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"They Belong Here": Understanding the Conditions of Human-wolf Coexistence in North-Western Spain

Hanna L. Pettersson[a,#], Claire H. Quinn[a], George Holmes[a], and Steven M. Sait[b]

[a]Sustainability Research Institute, School of Earth and Environment, Faculty of Environment, University of Leeds, Leeds, UK

[b]School of Biology, Faculty of Biological Sciences, University of Leeds, Leeds, UK

[#]**Corresponding author. E-mail**: eehlp@leeds.ac.uk

Abstract

Reintegrating wolves in human-dominated landscapes constitutes a significant conservation challenge. After decades of studying human-wolf interactions through a conflict lens, there is growing recognition that more nuanced perspectives are needed. However, this recognition has hitherto yielded few practical changes, and few have studied what underpins successful coexistence. Here we show that disproportionate focus on and resource allocation to conflict within conservation programmes risks undermining existing convivial relationships with large carnivores. Using a coexistence lens, we studied human-wolf interactions in Sanabria-La Carballeda in Spain; the region has one of the highest densities of wolves in Europe. We explored the underlying social and ecological conditions that have permitted both wolves and people to persist in the area, studied the mutual impacts, and surveyed how interactions are influenced by broader socio-economic processes. The findings of this novel approach to studying human-wildlife interactions elucidates how areas of functional coexistence have been neglected in policy, leaving them vulnerable to depopulation, low agricultural profitability, and the loss of biocultural diversity. When institutions fail to support functional coexistence, we risk losing the knowledge, the traditions and the trust of those who have sustained Europe's large carnivores, thereby undermining transitions to more convivial human-wildlife interactions in the future.

Keywords: human-carnivore interactions, wolves, convivial conservation, biocultural diversity, pastoral management, human-dominated landscapes

INTRODUCTION

In Europe, the ongoing trend of rural abandonment (Cimatti et al. 2021), shifting wildlife value orientations (Bruskotter et al. 2017) and increasingly supportive conservation legislation (Cretois et al. 2019), have enabled large carnivore populations to increase in number and recover historic ranges (Chapron et al. 2014). Since protected areas are too few and too small to make up viable habitats (Boitani and Linnell 2015), and because culling is limited by the European Habitat Directive, there are few practical and legal means of preventing large carnivores from expanding into agricultural landscapes. This generates questions about how humans and carnivores could share these spaces. An increasing number of stakeholders endorse a coexistence model for European carnivore conservation (López-Bao et al. 2017; Cretois et al. 2019), in which carnivores are integrated within humanised landscapes and protected throughout their range. This model constitutes significant challenges to protecting carnivores, mitigating negative impacts on local communities, and addressing disagreements about their management (Mech 2017).

Human perceptions and behaviour often determine carnivore abundance in shared landscapes (Llaneza et al. 2011; Mech 2017). For the coexistence model to work, communities need to be able to adapt to (returning) carnivores and be resilient to the

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higher degree of unpredictability that is inherent in integrated conservation spaces (Carter and Linnell 2016). It requires human tolerance of co-habitation on a scale that has not existed in recent memory (Boitani and Linnell 2015). However, the state of knowledge of such positive or neutral relationships is insufficient (Lozano et al. 2019; Pooley et al. 2020). While decades of research through a conflict-lens has yielded substantial knowledge of factors that lead to dysfunctional relationships with wildlife (Redpath et al. 2013; Adams 2015), little is known about what fosters and perpetuates resilient coexistence (Carter and Linnell 2016). Current interventions are still largely focussed on addressing intolerant behaviours of a particular social group, often failing to consider simultaneous relationships or issues (Pooley et al. 2017). This may cause biased representations of human-carnivore interactions, since functional dynamics often exist alongside dysfunctional ones, on both local and national scales (Peterson et al. 2010; Fernández-Gil et al. 2016). In order to advance the debate, we need in-depth studies of the prerequisites of coexistence, and the opportunities and challenges encountered by human and non-human inhabitants in shared spaces.

This research explored the factors underpinning successful coexistence in Sanabria-La Carballeda (S-LC)—one of the highest densities of wolves in Europe. Looking through a coexistence lens, we analysed the main social-ecological conditions of this region's uninterrupted relationship with wolves. This conceptual approach included exploring the influence of broader political-economic trends, both informal and institutional, power-dynamics and justice concerns on these relationships. The research was centred on addressing: 1) how coexistence in S-LC has been perpetuated through time; 2) what coexistence in S-LC has meant for wildlife and people; and 3) the main trajectories of change that may influence coexistence in the future. We also explored the possible implications for integrated conservation areas and approaches elsewhere.

The article consists of three parts: the first explores our conceptual approach to human-wildlife coexistence; the second explores coexistence within S-LC; and the third discusses implications and possible outcomes of the research.

CONCEPTUAL CONTEXT

Our conceptual approach is underpinned by recent scholarship on coexistence, biocultural diversity, and convivial conservation.

In recent years, coexistence has gained prominence within the field of human-wildlife interactions (König et al. 2020; Pooley et al. 2020). This focus complements, and partly replaces, the previous focus on human-wildlife conflicts that has been widely critiqued for its tendency to reinforce a human-nature dichotomy, ignore the underlying social elements of disputes, and over-emphasise top-down legal and technical fixes (Peterson et al. 2010; Pooley et al. 2017; Lozano et al. 2019). Within this research, resilient coexistence is understood as a series of conditions that create "a dynamic but sustainable *state* [italicised by author] in which humans and large carnivores co-adapt to living in shared landscapes where human interactions with carnivores are governed by effective institutions that ensure long-term carnivore population persistence, social legitimacy, and tolerable levels of risk" (Carter and Linnell 2016: 575).

