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Characterizing perceptions of wildlife poisoning and protected area management in the Douro International Natural Park

Morgan Rhys Dennis Mano Casal Ribeiro

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Resumo

No passado, os seres humanos têm recorrido frequentemente a venenos para eliminar animais selvagens que consideram indesejáveis, causando impactos negativos enormes em espécies ameaçadas por todo o mundo. Estes prejuízos incidem com intensidade notória em predadores no topo das cadeias alimentares ou em animais necrófagos, que são os principais alvos de envenenamento pelo Homem. Deste conjunto de espécies, os abutres são talvez o caso que melhor ilustra os efeitos nefastos do envenenamento ilegal, tendo levado ao declínio acentuado das suas populações por todo o mundo, onde em algumas regiões chegaram a reduzir-se em mais de 99%. Em Portugal, este envenenamento tem resultado na morte de milhares de animais selvagens ao longo dos anos, incluindo das emblemáticas espécies de abutres existentes no território nacional. Nas últimas duas décadas tem-se assinalado um aumento no combate a estes comportamentos ilícitos, particularmente em zonas rurais, através da criação de programas ambientais específicos, da melhoria das bases de dados relevantes, e até do envolvimento activo dos orgãos militares ligados à Natureza. No entanto, tem existido um baixo investimento na investigação e monitorização das dimensões humanas inerentes ao envenenamento ilegal de animais – especiamente quando comparado com as vertentes biológicas – tanto a nível nacional como internacional. De facto, a literatura académica atual é consensual quanto à necessidade de aumentar os conhecimentos e práticas interdisciplinares na área da conservação em geral. Os profissionais da conservação estão a ser encorajados a expandir os seus focos para além da implementação de regulamentos que visam proteger os ecossistemas, de modo a dar maior importância ao estudo dos comportamentos de risco que pretendem alterar, e dos contextos sociais em que se inserem. Dado que o uso ilegal de venenos para matar animais tem persistido ao longo dos anos, apesar de novas legislações e proibições por parte de organizações ambientais, parece essencial o maior envolvimento das ciências sociais da conservação. Compreender aprofundadamente os enquadramentos sociais complexos deste envenenamento poderia contribuir para uma gestão ambiental mais eficiente e duradoura. Estes poderão estar direta ou indiretamente ligados ao uso de veneno, dado que as motivações deste comportamento podem ser relativos a conflitos humano-animal mais latos, ou até a conflitos entre pessoas/grupos.

Uma região de elevado valor ecológico, na qual continuam a ser registadas repetidas mortes de animais por envenenamento (entre elas várias espécies ameaçadas), é o Parque Natural do Douro Internacional no nordeste do país. O parque apresenta uma baixa densidade populacional humana, com uma forte dependência em agricultura e pastorícia para sustento. Estas comunidades acabam por impactar – tanto positiva como negativamente – os ecossistemas em que estão inseridos e a importante fauna que neles habita (de salientar as espécies de abutres que as frequentam e nidificam).

Assim, este estudo procura explorar os fatores sociais associados ao uso ilegal de venenos na região do Douro em Portugal, assim como as relações entre áreas protegidas e comunidades locais que possam influenciar este comportamento. Uma combinação de entrevistas semiestruturadas individuais e de grupo (N = 47) foi realizada em 12 aldeias, localizadas em todos os municípios do Parque Natural do Douro Internacional. As entrevistas foram posteriormente analisadas qualitativamente utilizando codificação indutiva. Estas aldeias foram escolhidas por apresentarem casos recentes de envenenamento ilegal nos últimos anos (desde 2015). A metodologia qualitativa adotada permitiu selecionar comunidades bastante pequenas, por vezes com populações abaixo dos 100 habitantes, algo que em estudos passados foi inviável.

A investigação demonstrou que os participantes geralmente possuíam opiniões negativas ou neutras sobre animais selvagens, particularmente sobre aqueles aos quais são atribuídos prejuízos económicos. As atitudes ou discursos positivos sobre fauna foram raras e pouco detalhadas. Destacaram-se várias crenças e valores baseados em informação falsa ou incompleta de interesse para a conservação, das quais é importante salientar a perceção do aumento de predação de gado por abutres. Este entendimento tem-se verificado noutros países europeus e, se continuar a alastrar-se, poderá ter consequências graves para a proteção de abutres num futuro próximo.

