



Addressing inequality and intolerance in human–wildlife coexistence

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Abstract: Millennia of human conflict with wildlife have built a culture of intolerance toward wildlife among some stakeholders. We explored 2 key obstacles to improved human–wildlife coexistence: coexistence inequality (how the costs and benefits of coexisting with wildlife are unequally shared) and intolerance. The costs of coexisting with wildlife are often disproportionately borne by the so-called global south and rural communities, and the benefits often flow to the global north and urban dwellers. Attitudes and behaviors toward wildlife (tolerance versus intolerance) vary with social and cultural norms. We suggest more empathetic advocacy is needed that, for example, promotes conservation while appropriately considering those who bear the costs of conflict with wildlife. To achieve more equitable cost-sharing, we suggest limiting the costs incurred by those most affected or by sharing those costs more widely. For example, we advocate for the development of improved wildlife compensation schemes, increasing the scale of rewilding efforts, and preventing wildlife-derived revenue leaching out of the local communities bearing the costs of coexistence.

Keywords: compensation, human–wildlife conflict, inequity, rewilding, tolerance

Soluciones para la Desigualdad y la Intolerancia en la Coexistencia Humano – Fauna

Resumen: Los milenios de conflicto entre los humanos y la fauna han construido una cultura de intolerancia hacia la fauna entre algunos actores. Exploramos dos obstáculos importantes para la mejora de la coexistencia humano – fauna: la desigualdad de coexistencia (cómo los costos y los beneficios de la coexistencia con la fauna están compartidos de una manera desigual) y la intolerancia. Los costos de coexistir con la fauna generalmente están asumidos de manera desproporcional por las llamadas comunidades del sur global o rurales, y los beneficios de convivir con la fauna generalmente fluyen hacia el norte mundial y hacia los habitantes de zonas urbanas. Las actitudes y comportamientos hacia la fauna (tolerancia versus intolerancia) varían con las normas culturales y sociales. Sugerimos la necesidad de una defensa más empática que, por ejemplo, promueva la conservación a la vez que considera de manera apropiada a aquellos que asumen los costos del conflicto con la fauna. Para lograr costos compartidos más equitativos sugerimos limitar los costos incurridos por aquellos más afectados o compartir los costos de manera más amplia. Por ejemplo, abogamos por el desarrollo de esquemas mejorados de compensación de fauna, el incremento de la escala de los esfuerzos por el retorno a la vida silvestre y la prevención del secuestro de ingresos derivados de la fauna fuera de las comunidades locales que asumen los costos de la coexistencia.

Palabras Clave: compensación, conflicto humano – fauna, desigualdad, retorno a la vida silvestre, tolerancia

Article impact statement: Reduce coexistence inequality and intolerance by prioritising local economies, smarter compensation schemes, rewilding and empathetic advocacy.

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Introduction

Human–wildlife conflict (HWC) is generally considered “an action by either humans or wildlife that has an adverse effect on the other” (Conover 2002:8), but it extends to how people perceive risks associated with wildlife. Human–wildlife conflict has existed for millennia (e.g., Deutsch et al. 2018), contributed to numerous extinctions and population declines (Woodroffe et al. 2005; Ripple et al. 2014), and continues to cause human suffering and economic harm (Kruuk 2002).

Solutions that reduce HWC and promote coexistence must be implemented on local and global scales (Dickman 2010; Kansky et al. 2014). Two key barriers to conflict resolution include inequality (e.g., Kgathi et al. 2012) and intolerance (Bruskotter et al. 2015; Frank 2016). These have been considered individually, but we suggest their causes and consequences are interlinked such that they should be considered together.

Inequality

The costs and benefits of coexisting with wildlife are unevenly distributed (Barua et al. 2013; Kansky et al. 2014), and inequality persists at several societal scales. We call such disparities *coexistence inequalities*.

Nations that have not exterminated their wildlife, disproportionately carry the burden of coexistence, so that coexistence costs in developing nations are often greater than those in developed nations. For example, lions (*Panthera leo*) killed over 1000 people in Tanzania from 1990 to 2010 (Kushnir et al. 2010), compared with 7 people killed in Europe by (nonrabid) large carnivores throughout the 20th century (Kruuk 2002). Yet, richer countries and countries where large predators have been extirpated encourage other nations to conserve theirs (e.g., Mordaunt 2018), simultaneously advocating for coexistence abroad while dismissing it within their borders. For example, Norway is noted for its conservation spending (Lindsey et al. 2017), but practices little tolerance of large carnivores at home (e.g., they cull wolves) (Wijnen 2018). Similarly, the UK funds tiger (*Panthera tigris*) conservation abroad (Mordaunt 2018), but has yet to reintroduce lynx (*Lynx lynx*) due to resistance from farmers (Tasker 2018).