Resilient coexistence does not imply a complete absence of conflict, although the level of negative interactions that should be considered acceptable, and for whom (people or carnivores), is still being debated. According to Chapron and López-Bao (2016), a state can be described as human-carnivore coexistence so long as the carnivores persist in self-sustaining populations, implying that it is primarily about achieving species protection. In line with Pooley et al. (2020), we perceive a difference between protecting biodiversity and promoting coexistence. We favour a conceptualisation of coexistence as a state in which people are able to live equitably and sustainably with wildlife, and where conservation efforts are carried out within the context of wider societal challenges (Redpath et al. 2017; Linnell and Cretois 2018). This is more consistent with current conservation agendas, certainly in Europe, which aim to protect both wild spaces and certain cultural landscapes (Pretty et al. 2010). The conceptualisation is also more conducive to participatory approaches, which have greater potential to galvanise coexistence than 'command and control' approaches (Bennett et al. 2017).

Mainstreaming this coexistence model is hampered by current sectoral governance and disciplinary silos within academia (Hartel et al. 2019). There is a lack of collaboration between stakeholders whose primary aim is the conservation of certain (often charismatic) species, and those focused on the conservation of landscapes and cultural heritage, yielding separate and sometimes incompatible solutions (Torralba et al. 2018; Fagerholm et al. 2020). The concept of biocultural diversity reconciles these strands. It describes the interactions between people and nature at a given time in a given place, and the cultural and natural aspects arising from these links. Within Europe, where the spheres throughout history have become indivisibly interlaced, pursuing nature conservation separately from its cultural contexts could in many locations be counter-productive (Pretty et al. 2010; Bridgewater and Rotherham 2019).

Convivial conservation, advocated by Büscher and Fletcher (2019: 289), offers a new and a more holistic conservation paradigm. This vision departs from nature-culture dualism and proposes "not setting nature apart but integrating the uses of (non-human) natures into social, cultural, and ecological contexts and systems (i.e., re-embedding)." Since the erosion of cultural and biological diversity is oftentimes caused by the same drivers, such as climate change, over-exploitation and homogenisation of landscapes (Henle et al. 2008; Pretty et al. 2010), an integrated approach is necessary to address these underlying challenges. Convivial conservation also engages with peoples' relationship to their land and past conservation practices, such as (neo)colonial dynamics and dispossession, that are important to make historical reparations and address injustices within current conservation policy (Büscher and Fletcher 2019).

Coexistence and conflict are both part of a constellation of possible human-animal interactions. Both must be

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understood by examining economic, cultural, political and power dynamics, the agency of human and non-humans, as well as the social and ecological legacies of past interactions (Redpath et al. 2013; Pooley et al. 2017). The novel contribution of a shift from conflict to a coexistence lens comes from the way it draws attention to relationships and dynamics that could allow both humans and animals to flourish in the context of broader systemic change, rather than merely reducing conflict in a particular place.

CASE STUDY PRESENTATION: WOLVES AND VILLAGES IN SPAIN

We explore coexistence through a case study of human-wolf interactions in Spain[1]. Wolves are widely recognised as one of the most complex coexistence challenges in the northern hemisphere, particularly for agricultural communities (Kuijper et al. 2019). It is a highly adaptive apex predator prone to seeking out anthropogenic food sources, and it is considered a flagship species in most European cultures. Exploring what fosters coexistence with such a complex species could, therefore, inform work with other expanding and/or controversial species.

Due to their continuous presence in Spain, traditional methods of preventing wolf attacks have been maintained in some places, such as shepherding and the keeping of livestock guardian dogs (LGDs) (Álvares et al. 2011). During the past 40 years, the Iberian wolf (*Canis lupus signatus*) population has recovered and expanded significantly, from 200-500 at its lowest point in the 1970s to currently more than 2,000, making it one of the largest wolf population in western Europe (Blanco and Cortés 2009). The intersection of its large wolf population, the great number of priority habitats, and the persistence of shepherding cultures makes Spain highly relevant for the study of coexistence.

The study focussed on a selection of municipalities within the administrative region of S-LC in the Zamora province. It was selected for its exceptional wolf density, stable at approximately 7-10 individuals/100 sq. km since the 1980s; preserved preventative methods; and its acclaim as a wolf-watching destination (Vicente et al. 2000; JCyL 2018; Martínez 2019). The area is dominated by a low mountain range (800-1,200 m above msl), which contains the 67,000 ha regional hunting reserve Sierra de la Culebra and the 23,000 ha adjacent Lake Sanabria Natural Park. Both areas were established in the 1970s and have been included within the Natura 2000 network since the 1990s (Figure 1).

The study villages were characterised by subsistence agriculture, but the sector has decreased significantly over the past 50 years. The Spanish transition towards democracy (1977–1982) and entry in the EU (1984) increased social mobility in the S-LC region. Its marginal soils and harsh climate made it uncompetitive in a globalised agricultural market, leading to rural exodus that particularly decimated its shepherd community (Fernández Gónzalez 2013). In 2018, its population density was less than 5 inhabitants/sq. km and several villages have been completely abandoned (Martínez 2019). The remaining shepherds (sheep and goats) and farmers (cattle) graze their livestock on perennial meadows and in mixed forests and scrub, of which the majority is municipal property (Fernández Gónzalez 2013; Blanco 2017).