Sobre o envenenamento ilegal de animais selvagens, os participantes encontravam-se inadequadamente esclarecidos sobre os casos recentes nas suas aldeias, incluindo alguns presidentes de freguesias e até pessoas diretamente envolvidas nos casos. Apesar do desconhecimento geral sobre fauna morta por envenenamento, bastantes participantes revelaram que em anos recentes lhes tinham sido envenenados animais domésticos (maioritariamente cães), ou que conheciam donos de animais afetados por venenos. Estas

ocorrências foram raramente comunicadas às entidades apropriadas, com alguns animais a serem tratados em casa, ou, no caso de morrerem, abandonados em contentores do lixo. Estes resultados sugerem que os dados atuais sobre a quantidade de cães domésticos envenenados poderão estar subestimados, de modo que uma melhor deteção destes episódios poderia ajudar a identificar as áreas de envenenamento mais intensas. As motivações subjacentes ao envenenamento propositado de cães enquadram-se em três categorias: por incomodarem/irritarem, por vingança/retribuição, ou por inveja. Embora menos acentuados, possíveis justificações e incentivos ao envenenamento de fauna também foram encontrados, podendo estar associados a atitudes negativas.

Por último, as comunidades dentro do parque natural manifestaram múltiplos conflitos com as organizações ambientais da região, nomeadamente com a administração do parque. Os residentes de aldeias fora dos limites do parque expressaram opiniões mais neutras, mas a maioria conhecia as desvantagens para quem nele habita. Apesar de pouco numerosos, alguns participantes salientaram os benefícios que o parque fornece, como a proteção da Natureza e o incentivo ao turismo. Os valores e juízos associados aos diversos conflitos são descritos em detalhe; brevemente, as discordâncias entre a população e o parque giram em torno de diferentes regulamentos e proibições que limitam as atividades diárias dos habitantes do parque. Mais, vários participantes manifestaram a frustração de não poderem gerir os seus terrenos da forma que consideram mais apropriada, e de simultaneamente na prática não haver qualquer gestão por parte do parque. Outros conflitos parecem ter surgido devido à falta de comunicação entre os diversos grupos de interesse do parque, principalmente a ausência de diálogo entre a população geral e a administração. Por exemplo, muitos participantes mencionaram o seu desagrado com a reintrodução de animais selvagens por parte do parque, embora estas ações de reintrodução não existam. Rumores semelhantes já foram encontrados noutros países europeus, devendo ser desvendados para que não sejam obstáculos às atitudes pro-ambientais. Crucialmente, os participantes sentiram-se negligenciados pela administração do parque e organizações ambientais. Contudo, também se registou repetidamente a vontade de participantes em comunicar com estas entidades, e de se envolverem ativamente no futuro das áreas protegidas.

Ao analisar os contextos sociais do envenenamento de animais selvagens no Douro, este estudo apresenta várias recomendações e diferentes avenidas que poderão ser exploradas

no futuro próximo. Embora algumas das temáticas examinadas neste estudo estejam indiretamente ligadas a este comportamento, não deverão ser ignoradas nem postas em segundo plano. Os resultados parecem indicar que para mitigar de forma eficaz o envenenamento de fauna, as atitudes e conhecimento relativo a animais selvagens terão que melhorar e os conflitos entre o parque e as suas populações deverão ser elucidados através do investimento na comunicação bilateral. Os próximos programas de divulgação na área do Parque Natural do Douro Internacional devem ser talhados à diversidade de temáticas apresentadas neste trabalho. As organizações de conservação devem esforçar-se para incluírem as comunidades locais nos seus processos de tomada de decisão, aproveitando as ferramentas que as ciências sociais dispõem para investigar qual a melhor maneira de avançar com esta integração. Cada vez mais, enfrentar de forma eficaz o envenenamento de fauna, e outras questões de conservação no geral, requer aos praticantes adotar metodologias mais interdisciplinares, que os ajudem a lidar com os desafios sociais e humanos inerentes a estas áreas.