International inequalities extend to the impact of wildlife on agricultural livelihoods. Livestock losses to predators in rich countries rarely exceed 2.6% annually (Graham et al. 2005), whereas losses in low-income countries may exceed two-thirds of annual income (Wang & Macdonald 2006; Holmern et al. 2007). In wealthy nations, strong political representation and access to financial support means losses may be better compensated

than in relatively poor countries. French farmers receive full compensation for losses to bears, wolves, and lynxes, whereas farmers in Botswana are not compensated for losses to spotted hyenas (*Crocuta crocuta*).

Sometimes agricultural outputs are improved through coexistence. For example, predation on wild herbivores reduces crop losses (Thinley et al. 2018) and grazing competition (Prowse et al. 2015). In Botswana, cattle gain more weight in the wet season while grazing alongside wild ungulates, which graze on long grasses, increasing access to the short grass preferred by cattle (Odadi et al. 2011). Australian cattle producers coexisting with dingoes (*Canis dingo*) benefit financially from dingo predation on kangaroos, which reduces competition and increases gross margins (e.g., Prowse et al. 2015). Coexistence can also improve nutrition (e.g., increased meat intake from scavenged lion and leopard kills [Treves & Naughton-Treves 1999]) and mental health and well-being in some contexts (e.g., some people derive pleasure from encountering a wild animal [Curtin 2009]).

Nevertheless, often only a small proportion of coexistence benefits may reach those living alongside wildlife. In China, for example, giant panda (*Ailuropoda melanoleuca*) tourism rarely enriches those coexisting with pandas (He et al. 2008). In parts of Africa the consumptive and nonconsumptive safari industries support guides, agents, and other industries, but little of the money spent on these ancillaries enriches those communities coexisting with wildlife (Mbaiwa 2004), despite the perception that local benefits are substantial (WTO 2014). Local economies do not benefit from such activities (Mbaiwa 2004; Nasco 2017) primarily because goods and services are imported and profits are generated by nonlocals (Taylor et al. 2003).

Considerable funding for contemporary conservation comes from the Organization for Economic Cooperation and Development (OECD) member countries (Waldron et al. 2013; Lindsey et al. 2017), and the international community invests billions to halt biodiversity decline in developing nations (Ferraro & Kiss 2002). Thus, OECD member states and conservation organizations greatly influence where and how conservation funds are spent. It seems hypocritical for wealthy nations that fail to practice coexistence (Kojola et al. 2018; Tasker 2018) to impose coexistence on others.

Coexistence inequalities also occur within countries, and geographical divides can exist between legislators and citizens. Many rural communities bear significant coexistence costs—including opportunity costs (e.g., Barua et al. 2013)—as a result of urban-derived legislation (e.g., Hiedanpää 2013).

Rural residents and industries are most exposed to the costs of coexisting with wildlife. With fewer direct negative experiences, urban residents’ attitudes toward

species, such as wolves, are generally more positive (Williams et al. 2002; Mech 2017). However, attitudes toward wolves may also link to social factors (Dressel et al. 2015) as much as to actual threats (Dietsch et al. 2016).

Depending on revenue-sharing mechanisms, considerable inequalities can develop across community boundaries. For example, in rural southern Africa, community-based natural resource management (CBNRM) schemes offset the costs of coexisting with wildlife (Jones 1999), generally with revenue from hunting and tourism. Neighboring communities may, however, be divided by such initiatives according to geography or bureaucratic factors, so that one community may benefit from CBNRM revenue, whereas a neighboring community will not. This can establish coexistence inequality, where the community benefitting least from wildlife bears the greatest cost of coexistence (Blaikie 2006; Kgathi et al. 2012).

Coexisting with wildlife can also harm or benefit people within a community, depending on their occupation. A wildlife tour operator may benefit directly from the presence of wildlife, whereas a farming neighbor may bear significant costs. Such inequalities can put certain industries at odds with farmers (e.g., the White-tailed Eagle [*Haliaeetus albicilla*] reintroduction in Ireland [O'Rourke 2014]).