With the farming sector in decline (making up 7.28% of provincial GDP in 2017) (SEPE 2018) and the industrial sector practically non-existent, Zamora is dependent on its service sector. Over the past 30 years, this sector has been enhanced by a growing tourism industry (3.65% of the provincial GDP in 2017) (SEPE 2018), which is driven in S-LC to a significant extent by the interest in the wolf. High wolf density and the favourable topography of La Culebra (with intermingled hills and open spaces that facilitate observation) has made the area emblematic for wolf-watching, in Spain as well as internationally (Martínez 2019).

DATA COLLECTION AND ANALYSIS METHODS

The study was conducted through an experience-based assessment of community conditions, which elicits the knowledge of community members to survey factors and processes related to adaptive capacity and resilience (Smit and Wandel 2006). The approach is well suited for appraisal of the complex systems within which human-carnivore interactions are embedded. Primary sources consisted of observation data and key informant interviews. Secondary data consisted of management plans, newspaper articles and documentaries on the topics of human-wolf interactions, depopulation and rural abandonment in Spain (see SI 1 and SI 2).

The lead researcher undertook site-based fieldwork from January 2020 to May 2020, which was approved by the Research Ethics Committee at the University of Leeds (AREA 19-018). In order to gain a broad perspective of coexistence in the area, we focused on villages with presence of tourism, wolves and traditional agriculture. Participant and non-participant observation was continuous and included meetings and events, wolf-watching activities and accompanying farmers and wildlife managers during their daily tasks, which was recorded in a fieldwork diary. Within or connected to the communities, we identified and selected interviewees who were deemed particularly affected by wolves, or who were involved in species or area management (see SI 1). In total, 33 semi-structured interviews were conducted in Spanish, tape-recorded and subsequently transcribed. Questions were centred on rural issues and trends, perspectives on human-wildlife interactions and aspirations for the future. Questions about wolves, unless brought up by the interviewees, were asked at the end in order to understand whether or not it was a primary concern.

We did not presume to deduce coexistence conditions or their determinants a priori, but used a grounded type approach (Mabon et al. 2020), which allows interpretative flexibility during data collection and analysis. We processed primary and secondary data through thematic coding using the NVivo software. We established a crude coding structure according to

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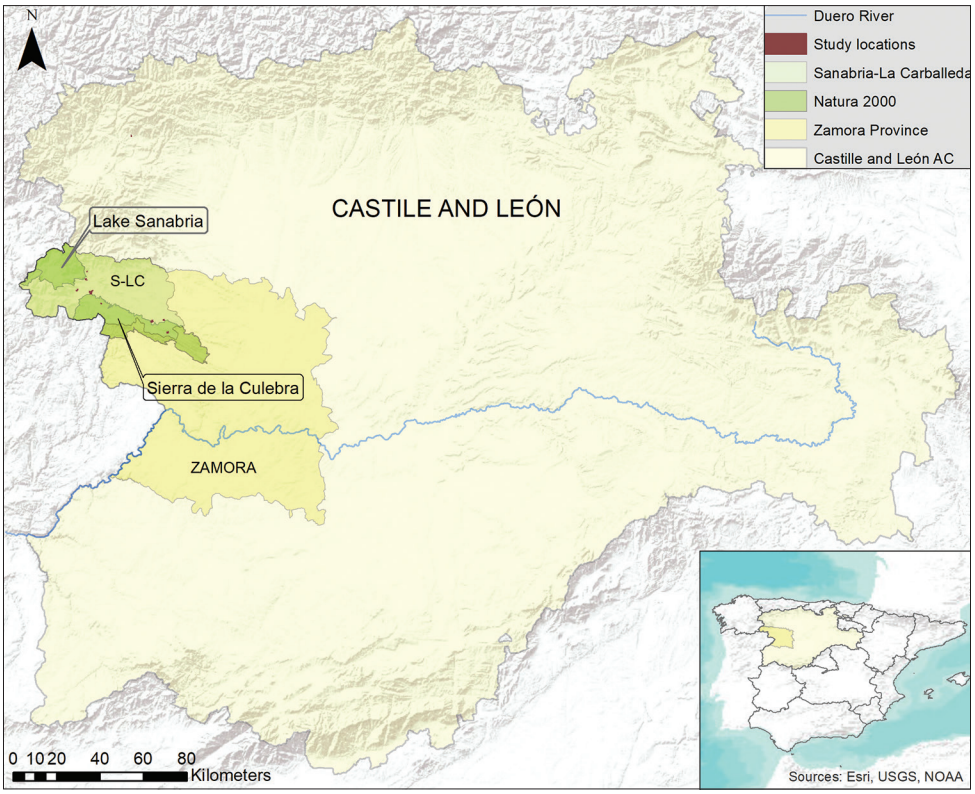

Figure 1

Map of Sanabria-La Carballeda (S-LC), located within the autonomous community of Castile and León. The villages within or adjacent to where informants were located are marked in brown. North of the Duero River, the wolf is included in Annex V of the Habitat Directive (managed as game species), while in the south it is protected under Annex IV

the research questions, which was expanded through an iterative process with themes that emerged from the data. This inductive approach allowed the data codebook and structure of the results to stem from conditions and trajectories deemed important by the informants themselves (see SI 3). The findings were then contextualised through the concepts outlined above to empirically support and expand current scholarship on coexistence.

The sample size and scope of the research was limited by time and spatial constraints, and to some degree by language and cultural barriers. Follow-up and comparative studies from other coexistence areas would add nuance on the idiosyncrasies of S-LC and its implications for efforts to achieve coexistence elsewhere.