Palavras-chave: ciências sociais da conservação; conflitos sociais: conservação de abutres; dimensões humanas, sistema socioecológico

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Abstract

Humans have frequently used poisonous substances to persecute wild animals that are perceived as undesirable, causing massive negative impacts on endangered species throughout the world. Despite focused efforts to minimise these consequences, illegal usage of poisons has persisted, and comprehending the complex social landscapes underlying this behaviour – directly or indirectly linked to poisoning itself – could contribute to more efficient and long-lasting conservation management. Social sciences provide the knowledge and tools needed to understand these human dimensions, but have seen limited application to wildlife poisoning contexts. This research aims to explore the social factors related to illegal poison use in the Portuguese Douro region, as well as relevant relationships between protected areas and local communities that may influence this behaviour. A combination of individual and group semi-structured interviews (N = 47) were performed in 12 villages of all four municipalities of the Douro International Natural Park, which were subsequently coded through broad qualitative analysis. Study participants were shown to have generally negative and neutral views of wildlife, were inadequately aware of regional poisoning events, and displayed various conflicts with environmental organisations. Important beliefs were described, such as rumours of species reintroduction, increases in vulture predation of livestock, and scepticisms or reasonings of animal poisoning. Domestic dog poisoning may be more intense than has been recorded, so encouraging animal owners to report these cases could potentially help reveal hotspots of wildlife poisoning. Crucially, participants felt neglected by the protected area administration and dialogue between these stakeholders seems lacking. Future outreach programmes should be specifically tailored to this variety of issues, and conservation efforts should work towards including local communities in decision-making processes. To effectively address both wildlife poisoning and conservation in general, practitioners must inevitably rely upon more interdisciplinary research which tackles the fundamental social and human challenges they face.

Keywords: conservation social science; human dimensions; social conflicts; socioecological system; vulture conservation

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1 – Introduction

1.1 – Impact of poisons on wildlife

The illegal or improper use of poisonous substances is immensely consequential to global biodiversity and wildlife conservation, being responsible for the decline or outright extinction of many endangered species (Guitart et al., 2010b; Ogada et al., 2012; Ogada, 2014). Humans have frequently used poisons to directly persecute undesirable wild animals, most commonly carnivores and other apex predators such as wolves and raptors in Europe (Guitart et al., 2010b; Whitfield et al., 2003) or lions and hyenas in Africa (Ogada, 2014). Rural communities tend to want to eliminate these species from their regional ecosystems in order to deter attacks on livestock or reduce hunters' competition for game animals, such as rabbits or pheasants (Alváres, 2003; Mateo-Tomás et al., 2012; Ogada, 2014). However, these poisoning behaviours result in substantial unintended effects on other fauna. Toxic substances, like pesticides, are not only easy to obtain and administer, but once a poisoned bait has been set its effects are unpredictable and uncontrollable considering it eliminates animals non-selectively (Álvares, 2003). These baits – which frequently consist of raw meat or small animal carcasses laced with synthetic pesticides – may end up killing more than a single animal, instead killing many individuals from different species that feed on the same bait (Pantović & Andevski, 2018). Wild species are not the only ones affected by illegal poison use. Domestic dogs are also common victims of ingesting poison, sometimes by accident (by eating baits aimed at killing wildlife) but frequently they are the intended targets – as a result of social conflicts between rural inhabitants escalating (Barosa, 2018; Berny et al., 2010).

The most intensely affected species are necrophagous or scavengers such as vultures, certain birds of prey, and foxes. Not only can they ingest toxic substances from meat baits but can also suffer secondary exposure through bioaccumulation, by consuming other animals that fed on poisoned baits (Berny & Gaillet, 2008; Guitart et al., 2010b; Smart et al., 2010). These scavenger species tend not to be the actual target of the bait, demonstrating the collateral damage that stems from conflicts associated with hunting, agriculture and livestock ownership (Guitart et al., 2010b; Hernández & Margalida, 2009; Xirouchakis et al., 2000). The following section examines the effects that illegal wildlife poisoning has had on vulture species across the globe, as they epitomise its devastating consequences and testify to the

importance of reducing these behaviours to prevent endangered species from soon going extinct.