Even when communities benefit from coexistence, gains are often unevenly distributed. For example, relatively well-off participants in a CBNRM scheme in Zambia sometimes benefit more than participating poorer households (Tembo et al. 2009).

In general, many economic benefits of coexisting with wildlife circumvent the local economy (Bookbinder et al. 1998), and such exclusion from coexistence benefits is a key imbalance in the coexistence cost-benefit equation.

Intolerance

Intolerance for wildlife can manifest in attitudes and behaviors. Intolerance is sometimes confused by a lack of conceptual clarity and inconsistencies in how it is measured (Bruskotter et al. 2015). The meaning of *wildlife stakeholder acceptance capacity* (WSAC) is similarly fuzzy (Gigliotti et al. 2000), but WSAC (i.e., how many animals people are willing to coexist with before acting against them) and tolerance for wildlife (i.e., perceptions of value or threat of different species) are essentially the same (Bruskotter & Fulton 2012). We use the term *intolerance* to include prejudicial attitudes and discriminatory behaviors that negatively relate to and impact wild animals.

Intolerance may be influenced by local culture (Piédallu et al. 2016) or moderated by awareness of the potential financial advantages of coexisting with wildlife

(Loveridge et al. 2006; Lindsey et al. 2013; but see McNutt et al. 2018). Some landholders are intolerant of wildlife (Sindiyo 1968; Knight 2001), and global large carnivore declines continue (Ripple et al. 2014), often through direct persecution (Woodroffe 2000).

Compensation schemes can improve tolerance (Carter & Linnell 2016), but mistakenly assume the cost and extent of damages are proportional to the level of conflict. In fact, the overall impact of wild predators on livestock is typically much lower than other causes of mortality (e.g., disease [Dickman et al. 2014]), and antipathy toward predators may persist independent of costs and long after predator extirpation (Treves & Bruskotter 2014; Behr et al. 2017). Attitudes are further complicated by division between urban liberalism and rural conservatism (Dahlström 2009). Such attitudes stem from a complex interaction of wider societal expectations and cultural norms (Dickman 2010).

Lethal control of carnivores is commonly used in agricultural landscapes. Although its efficacy is debated (Bulte & Rondeau 2005; Wielgus & Peebles 2014; Santiago-Avila et al. 2018), it remains popular and has undoubtedly contributed to carnivore population declines (Ripple et al. 2014). Persecution by farmers and game-bird hunters may be the principal factor limiting the recovery of some predators (Liberg et al. 2012; Melling et al. 2018). Official predator culls hinder recovery of carnivores, such as the Iberian wolf (*Canis lupus signatus*) (Quevedo et al. 2018), and may encourage unauthorized killing (Chapron & Treves 2016).

The most observant Buddhist herders in northern India (Bhatia et al. 2017), smallholders in Sumatra (Struebig et al. 2018), and Japanese fishers (Gough 2015) are exceptionally tolerant of wildlife. However, species tolerated in one place may be persecuted elsewhere, sometimes because conflict is localized (e.g., White-tailed Eagles cause few problems in Norway [Halley 1998] but may threaten lambs in Scotland [Marquiss et al. 2003]).

Different individuals and societies exhibit different attitudes (Anderson 2017) that are influenced by a mix of spiritual beliefs, cultural norms, economic factors, and a complex socioecological interplay between risk and tolerance (Struebig et al. 2018). In Europe and North America, wolves were intensely persecuted, chiefly because of their potential threat to livestock, but in India's Koppal district, farmers apportion their flocks, "One-third of our flock is for god (losses through disease), one-third is for us, and one-third is for wolves" (Rao 2018).

With entrenched cultural prejudice, compensation may not increase tolerance (Marino et al. 2016) or may incentivize poor husbandry (Nyhus et al. 2003; Dickman et al. 2011). Similarly, state-sanctioned culls may neither encourage goodwill toward targeted species (Chapron & Treves 2016) nor discourage further killing (Treves & Bruskotter 2014). Intangible factors may be more important than monetary costs in shaping attitudes

(Marker et al. 2003; Kansky & Knight 2014), and antipredator sentiment may reflect a dislike of anything resembling a carnivore (Kurberg 2005). Furthermore perceived problems with one group of predators may generate perceived problems with others (Dickman et al. 2014).