FINDINGS

We begin by describing the socio-ecological context of human-wolf interactions in S-LC; followed by an elaboration of four main coexistence conditions that emerged from the data and associated trajectories of change that may impact these conditions. The final section contextualises the results and discusses wider implications of using a coexistence lens to study and govern human-wildlife interactions.

Trajectory of human-wolf coexistence in S-LC

Similar to other locations in Europe and North America (Bruskotter et al. 2017), people in S-LC have within their lifetime observed the wolf pass from being defined as a pest, both legally and in the public discourse, to an animal that is widely revered and alluring to tourists. When the countryside of S-LC was still extensively populated and farmed, people's primary defence against the wolf consisted of human presence (many small flocks of sheep demanded vigilance from shepherds) and various methods of killing wolves (traps, snares, poison and shooting). However, according to interviewees, the persecution was intermittent and retaliatory rather than a government-organised scheme as in other parts of the country. This contributed to S-LC becoming one of the last wolf bastions in Spain, albeit with declining numbers (Vicente et al. 2000). The trend was reversed in 1970, when the wolf's national status was changed from 'vermin' to 'game', which regulated the time, number and the approved methods with which wolves could be hunted (Blanco and Cortés, 2009).

Around the same time, Sierra de la Culebra was declared a hunting reserve. The declaration encompassed new policies of forest and species management, including the reintroduction of Red deer (*Cervus elaphus*), which had become extinct in the early-1900s. The species boomed thanks to favourable habitat conditions, making La Culebra renowned for some of the highest densities and highest quality specimens (indicated by antler size) in the country (Vicente et al. 2000). This type of big game and trophy hunting has traditionally been dominated by the upper class and the political elites,

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while local hunters usually were limited to minor game such as foxes, grouse and hares. According to administrative staff, the hunting policy converted the reserve into a haven for wolves and ungulates, from where populations expanded into the surrounding region.

While wolf and deer numbers increased, human inhabitants continued to decline. Various informants perceived it as a deliberate scheme by governing institutions, in which they were being 'educated to leave.' The processes of depopulation also meant that social cohesion and the communal management of commons was eroded, leaving increasingly isolated farmers to fight what they perceived a losing battle to maintain traditional landscapes and cultures:

> "If it continues along this road, it will disappear. Another thing would be if they [the administration] notice what is happening and start incentivising pastoral farming. But it would have to be an enormous jump, because if there is no generational shift right now, […] the new people who come won't know anything about the land. Because people traditionally take over from someone or have someone who can show them. But if this disappears.. Who will come to the village to set up farming when this is all virgin land?" (Shepherd, 2020)

Coexistence conditions

A triangulation of academic publications, observation and informant interviews elucidated four main conditions of wolf persistence in the area:

Favourable habitat

The ecological conditions for the wolf in S-LC have improved since the 1970s, when the habitat for wildlife was severely fragmented (Vicente et al. 2000). A common perception among informants was that wolves in those times survived by predating on livestock. The forest cover has since increased dramatically (both native and planted), and so too the prey populations (Red deer, Roe deer, Wild boar) (San Miguel et al. 2016). To some extent, this has facilitated a spatial separation of human and wolf activities. For example, informants often credited the booming ungulate populations for decreased livestock losses to wolves over the last decades.

However, expanding forest cover and rising prey populations were also major causes for concern among local informants. A significant proportion of resources of S-LC's farmers must be dedicated to addressing scrub encroachment on their private and the common lands. They indicated that maintaining open pastures is essential to prevent wolf attacks, since LGDs can more easily survey the flock, and wolves have less shelter to mount their ambush. In addition to scrub, deer are decreasing agricultural yields, damaging vegetable gardens, causing traffic accidents and increasing the prevalence of zoonotic diseases. Interestingly, our observations indicated that local communities were often more angered by deer than by wolves. "It would be better for me if they [the hunters/administration] came here and killed 600 deer, and didn't kill any wolves. […] There are grounds that I had reserved for the cows, and when I get there the deer have already gotten to it," (Farmer 2020).

From a historic perspective, the social and ecological transitions of S-LC have been drastic, practically rendering the systems practiced during millennia obsolete within the span of half a century. When discussing the landscape for wolves and shepherds in the future, several shepherds wryly remarked that wolves will clearly be 'the winners.' A local wolf expert emphasised that the disappearance of shepherds could be detrimental to wolf conservation in the long term, as the buffer zones between human communities and natural areas, traditionally maintained by shepherds, would be decimated. This could increase the risk of negative interactions in the villages, as wildlife would quite literally be 'on people's doorstep.' In addition to eroding local knowledge and customs, landscape homogenisation also threatens certain species associated with meadows and pastures, including within Natura 2000 areas (Fuentes et al. 2011). Wildfires have also increased dramatically over the last few decades, partly due to the growing expanse of flammable scrub (JCyL 2014).

Sustained coping mechanisms

Tangible impacts of wolves in S-LC are primarily experienced by rural communities, particularly livestock owners. Among this group, versions of the sentiment "we have always lived with them" were frequently expressed, and we found a general acceptance of wolves as part of the local system, whether cherished or disliked. The various coping mechanisms that have resulted from the convergent evolution of wolves and shepherding have been passed down from generation to generation. Sheep and goats are enclosed at night, accompanied by a shepherd during the daytime, and kept with numerous LGDs. While the efficacy of LGDs to defend cattle was more contested, we found that many cattle farmers kept them regardless, and there was an informal system for matching spare puppies to those who needed them. The number of dogs among our informants ranged from four to 21. For instance, a pack of 18 LGDs had kept a flock of 1,400 sheep free from attacks for as long as the shepherd had been active. However, the effectiveness of LGDs was hampered by national legislation that fails to recognise them as working animals. The law dictates that they should be kept on a leash, and the owners risk prosecution if LGDs attack people or pets. The preventative measures are also a significant economic burden and highly labour intensive, which respondents considered one of the main reasons for younger generations' disinclination to engage in traditional farming.