1.2 – Vultures as a case study

Perhaps more than any other group of species, the rapid decline of vultures can be viewed as a prime example of the severe repercussions of the improper use of poison. They are highly vulnerable to poisonous substances due to their particular ecological traits: vultures are almost exclusively necrophagous, feeding on remains of dead animals or their waste; they feed communally, meaning large numbers of birds consume meat from the same source simultaneously; and they have a long life expectancy at a high trophic level – they are placed at the top of their respective food chains, increasing their susceptibility to bioaccumulation (Ogada et al., 2012). There are numerous instances of illegal poisoning that result in the deaths of dozens of vultures at once. For example, two such occasions occurred in Crete where two poisoned baits decimated three entire Griffon vulture colonies with dozens of individuals, due to conflicts between stockbreeders (Xirouchakis et al., 2000). Another incident of massive vulture poisoning happened in Bulgaria, where after years of conservation work at least 30 vultures died from ingesting a poisoned bait targeted at wolves, destroying the bulk of the local breeding population (Stoynov & Peshev, 2011).

As was touched upon, not only might vultures suffer from direct poisoning, they may also feed on animals that had previously been poisoned and subsequently died. The fact that vultures are very long-lived only increases this bioaccumulation risk (Ogada et al., 2012). Lower levels of bioaccumulation may also have sublethal effects, hindering reproductive success, behaviour, immune responses and physiology (Hernandez & Margalida, 2008; Ogada et al., 2012). Although poison is mostly used by humans in an attempt to eliminate or retaliate against various top predators, when considering these characteristics it is not hard to understand why vultures are so much more harshly affected than any other species..

Many European countries struggle with combating these cases, namely Spain, Italy, France, Belgium, Greece, Macedonia and other Balkan countries (Guitart et al., 2010b; Pantović & Andevski, 2018). The use of pesticides to eliminate scavenging birds such as the red kite has seen a significant increase in Belgium and France (Berny & Gaillet, 2008; Guitart et al., 2010b). The Balkans have shown catastrophic consequences of illegal poisoning, as of

the only four European vulture species that once nested there in the past, the bearded vulture is all but extinct, the cinereous vulture is on the precipice of extinction, the Egyptian vulture has lost half of its population in the last decade, and the griffon vulture population is highly fragmented and threatened (Pantović & Andevski, 2018).

The situation in various regions of Africa is more severe, seen as the rise of the human population on the continent has intensified conflicts between rural communities and wild animals, and by extension has aggravated the use of poison to deal with predators or other undesirable species. In certain regions vulture populations have declined between 42% and 95% over the past 30 years, and in others they have gone completely extinct, in what has been termed the African Vulture Crisis (Ogada et al., 2012, Ogada, 2014, Ogada et al., 2016). More alarming data comes from India, where in many regions the three species of *Gyps* have declined by over 99% since the mid-1990s, and continue to do so rapidly (Samson et al., 2018). The Americas, especially South America, are the region with the least information on vulture poisoning, but through the insufficient data currently available it can be discerned that its impacts are also severe (Plaza et al., 2019; Ogada et al., 2012).

In fact, the critical situation in India can serve to illustrate ecosystem services provided by these scavenger species towards human societies: from 1987 to 1997, as these populations crashed due to diclofenac toxicity (an anti-inflammatory drug commonly used in wildlife poisoning), they stopped feeding on remains of dead animals; this in turn resulted in a huge increase in the number of feral dogs from seven million to 29 million. These led to an additional 38.5 million dog bites on humans, which caused 50,000 extra deaths from rabies. These fatalities, plus medical treatments and other repercussions such as disposing of corpses and losses in tourism were estimated to cost over $34 billion (Rinde, 2019). Although extreme, this is one possible example of the various ecological, economic and cultural services vultures provide us with, not to mention the integral part they play in their ecosystems (Vulture Conservation Foundation, 2019). Therefore, preventing wildlife poisoning is not only beneficial for biodiversity conservation but to a further extent towards public health, tourism, and regional or national economies (Margalida & Donázar, 2020, Vulture Conservation Foundation, 2019).

1.3 – An overview of the circumstances in Portugal

The illegal use of poison is currently one of the biggest threats to some of the Iberian Peninsula's most emblematic endangered species. Historically it has been mostly associated with attempts to eliminate wolves in rural settings. In fact, during the early 19th century a profession known as *bicheiros* existed solely to poison wolves, often in elaborate ways. During the 1950s and 60s the Portuguese state authorised mass exterminations through poisoning, resulting in the elimination of thousands of mammals, birds and reptiles, and inadvertently several people (Álvares, 2003; Programa Antídoto, 2004).