Addressing Inequality

The imbalance in the costs of coexistence could be reduced by limiting the costs incurred by those most affected or by sharing those costs more widely. Although everyone benefits from biodiversity and ecosystem services, many pay less than their fair share of the costs (Lindsey et al. 2017). To ensure that communities coexisting with wildlife benefit clearly and directly, we suggest the following.

Prioritizing Local Economies

A persistent challenge to redressing coexistence inequality is ensuring money generated from wildlife benefits local communities, particularly where coexistence is costly. For example, wildlife tourism often relies on coexistence with wildlife by nearby communities, but foreign domination of tourism sometimes leads to minimal local tourism revenue being generated and no improvements in livelihoods for locals (Mbaiwa 2005). More revenue needs to be retained near and be closely tied to its source (Western et al. 2015).

Smarter Compensation Schemes

Direct payments for economic losses caused by wildlife generally come from a fixed funding source and lack a sound evidential basis (van Eeden et al. 2018). They can reduce retaliatory killings of predators (Hazzah et al. 2014; Bauer et al. 2017), but can also generate competition over access to funds. When payouts approach market value, moral hazard can occur, such that there is benefit in relaxing husbandry practices (Nyhus et al. 2005; Dickman et al. 2011). To combat moral hazard, some schemes have reduced payouts to a proportion of market value, but this can lead to resentment, antipathy, and wildlife persecution rather than mitigating it (Hoare 2000). Use of lethal control may even increase following rejections of compensation claims (McNutt et al. 2018).

Insurance schemes attempt to avoid some of the failings of direct compensation (Morrison et al. 2009). An alternative approach may be to promote local management of compensation funds, retaining unclaimed funds for distribution within the community. Individuals may hesitate to make repeated claims from their own community, especially if achievable husbandry changes could prevent losses (LeFlore et al. 2019). Farmers with losses from

wildlife may find it easier to catalyze community support in mitigating HWC if it helps conserve community funds. Such schemes would need independent monitoring to ensure good governance and that conservation goals are achieved. Financial incentives for proactive coexistence rather than reactive compensation may also work better if the former results in greater returns (Muhly & Musiani 2009).

Harnessing Local Culture

Coexistence is more likely when local culture, values, and economies are factored into conservation strategies (Wolsko et al. 2016). Cultural values that laud predator killing may be adaptive and are typically stable across generations, so efforts to shift values fail (Manfredo et al. 2017). Thus, traditional values that can be redirected toward generating conservation outcomes need to be identified and harnessed. For example, the Lion Guardian program in Kenya employs young Maasai to protect lions at risk of conflict with cattle (Hazzah et al. 2014). Traditionally, young men hunted lions as a rite of passage; a source of great importance in building social standing within their community. The guardian program leverages this tradition by employing similar skills (lion tracking) but shifting the mechanism and outcome to achieve positive outcomes for people and wildlife.

Rewilding

Restoring species and processes lost due to anthropogenic impacts (Sandom et al. 2013) provides an opportunity to redress coexistence inequalities in circumstances where countries or communities demand tolerance from others without practicing it themselves. Arguably, too few current schemes include megafaunal components, such as apex predators (but see Hayward & Somers 2009), focusing instead on more politically palatable species such as the Eurasian beaver (*Castor fiber*) (Gaywood 2018). In Australia, rewilding has focused on small rodents and marsupials inside predator-proof exclosures (Mills et al. 2018), removing the need for coexistence. As such, the current nature of most contemporary rewilding schemes risks exacerbating perceptions of inequality rather than reducing them.

Although rural landowners may strongly resist rewilding with apex predators (Lorimer et al. 2015), the public may support it where predators replace or reduce human-imposed pest control (Crowley et al. 2018; van Eeden et al. 2019). The pursuit of more ambitious rewilding policies in rich countries could begin to redress contemporary coexistence inequalities (Lindsey et al. 2017) and simultaneously strengthen the moral position of high-income countries or communities calling on others to protect their wildlife. Widespread uptake and success of rewilding will likely require clear political will and strong

advocacy (Jepson 2016), particularly where there are no current coexistence costs.