Irrespective of these issues, there was a broad consensus among locals and civil servants that the measures are efficient at limiting wolf attacks in their area. While farmers still lose livestock (in 2017 there were 344 damage claims in the province of Zamora) (JCyL 2018), attacks are mostly opportunistic on animals that were left behind or strayed from the flock (locals called them '*oveja del lobo*', meaning the wolf's sheep). Events in which multiple livestock are killed at the same time were said to be rare.

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When locals were asked about their main concerns, the wolf was usually mentioned after low agricultural profitability, depopulation, deregulation of social services, lack of infrastructure, low generational turnover, and an inefficient governance system. The relatively low level of conflict was reflected in media coverage, where few of the articles about wolf-related grievances within Spain originated from the study area. Instead, as shown by Delibes-mateos 2020., such articles disproportionally originate from the southern part of the province, where wolves have recently returned. While there was a wealth of cultural legacy and intimidating stories about wolves from the past (corresponding with those described by Álvares et al. 2011), the present sentiments were dominated by indifference or delight. Fear, apart from concern on behalf of livestock and pets, was largely absent among informants. In one instance, the lead researcher for this study observed an event in which a wolf became trapped in a villager's chicken coop while attempting a raid. It later escaped, and the commotion was described in the local newspaper in terms of a 'delighted' villager and a 'poor, sick little wolf' who 'regained freedom' during the night. When asked how he thought wolves should be governed, a shepherd (in 2020) replied: "Instead of letting them spread, that they lived always in the same area. Here for example, in this area. […] Here it is possible to live with the wolf, but there are areas where it won't be possible."

These examples illustrate a generalised tolerance and coping capacity of S-LC's communities, which has been cultivated over generations. It supports earlier findings from a region with similar conditions (Llaneza et al. 2012), which highlighted the importance of long periods of cohabitation to establish harmonious human-wolf interactions. This ability to live and produce alongside or despite of wolves is gaining repute as proof that coexistence is possible. A growing number of documentaries, newspaper articles, and campaigns have centred on a group of S-LC shepherds and farmers considered emblematic for their preventative measures, such as the keeping of LGDs. Additionally, we identified a widespread pride among locals of their expertise (see SI 2). However, agricultural policies in Spain have incentivised cattle over sheep and intensive agriculture over traditional pastoral systems (San Miguel et al. 2016); thus disfavouring traditional coexistence practices. Cattle are consequently becoming increasingly dominant, while sheep and shepherds are declining. Cattle require less vigilance because they are larger and more easily fenced. This provides more time for farmers to diversify their income, which they perceived as essential in a sector where, after decades of unfavourable market conditions, the economic margins are very narrow. However, the transition to cattle is an emerging coexistence challenge due to the vulnerability of young calves. Their growing numbers in combination with decreased human presence have now become the main cause of wolf attacks and associated disputes in S-LC (JCyL 2018).

Managing wolves as game and compensating damages

In the northern half of Castile and León (Figure 1), the wolf is listed in Annex V of the Habitat Directive and managed as a game species. A range of stakeholders cited this partial protection as essential for coexistence in general, and for S-LC in particular. The consistently high density of wolves in the last decades was considered a proof of concept, often contrasted with the poor conservation status of wolves in areas where they are strictly protected by Annex IV. This includes Andalusia in southern Spain, where wolves are now believed to be extinct; and in Portugal, where poaching is a significant issue (although there is limited evidence that legal hunting decreases poaching, see Blanco 2017). While wolves still die of unnatural causes in S-LC, it is in low numbers. In 2017, the official figure was 34, mainly from traffic accidents (JCyL 2018). A common theme in interviews with locals was that the regular hunting ensured that wolves were 'under control', something that was considered essential for all wildlife in order to prevent overpopulation and disease. The 2019-2022 hunting plan in Zamora province approved the hunting of 29 specimens per season from its estimated 30 wolf packs, of which the majority are to be shot in La Culebra (JCyL 2019). For both wolves and deer, the hunting fees are substantial. The wolf permits in La Culebra are auctioned with a starting bid of EUR 3,600 (plus an additional EUR 2,500 in fees and 21% tax) (JCyL 2020). The income from hunting (around EUR 120,000 per year in recent years, according to the reserve administration) is divided proportionally among the 12 municipalities which own 70% of its area amongst themselves. Various locals cited the importance of this income for the maintenance of infrastructure and other necessities.

As part of the management plan, the regional government is also responsible for compensating direct damage from wolves to livestock within hunting reserves. Outside of the reserves, shepherds and farmers are compensated only if they have specific insurance, for which the deductible is covered by the government, in case of attacks. While compensation was considered important for coexistence, there was wide consensus that submission and payment of claims is incredibly cumbersome and slow. Claims are only granted if attacks can be proven, which, since carrion-consuming species are abundant in the area, is often impossible.