Before the existence of more detailed, concrete data in Portugal, the extent of poisoning's consequences were known by observing reports from neighbouring Spain. From 1990-2002 there were a total of 4928 known accounts of wild animals being killed by poisoning in Spain, of which 58% belonged to endangered species, mainly vultures. The Iberian Peninsula is still home to some of the most important vulture populations in Europe: Spain alone had 80% of European breeding pairs of Egyptian vultures, which suffered a loss of almost a third of its numbers during that decade, and over half the world's breeding cinereous vultures, having lost 454 of their approximately 2000 individuals. These declines were a direct cause of poisoning events during the 1990s (Álvares, 2003).

While reliable mortality data in Portugal was still unavailable at that time due to the absence of any organization or entity that dealt with suspected poisoning cases, available resources were already able to confirm the threat posed by poison use (Programa Antídoto, 2004; Brandão, 2005). This is best depicted by the now nationally infamous death of 36 griffon vultures, three cinereous vultures and three red kites in one single event, in Idanha-a-Nova in November of 2003 (RTP Linha da Frente, 2018), which remains the largest recorded poisoning event in the country to date. As the interest in wildlife conservation grew, a variety of organizations were mobilised to better study this threat and, by articulating together, tackle it effectively. From 2003-2014 there were 1593 confirmed deaths due to animal poisoning in Portugal, which meant – at the very minimum – 133 animals were being poisoned per year (Barosa, 2018). Interestingly, only 19% of these individuals belonged to wild species, while the remaining were domestic animals.

More recent data from 2013-2018 provided by the LIFE Rupis project shows that in the Northeast of Portugal domestic dogs are the most affected, followed by Egyptian, cinereous and griffon vultures (SPEA, 2018). In the north-eastern corner of Portugal lies the Douro region, an important nesting location for these species, whose valleys are visited daily by other individuals that travel from Spanish territories to feed. This border with Spain is among the last remaining nesting spots within Portugal for Egyptian vultures, which may be especially susceptible to being poisoned in comparison to other vulture species. Its ecology dictates that it feeds more frequently on the remains of smaller animals, meaning it is more likely to ingest smaller poisoned meat baits intended for other predators (Godinho, 2011).

1.4 – Social and human dimensions of conservation

Ever increasingly, the importance of understanding the relationship between human communities and the natural environment with which they interact has been recognised as crucial to develop viable long-term conservation measures and goals (Bennett et al., 2016; Crandall et al., 2018; Moon et al., 2016). Arguably the most urgent factors that drive wildlife conservation lie within the human dimensions; therefore, many demanding conservation challenges come from social, economic, and political structures (Newing et al., 2011).

At their core, incidents concerning the illegal use of poisons are social phenomena, and should therefore be treated as such by employing social science expertise in order to understand and unravel them. Such is the case with wildlife poisoning occurring around the world, and more specifically in several regions of Portugal, where it is motivated not only by human-animal conflict, but also conflicts among people themselves and related to protected area management (Álvares, 2003; Barosa, 2018; Taylor, 2016).

Why is it so essential to conduct social science research in regard to wildlife poisoning? There are numerous advantages to tackling the human side of poisoning, beyond merely implementing laws and legislations, that are delineated more in-depth during the literature review. Broadly, each country or region should focus on understanding the attitudes, behaviours, knowledge, perceptions, past experiences, social norms and opinions of their communities and stakeholders (Bennett et al., 2017; Clayton & Brook, 2005). This can help develop and maintain effective outreach/awareness/education strategies, ensuring they have a solid theoretical support, they communicate relevant information, they target

appropriate audiences or groups, and that they are conducted in the best possible settings (Jacobson et al., 2006). Comprehending those factors can also aid in integrating key stakeholders in policy formulation and decision-making, which contributes to more successful poison prevention measures. It is also fundamental to subsequently measuring social progress, which is hard to determine without having sufficient baseline information (Jacobson et al., 2006; Thomas et al., 2018).

In the context of wildlife poisoning, whether it be intentional or not, pertinent social and psychological factors may not relate directly to poisoning itself. Instead, it is likely that attitudes, perceptions, etc., about wild animals, conservation management, protected areas and rural activities are also decisive in understanding poisoning incidents. Negative interactions and perceptions of protected areas have already been shown to relate in some way to compliance with regulations related to wildlife poisoning and may be inhibiting conservation efforts, both internationally and in Portugal, (Fairbrass et al., 2016; Jones et al., 2020; Taylor, 2016). These companion factors should not be ignored and are best given the proper attention in any comprehensive research about animal poisoning.