Addressing Intolerance

If some richer nations are unwilling to coexist with relatively benign wildlife, it is hypocritical for them to expect low-income countries to demonstrate the greater tolerance many currently exhibit (Lindsey et al. 2017; Kojola et al. 2018), especially where suitable habitat exists but predators are still not tolerated (Wilson 2004). Such intolerance may be addressed by the following.

Empathetic Advocacy

Overcoming enculturated antipredator sentiment may require conservationists to employ empathetic advocacy (i.e., working for wildlife while demonstrating empathy for those bearing the costs of HWC). This should be combined with sympathetic education (where, for example, misconceptions about risk exist) and applying methods that mitigate the real costs of predators and providing robust financial support for those adversely affected.

It is particularly important for conservationists to exercise caution in how they advocate for wildlife because cognitive dissonance theory suggests people forced to defend a position often become further entrenched in their original view (Festinger & Carlsmith 1959). Lecturing about the ecological benefits of apex predators and the minimal risks to livestock is therefore more likely to alienate farmers than convincing them.

Understanding Intolerance Drivers

It is important to understand why stakeholders feel the way they do to ensure their autonomy is respected and viewpoints heard (Voss & Raz 2017). Thus, conservationists should be cognizant of decision theory that holds the pain of loss is stronger than the joy of gain (Kahneman & Tversky 1979), partially explaining the reticence of farmers to embrace potential future benefits of coexisting with carnivores. This reluctance is further strengthened by a natural inclination to overvalue what one has now compared with future abstract gains (Thaler & Benartzi 2004). When predators kill more than they can immediately consume, it can be particularly devastating for pastoralists with few animals (Lybbert et al. 2004). The potential risk of irreparable losses, though small, can be sufficient to drive the perception that carnivores are a major problem, even where other factors, such as disease or theft, normally constitute greater threats (Dickman et al. 2014).

Some mitigation strategies may even inadvertently decrease tolerance by focusing excessively on hazards (Bruskotter & Wilson 2014), highlighting the need to

consider positive outcomes and combat scaremongering (e.g., Tasker 2018). Proper consultations with local communities that include veto of proposed interventions may foster greater conservation collaboration. While consensus across entire communities is usually impossible, conservationists should strive to balance wildlife conservation with protecting the interests of all stakeholders. Conservationists will however need to come to terms with communities not prioritizing conservation, and conservation goals not always being supported as a result.

Reintroductions can promote tolerance over time if people see their worst fears are not being realized (O'Sullivan 2017). However, exposure to predators can dampen as well as foster enthusiasm because sympathies may be tempered quickly by the challenges of coexisting with predators (Eriksson et al. 2015). This highlights the need for ongoing community support and pre-emptive conflict mitigation.

Promoting and Fostering Change

Conservation success depends on efforts to understand and influence human behavior (Reddy et al. 2016). Interventions are likely to be more effective when underpinned by evidence and a theory of change (Biggs et al. 2017), but too few interventions meet these criteria (Baynham-Herd et al. 2018). Achieving coexistence often involves managing conflicting human interests, values, and actions (Madden 2004; Redpath et al. 2013) including conflicts among governments, private industry, and community stakeholders. Research provides insight into the conditions for creating effective collaborations (Yuliani et al. 2015) and proenvironmental behavior (Byerly et al. 2018). Conceptual frameworks outlining the socioecological factors influencing HWC that apply psychological and social theory to identify drivers of behavioral change provide support for such approaches (Baruch-Mordo et al. 2009; Lischka et al. 2018).

Conclusions

Innovative thinking is needed to discover and implement practical solutions across diverse social, economic, and ecological contexts. Reducing coexistence inequalities requires those benefiting from, but least affected by, coexistence to shoulder a greater share of the costs by contributing financially to coexistence costs where they are felt most, by supporting significant rewilding efforts at home, or preferably by doing both.

We advocate for the localized management of coexistence compensation funds. Ideally, compensation funds would be generated locally from wildlife and unused funds retained locally. This would allow a clearer connection to be made between the costs and benefits of

coexistence and avoid moral hazards that sometimes undermine such schemes. Tackling intolerance requires diagnosing the social, economic, and environmental issues driving negative attitudes and behaviors to assist policy makers, practitioners, and scientists in developing and testing interventions. The success, or failure, in resolving HWC in agricultural landscapes likely represents a litmus test of the ability to reconcile even broader examples of inequality and intolerance.

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