> "Yes, I have insurance. But it doesn't make much sense, what it costs me in fees means that it doesn't compensate for the cost of the livestock if it gets killed. […] First I have to find it. And how am I then to prove to the Junta [the regional government] that it was the wolf who killed my foal? They will tell me "bad luck, amigo". […] They won't pay you. And if they do it won't be what it is worth, it will be nothing." (Cattle and horse farmer, 2020)

> "But what is certain is that to the south of the river Duero, because it [the wolf] is a protected species there, damages are paid out faster. […] But because the wolf to the north of the river Duero is a game species, it is possible to hunt it, well, I don't know, for some reason the payments are delayed. And people become angry with all the right in the world." (Civil servant, 2020)

According to official statistics, the numbers of registered and compensated damages north of the Duero river have declined

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in recent years, particularly for sheep, while remaining stable for cattle (JCyL 2018). However, our findings indicate that due to the inefficient bureaucracy, many farmers abstain from reporting anything but major losses, resulting in an official underestimation of damages.

Notwithstanding its historic role in preserving the species, wolf hunting is today a deeply polemic topic in Spain, and there is growing support for the strict protection of wolves. This was evident in the media and in statements from informal groups, NGOs and public institutions (MITECO 2020). In S-LC, it is enhanced by the growing importance of wolf tourism. Views diverged within and between stakeholder groups about the role of hunting in sustaining coexistence in the future, and whether it could be compatible with wolf tourism. Uncertainty over the impact of culling on pack structure, and its efficacy in preventing livestock damages (see Eklund et al. 2017), contributed to this division, noticeable in how certain facts from scientific papers and reports were cherry-picked to support particular standpoints. Exacerbating this increasingly polarised debate is a lack of transparency in how and why decisions regarding wolves are made by public institutions. We found a systemic distrust of politicians and managers, on all levels, throughout the studied communities. The regional government has been prosecuted on various occasions for insufficient scientific grounds justifying their hunting quotas, leading to temporary hunting bans, the most recent in 2019 (Blanco 2017; Camazón 2020). Simultaneously, hunters perceived increasing social pressure and aggression from animal-rights groups, which they believed was partially to blame for the low generational turnover within the hunting sector. Thus, the future of hunting in S-LC, and its broader implications for wolves, is uncertain.

Tourism

In recent decades, the ability to commodify the wolf has become an important justification for coexistence. Year 2015 saw the inauguration of Iberian Wolf Centre in Sanabria, a 21 ha interpretation centre, and a part of a socio-economic revitalisation project linked to the regional Wolf Conservation and Management Plan (https://centrodellobo.es/). The centre, with its two packs of captive-bred wolves, has cemented the status of the S-LC as 'Land of the Wolf.' Wolf imagery is readily displayed throughout the area, on touristic information material and on various paraphernalia sold in village shops. There are 12 wolf-watching businesses that completely or partly base their operations in La Culebra, four with local offices, and an estimated 3,100 visits in 2017 (Martínez 2019; Lora Bavo and Villar Lama 2020). According to a study from La Culebra in 2012, wolf tourists represented almost half of the overnight stays in rural hostels (Blanco 2017). Wolf observation, a year-round activity, has also been important to mitigate the uneven distribution of tourism income, which is otherwise restricted to the summer and public holidays. The economic benefits of the sector were widely acknowledged, and a majority of mayors saw tourism in general, and wolf watching in particular, as essential to ensure a future of their municipality.

Concomitant with the growing demand for nature tourism across Europe, the sector in Spain will likely keep expanding and attracting tourists to rural areas where bears, lynx and wolves can be observed (MAPAMA 2017). The increasing volume is a challenge for local and regional administrations. They do not receive any direct income from tourism (there are no park fees), but are responsible for providing and maintaining infrastructure, regulating businesses and preventing disturbance of wildlife. Growth notwithstanding, wolf tourism still represents a small percentage of the local economy, and one that is dependent on outside patronage rather than the communities' own production. As became evident during the COVID-19 pandemic (which broke out during the fieldwork period, canceling all tourism activities), the industry is fickle and prone to sudden changes in demand. Wolf tourism is also unfeasible in most areas outside of the hunting reserve, and Spain in general, since topography, forests and other factors make wolves difficult to spot.

FOSTERING COEXISTENCE AND CONVIVIALITY—WHAT CAN S-LC TEACH US?

In order to understand coexistence in S-LC, we return to the elements outlined by Carter and Linnell (2016): social legitimacy, tolerable levels of risk, mutual adaptation, carnivore population persistence, and effective institutions.

What characterises the coexistence state in S-LC has not been an absence of disputes. Some locals dislike and find wolves problematic, and a minority react accordingly (for instance by publically voicing anti-wolf opinions). Nevertheless, for the most part, wolves are considered a legitimate element of S-LC's fauna. While opinions diverged about acceptable population size and impact, we did not encounter anyone who advocated for the extinction of wolves, or who would not tolerate some level of wolf-related inconvenience, which is consistent with earlier findings from the region (Martínez 2019). This makes S-LC stand out among case studies from Europe and North America, where resident wolf packs are usually reported as the main concern of rural inhabitants, and where tolerance for coexistence decreased with proximity to the nearest wolf habitat (Blanco 2017; Bruskotter et al. 2017). The tolerance of S-LCs inhabitants, and their ingenuity to protect their livestock, has been important for the recovery of wolves across the Iberian Peninsula, since the area has functioned as a buffer zone from which wolves could reclaim territory. Their attitude is a likely testament to the uninterrupted process of adaptation. People who live and produce in S-LC are aware of the wolf as a local idiosyncrasy and can readily learn about efficient coping mechanisms from senior shepherds. Similar findings were made in Albania, where locals attributed the relatively few wolf attacks on livestock to inexperience or poor shepherding (Trajce 2017). Since wolves are expanding across Europe (Cimatti et al. 2021), these examples of convivial practices and attitudes, and the embodied knowledge of these stakeholders, are crucial to inform conservation policy in the coming decades (Carter and Linnell 2016). Our observation that deer seem more contested and troublesome than wolves in S-LC supports theories that

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(re)introduced species tend to generate more conflict than those with permanent presence (Linnell and Cretois 2018). However, we encourage further exploration to ascertain how widespread this perception is. The importance of habit to the legitimacy of a species is a challenge to conservation. It could mean that the return of many large-bodied mammals will be accompanied by long periods of turbulence and dispute before a harmonious coexistence state can be established. It raises the question of how the process of legitimising and becoming accustomed to these species can be accelerated, including the development of effective and locally appropriate coping mechanisms.