Even when all these aspects are acknowledged by national conservation organizations, it has often been difficult to discern how best to engage the human dimensions of poisoning cases. Commonly though, it seems this importance is overlooked or integrated almost as an afterthought. For example, a Portuguese national platform that works to reduce the illegal use of poisons called Programa Antídoto outlined their strategy and proposed measures, but no concrete mention of researching the human and social dimensions of poisoning was defined. Regarding outreach, awareness programmes or education, these are referred to as “complementary actions” (Programa Antídoto, 2004). As shall be further explored in the following chapter, recommendations concerning how best to combat illegal wildlife poisoning may sometimes acknowledge the role of conservation social science research to a degree, but other times neglects it outright.

1.5 – Purpose of this research

This dissertation is, to current knowledge, the first entirely qualitative research endeavour concerning the illegal use of poison in the Douro region. The study area consists of several villages in and around the Douro International Natural Park (PNDI), an important

nucleus of endangered vultures and birds of prey in the Iberian Peninsula (Godinho, 2011; Sequeira, 2019). There, many poisoning incidents have been recorded throughout the past decades that negatively impact these protected species, that not only nest in the Douro region but also constantly travel from across the Spanish border to feed (SPEA, 2019). Due to its importance regarding biodiversity a number of conservation non-governmental organizations (NGOs), both based in the Douro itself or outside it, have a keen interest in gaining deeper knowledge on how and why people choose to poison animals, wild or domestic, intentionally or not. A previous effort has been made to identify the main factors predicting wildlife poisoning behaviour, but results were partially inconclusive due to the methodology adopted (Taylor, 2016).

Therefore, considering what has been put forth throughout this introduction, the present research has the following goals:

- To comprehensively define and understand the variety of existing social factors related to the illegal use of poison on animals in and around the PNDI, such as attitudes, behaviours, motivations, awareness, knowledge, perceptions, social norms, past experiences and barriers towards poisoning. These may relate directly to poison use or to complementary topics like wild animals, social conflicts or the existence of protected areas.
- To explore what relationships and communication structures are in place between rural communities and the administrative bodies of the PNDI or other conservation-based organizations.
- Contribute to more socially and ecologically efficient, participatory and long-lasting conservation planning and management in the regional context. Supplied with sufficient information regarding the previous two goals, the executive entities of the PNDI and conservation NGOs can structure more efficient outreach and awareness campaigns, take suitable steps towards more inclusive decision-making processes, provide a qualitative baseline from which to monitor and assess future improvements in existing conflicts or negative attitudes and perceptions, and overall establish more effective conservation actions.

2 – Literature review

This chapter intends to frame the present dissertation in the context of existing literature, by describing and interpreting the contributions of previous authors towards addressing illegal wildlife poisoning and the conservation conflicts that surround it, focusing on research that employs methods and knowledge from social sciences. This will help shed light on existing gaps in the literature that should be addressed and advocate the need for further studies such as this one.

To better understand in what way the application of social sciences can alleviate wildlife poisoning, first it is important to assess how the broader field of conservation interacts with them and how they help guide education, outreach and awareness programmes, involve relevant stakeholders in the decision-making processes and lead to better conservation outcomes in general. Therefore, the opening section of this review encompasses a varied range of research, that ultimately will illustrate how recommendations for conservation as a whole and wildlife poisoning specifically are similar, yet both somewhat disregarded. The middle section of the chapter concerns conflicts that may occur between protected areas/national parks/nature reserves given that poison use is often found in or around these areas. Behaviours such as illegal poisoning of wild animals show a disregard for national and regional policies or regulations, and point to the underlying social disputes and animosity that exists between local communities and the administrative entities that manage protected areas; it is important to understand from where these conflicts emerge, how they have been dealt with in that past, and what has worked or what hasn't, in order to move forwards. Finally, efforts towards reducing wildlife poisoning itself are explored using examples from global scale literature through to research conducted in and around the same study area as this dissertation, examining to what extent conservation initiatives have been guided by insights from social sciences. The concluding paragraphs of the literature review provide a summary of the essential take-home messages of the entire review, which help frame the purposes of this research and make its importance clear in light of what is so far known.

