that suggest wolf predation likely acts as a selective force against genes associated with developing severe osteoarthritis in prime-aged moose. These findings support the benefits of allowing wolves to help regulate large ungulate populations and that intensively hunting wolf populations could affect this force of predation. [Borg and Schirokauer](#) analyzed long-term data from Denali National Park in Alaska, demonstrating that wolf populations can have increases in natality concurrent with population declines. When conditions favored an increase in ungulate population, the wolf population failed to respond numerically through social limitations imposed by territoriality. This highlights the importance of pack dynamics in regulating wolf population growth.

Other studies in North America focused on human impacts on wolves. [Chakrabarti et al.](#) examined long-term known fate from radio-tagged wolves in Minnesota, USA to determine temporal trends and age- and sex-specific survival rates. While survival rates have gone down over the years, they did not observe evidence that survival was markedly reduced during years when a regulated hunting and trapping season was implemented. Still, human causes resulted in ~66% of known mortalities. In southeast Alaska, USA, human hunting was a key regulator of both wolf abundance and deer abundance, as shown by [Gilbert S. et al.](#) Importantly, it is likely that wolf predation in this region has provided an ecosystem service to the timber industry *via* reduced tree browsing by deer.

Human attitudes and perceptions have been and will continue to be critical to the health and persistence of wolf populations in North America. [Schroeder et al.](#) examined how specific identities (wolf advocate, hunter, environmentalist, nature enthusiast, farmer, trapper, and conservationist) related to political ideology, trust in a wildlife management agency, wildlife value orientations and attitudes about wolves. Hunters associated with a domination value orientation and conservative political ideology; a farmer identity was most strongly associated with wildlife management agency distrust and negative wolf attitudes; wolf advocates were most strongly associated with a mutualism orientation, agency trust, and positive wolf attitudes. They also found that a conservationist identity was positively correlated with all other identities, which indicates to management authorities that a conservationist, rather than an environmentalist, or hunter perspective may be supported by a broader constituency and increased trust in agency actions. [Slagle et al.](#) assessed wolf tolerance among the general public throughout the USA. Wolves are not an issue important enough to compel action to the majority of respondents, i.e., 55% did not intend to engage in either supportive or oppositional actions. This is a significant challenge to continental-scale carnivore conservation.

In contrast to the studies in this collection on multiple identities and perceptions of wolves at national levels, [Gilbert J. et al.](#) describe the identity and perception of wolves held by indigenous Ojibwe communities. In their perspectives article they review the relationship between Ojibwe people with *Ma'iingan* (wolf); this relationship maintains that *Ma'iingan* and the Ojibwe people are to be considered relatives, with intertwined fates. The authors use a case study of a recent wolf hunt in Wisconsin, USA to illustrate how the *Ma'iingan* and Ojibwe people have lived parallel histories that include the effects of colonization, population decline, and cultural losses. Such perspectives have historically been ignored or devalued by contemporary, western wolf management.

Conclusion

Wolves will continue to capture human hearts and minds through the next century and, as a consequence, wolf conservation will continue to challenge us. Without national, continental, or wide scale collective policies, wolf management is expected to be highly heterogeneous. For example, while we completed this Special Issue, wolves in the United States simultaneously received greater protection in the northern Great Lakes region and less protections in the northern Rocky Mountains region. Highly variable wolf policies across the globe warrants comprehensive wolf science and knowledge, to encompass a broad range of locations, subject areas, perspectives, and authors. With that in mind, we especially solicited article submissions from a diverse spectrum of researchers and managers that would hopefully represent a global contribution. While this Special Issue involved a diverse array of authors and Research Topics, it is dominated nearly two-to-one by contributions from European or North American studies compared to elsewhere. Such skewed contributions partially reflect unequal access to resources that support wolf/carnivore science and publication. Case in point, the first article submitted was a study on wolves from eastern Russia. That article was withdrawn due to lack of publication funds. While our best efforts to convince publishers to waive processing charges for that article failed, we were successful in waiving the publication charges for the contribution by [Sonam et al.](#), yet another perspective from the Global South where support for disseminating wolf science is not easily available. If we hope to collectively meet the challenge of wolf conservation for the next century, then we also have to look beyond the borders of typical wolf research and support wolf science in the broadest sense. Support for research and publication costs, especially to early career researchers, collaboration with and promotion of researchers beyond the dominating Euro-American perspective, and shifting wolf research foci beyond protected areas are important steps if we are to effectively and inclusively understand and manage wolves in the next century.

Author contributions

SC and JB conceptualized the editorial. SC led the writing. All authors edited drafts, contributed to the writing of various sections, and approved the submission.

Acknowledgments

We thank all contributors for submitting their research that has made this special issue diverse and broad. We also acknowledge all peer reviewers who have reviewed, commented, and edited the articles - their contributions were crucial in promoting the rigor and diversity of this special issue.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships

that could be construed as a potential conflict of interest.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

References

- Hennelly, L. M., Habib, B., Modi, S., Ruess, E. K., Gaubert, P., and Sacks, B. N. (2021). Ancient divergence of Indian and Tibetan wolves revealed by recombination-aware phylogenomics. *Mol. Ecol.* 30, 6687–6700. doi: 10.1111/mec.16127
- Lopez, B. (1978). *Of Wolves and Men*. Simon and Schuster.
- Mech, L. D. (2012). Is science in danger of sanctifying the wolf? *Biol. Conserv.* 150, 143–149. doi: 10.1016/j.biocon.2012.03.003
- Sharma, D. K., Maldonado, J. E., Jhala, Y. V., and Fleischer, R. C. (2004). Ancient wolf lineages in India. *Proc. Biol. Sci.* 271 Suppl 3 (Suppl 3), S1–4. doi: 10.1098/rsbl.2003.0071