Our findings align with Von Essen and Allen's (2018), in that our informants recognised that change is unavoidable and often desirable, as long as it is gradual and can be unified with major elements of the prior status quo. We therefore contend that public institutions should be more proactive in ensuring the adaptive capacity of rural communities, so that they can develop with ongoing transitions. Their role is central to coordinate management across scales (European to local) and policy areas (such as rural development and species conservation). The first priority should be to address the disparity in living conditions between urban and rural people, perpetuated by unequal access to social services, subsidies that incentivise quantity over socio-environmental indicators, and the decoupling of consumers from producers (as detailed by Leal Filho et al. 2016; Navarro and López-Bao 2018).

In S-LC, interventions are urgently needed within this realm. Informants agreed that it was not the wolves themselves that were the problem, but how they and their rural surroundings were governed. Farmers and villagers considered the regional government to be ignorant of their reality and unresponsive to their needs, and also felt excluded from decision-making processes. This distrust was exacerbated by the poor performance of the damage compensation programme, mirroring earlier findings of the inherent problems with ex-post payment schemes (see Nyhus 2016). The disinclination within both Spanish and European policy to support functional coexistence has exacerbated the vulnerability of communities such as S-LC to surrounding challenges. It has also undermined habitat protection and public accessibility within Natura 2000 areas through increasing scrub encroachment, wildfires, and deteriorating infrastructure (Fuentes et al. 2011). Retroactive and ineffective governance is thereby neglecting the very conditions that have fostered conviviality in S-LC, perpetuating low generational turnover, depopulation and urban-rural polarisation. As shown elsewhere, wolves can easily become symbols for such issues, particularly when locals feel disempowered (Peterson et al. 2010; Madden and McQuinn 2014).

The situation in S-LC reflects a policy-reality that remains biased towards negative interactions and conflict. This means that opportunities to maintain and amplify positive relationships and practices are missed, for instance by subsidising LGDs or providing price premiums for sustainably produced meat. Another example of this bias can be observed in Idaho, USA, which recently passed a law that calls for the killing 90% of the state's wolves, with the stated rationale to appease angry hunters and farmers (Oppie 2021). Analysing the situation in Idaho through coexistence lens could possibly have revealed a more nuanced image of human-wolf interactions, underlying issues and possible solutions. One example is Lava Lake Farm[2], which prides itself on raising free-roaming lamb in an area with wolves and other large carnivores, with minimal losses.

Given burgeoning global restoration agendas (e.g., 'UN decade on ecosystem restoration'[3]), there is an increasing urgency to explore and build on existing ways of leading convivial lives with 'problematic' species such as the wolf. If areas that are emblematic for wolf coexistence are overlooked and their traditions and cultures allowed to disappear, it may reinforce the image of the wolf as "the beast of waste and desolation"[4] and further intimidate areas that are expecting their return.

Governing for sustainable coexistence

Our study supports earlier findings that large carnivore conservation cannot be decoupled from other aspects of rural policy and that coexistence measures should be mainstreamed within wider rural development programmes (Linnell and Cretois 2018). Present disputes in a system may indicate where to direct efforts and serve as a catalyst for positive change (Madden and McQuinn 2014). Our data indicate that most disputes in S-LC spring from the unequal distribution of responsibilities and benefits of wolf conservation. Local communities (particularly farmers and shepherds) face the practicalities of coexistence, while a different set of stakeholders (hunters, tourists and wolf-related businesses), who often live elsewhere, are the predominant beneficiaries. Although farmers and shepherds indirectly benefited from increased economic turnover and service provision associated with hunting and tourism, there was no direct funding stream that alleviated their precarious economic status, or the increased workload from overlapping with wolf habitat. As a local shepherd put it in 2020: "The ones of us who live in wolf territory have significantly less quality of life than those who don't. So you will always lose, always. […] Even if you are economically compensated for all the costs you have from the wolf, even then you will lose."

This illustrates a generalised conundrum within conservation. The actors who are directly dependent on and living with natural resources are usually most negatively affected by wildlife, least enriched by species protection, and most targeted by interventions that strive to change behaviours and livelihoods to meet biodiversity targets (Büscher and Fletcher 2019; Jordan et al. 2020). If left unaddressed, this disparity will keep undermining coexistence and the perceived legitimacy of conservation policy. The negotiation of the European Green New Deal and the Common Agricultural Policy offers a window to adjust funding mechanisms according to more just and environmentally sustainable principles. The mechanisms (that have been reviewed elsewhere, see Marsden et al. 2016; Navarro and López-Bao 2018) must be flexible in order to address idiosyncratic local needs—ranging from the

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provision of infrastructure (barns, fences, producer- consumer networks), services (scrub removal, communal shepherding schemes) or support with bureaucratic and legal issues (land rights and application procedures). Participatory Action Research is one approach which could support managers to design more context-specific and proactive policies for coexistence. It is based on collaboration between researchers and communities to identify local problems and design appropriate solutions (Milich et al. 2020). Promoting dialogue between different stakeholder groups, which was accomplished by a regional mediation initiative within our study area[5], is also essential to counter polarisation and improve local stewardship of wildlife (Redpath et al. 2017; Büscher and Fletcher 2019).