2.1 – Conservation outreach and social sciences

Within the wider field of conservation, interventions, policies and practices have historically been guided in large part by biological and ecological experts (Bennett et al., 2016;

Bennett et al., 2017; Madden & McQuinn, 2014; Newing, 2011). Highlighting the importance of including social science knowledge in global and local conservation agendas is now routine in contemporary literature (Bennett et al., 2016). However, not only is this vast and well-established knowledge underutilised in conservation programmes and research, many scientists and practitioners lack awareness about the different disciplines, objectives, tools and results within conservation social sciences (Bennett et al., 2017). When discussing the limitations of the standard approaches to conservation, Madden & McQuinn (2014) illustrate this in a simple and clear manner, "The field of conservation is rooted in biology. Conservation professionals enter the field because of an interest in understanding, protecting or managing the needs of wildlife and wild nature – not humans" (p. 98). They go on to argue that efforts are still focused on technical solutions, economic incentives, stricter legal enforcement measures and biological methods to protect wildlife. Although these kinds of measures may be necessary for conservation success, there is global evidence that on their own they are insufficient to address the human issues underlying them. In their now often cited review "Conservation social science: Understanding and integrating human dimensions to improve conservation" Bennett et al. (2016) provide an overview of several disciplines that draw from social sciences, humanities and art that now compose the larger field of conservation social science (Figure 1), each defined by their varying disciplinary traditions and topical strengths. This helps illustrate the array of possible approaches researchers can explore to ensure conservation decision-making is guided by the best possible data.

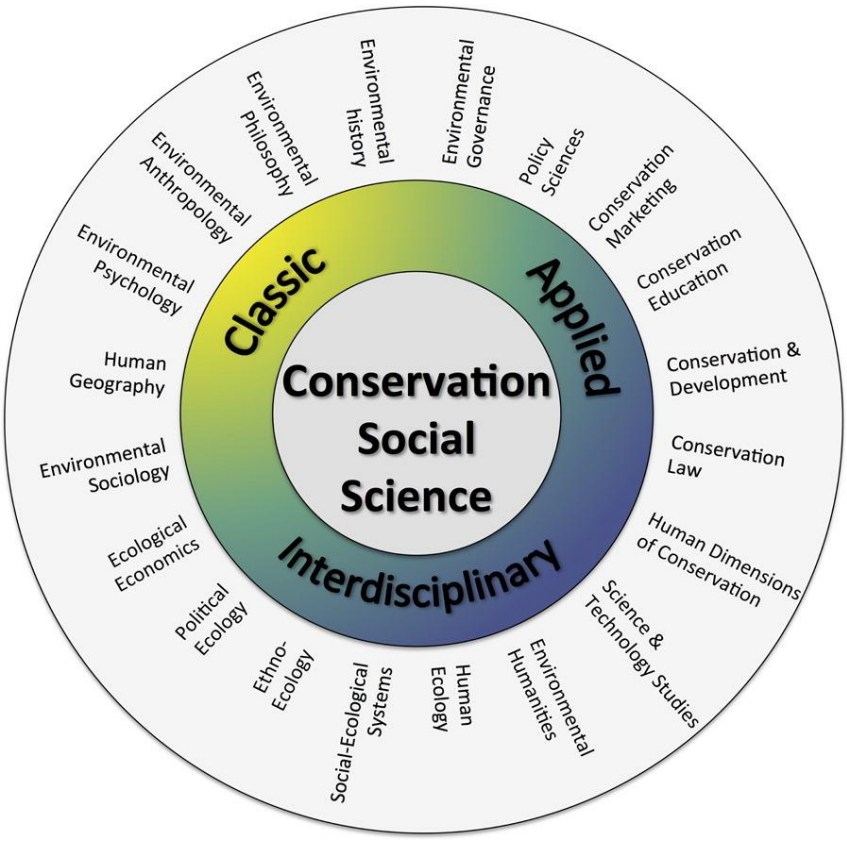

Figure 1 – A diverse set of some of the prominent conservation social sciences. Reprinted from Bennett et al. (2017).