The effects of such policy interventions may result in a shift away from damage payments, due to their long-term economic unviability (particularly as carnivores keep expanding) and failure to incentivise good practice (Nyhus 2016). An alternative may be ex-ante payments for those residing in a carnivore area, similar to the support to farmers who produce on marginal lands. One such scheme for wolverines has been rolled out with some promising results in Sweden (see Persson et al. 2015). Another interesting proposition is a Conservation Basic Income, combining the social benefits of Universal Basic Income with the focus on environmental protection of the Payment for Ecosystem Services' programme (Fletcher and Büscher 2020). However, many questions remain for both of these schemes before they can be applied on a larger scale, for instance, concerning delineation of territory, funding, and legitimacy. These queries notwithstanding, we believe these schemes could contribute to a more hopeful and equitable conservation policy by incentivising convivial practices and ensuring that functioning coexistence areas prosper in the long term.

Population management of a flagship species

The peculiar status of S-LC as a destination for observing and hunting wolves creates an interesting dynamic and gives rise to incongruent views about the area's past and future coexistence conditions. It is illustrative of a global trend in which increasingly mutualist animal ethics clash with local, often more utilitarian values of wildlife (such as trophy hunting), and the practicalities of wildlife management in marginal(ised) landscapes (Bruskotter et al. 2017; Pooley et al. 2017). Given the flagship status of large carnivores and the reoccurring prosecutions of the regional government by NGOs and civil society, it seems unlikely that S-LC's approach, allowing recreational killing as a means of control, would be accepted on a larger scale (Blanco 2017). Prohibiting culling completely seems equally unfeasible. The nature of coexistence means that the dynamics that would regulate wolf populations in a completely 'natural' system are significantly altered. As noted by Mech (2017), wolves can and will adapt to almost any type of habitat conditions as long as there are food sources, whether anthropogenic or wild. Since wolves have a high reproductive potential, they will continue to expand their ranges in the absence of threats, increasing the pressure on domestic livestock and moving closer to suburbs and cities. In policy advice for the European AGRI Committee (2018), it was therefore acknowledged that some level of lethal control will always be needed, and Boitani and Linnell (2015: 67) further note that in Europe, "[…] human influence on all trophic levels is pervasive, legitimate, necessary and often even desirable".

However, even an inherently pragmatic position on control, for instance, only targeting individual animals that cause damage, is likely to be controversial. Decisions about where and when wolves should be culled, legally hunted, or protected, will require transparent and participatory approaches in order to successfully balance the goals of carnivore conservation with the goals of preserving rural culture, population and production in marginal areas (Linnell and Cretois 2018).

CONCLUSION

Studying the histories and conditions of human-wildlife interactions helps us identify where and when different animals are perceived to belong or be out of place (Pooley et al. 2017). In this research, we have illustrated that the use of a coexistence lens to study human-wildlife interactions is instrumental to identify areas from which to seek knowledge and inspiration on how to promote resilient coexistence. In the case of S-LC, we found a clear manifestation of functioning coexistence, but also threats to the stability of this state. Our work with local informants indicated that boosting sustainable farming practices could ensure both wolf conservation and the preservation of local cultures, thereby enhancing the area's reputation as a successful coexistence model.

Where the conflict lens has repeatedly produced the same apolitical and technical solutions (i.e., compensation payments), an approach which builds on 'bright spots' and biocultural diversity could accelerate transformative changes in conservation policy (Pretty et al. 2010; Bennett et al. 2015). A shift in policy orientation, from reducing conservation conflict to enhancing coexistence, would mean dedicating more resources to addressing underlying socio-ecological issues and promoting resilience of convivial lifestyles and behaviours, embracing the plurality of ways in which they can be manifested. This aligns with Büscher and Fletcher's (2019: 288) principles that conservation should go beyond preserving only non-human nature, and that it should be conducted within the "broader amalgam of 'living landscapes' that do long-term socio-ecological justice to humans and non-humans." Through ensuring dignity, inclusivity and supporting communities to develop with global transitions, we can preserve Europe's vibrant and entangled biocultural diversity, while shifting towards more harmonious human-nature interactions. There are undoubtedly more positive examples which we could build on—we just need to look for them.

Supplementary material

https://bit.ly/2XQeFW5

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Author contribution statement

HP was responsible for conception and design of the study, collection and analysis of data, and led the drafting and visualization of the manuscript. All authors assisted in review and editing of the manuscript and gave final approval of the version to be published.

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Conflict of interest

The authors declare no competing interests in the conduct of this research.

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Research ethics approval

The studies involving human participants were reviewed and approved by Research Ethics Committee at the University of Leeds AREA 19-018. The patients/participants provided their written or oral informed consent to participate in this study.

Data availability

In order to protect the anonymity of study participants according to the terms of our ethics approval, we cannot share the raw data, which may contain identifiable information. Requests to access the datasets should be directed to Hanna L. Pettersson, eehlp@leeds.ac.uk

NOTES

1. This constitutes the first part of a larger research project, involving case studies of three areas at different states of coexistence with wolves in Spain, see Pettersson et al 2021.
2. https://www.lavalakelamb.com/lava-lake-story/conservation/
3. https://www.decadeonrestoration.org/
4. Phrased about wolves by Theodore Roosevelt in "Hunting the Grisly and Other Sketches" in 1902.
5. See http://www.grupocampogrande.org/

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