More pertinent still to the present research, that essentially deals with human-wildlife conflict, is conservation outreach, in itself a fundamentally transdisciplinary field. The need for improved scientific outreach about the environment grows constantly, as communities increasingly overlap with natural areas and generate conflict with the surrounding wildlife over natural resources. Despite reporting that they care about the environment in general, peoples' understanding of conservation is minimal and concern over wildlife is often constrained to appealing species. In the opening chapter of their book "Conservation outreach", Jacobson et al. (2006) state "In essence, researchers could spend years designing plans or studying biological processes, but fail to achieve conservation goals without adequate public support" p. 7). This publication places large emphasis on how crucial it is to plan, implement and evaluate adequately designed outreach programs. On the one hand these aim to understand the specificity of a certain conservation issue through establishing dialogue with communities, while on the other they provide people with knowledge, awareness, attitudes and skills to tackle environmental problems. The acronym SMART encapsulates the criteria such programs should meet: Specific, by targeting behaviours or

outcomes that are observable; Measurable, providing the means to assess potential progress towards the objective; Audience-focused, identifying who the outreach is aimed at and what expectations are held towards them; Relevant, describing an important and realistic desired outcome; and Time-limited, by giving a time frame for achieving the programs objective (Jacobson et al., 2006). These principles may seem somewhat straightforward, yet conservation education and outreach programs often lack a theory-based design and do not offer metrics or methods by which to evaluate them (Thomas et al., 2018). It is essential to properly identify target audiences through previously undertaking audience research using surveys, interviews, public meeting and workshops (Jacobson et al., 2006). Even when target audiences have been defined, the complexity and uncertainty in which human-wildlife conflicts are often enveloped means that unintended consequences are a possibility (Veríssimo et al., 2019), as will be explored in the next chapter. Practitioners require an insightful understanding of audience baseline knowledge and beliefs to competently create conservation outreach (Jacobson et al., 2006).

Moving people from "awareness to action" is not a simple task. Knowing about something does not guarantee caring or doing anything about it. Programs that simply provide information often may not lead to the hoped-for changes, except where the lack of information is a significant barrier to conservation behaviour (Jacobson et al., 2006, p. 63)

This quote leads into an interesting point that has gained considerable attention in human-wildlife conflict research: how can conservationists best encourage positive or pro-environmental behaviours? As Jacobson et al. (2006) explain in their book, "behaviour" holds different meanings for different people coming from different fields. Here we focus on how psychology, sociology and marketing principles may refer to behaviours as a specific action that can be a target for change, as this seems to be a slowly yet steadily increasing view held within conservation social sciences (Bennett et al., 2016; Green et al., 2019; Nilsson et al., 2020; Veríssimo, 2013). Attitudes, norms, values and motives are essential to shaping how individual people adopt certain behaviours. When conservation initiatives are designed to target behavioural changes, researchers pay attention to who conducts these behaviours, where they occur and what factors prevent or motivate them (Jacobson et al., 2006).

A panoply of conceptual theories have been put forth that identify the key factors driving a human behaviour (the previously cited book alone details ten distinct models, many

more being readily available in sociopsychology literature). Still, it seems that when these theories were first adopted within environmental education research, more often than not their applications were towards ecological behaviours such as recycling, energy use and water consumption (Heimlich & Ardoin, 2008; Klöckner et al., 2013). Heimlich and Ardoin (2008) present a comprehensive overview of these works and the most prominently adopted theories of the time, reasoning that to propel itself forward environmental education should ground its practice in the decades of research related to behavioural theories. Around the same time, Clayton & Brook (2005) give a review of the then scarce research done within the new field of conservation psychology, which focused on promoting sustainable behaviours more directly related to biodiversity and wildlife. They argue that psychology approaches were severely underutilised in formulating conservation policy, that could be made more effective by integrating social and physical contexts in their development. Five years on and a review by St. John et al. (2010) make similar arguments: conservation projects were mostly too intent on altering human behaviour through limitations and legislations rather than addressing them directly. Interestingly, they note the increase in studies that focus on attitudes towards conservation – a somewhat step in the right direction, as attitudes are a common variable in behavioural models. However, they point out that general attitudes on conservation are not necessarily relevant towards the clearly defined behaviours that researchers wanted to promote or reduce. Additionally, other contributors towards behaviour change were being neglected as few studies were adopting a coherent, holistic approach. Finally, Nilsson et al. (2020) echoed all the previously mentioned literature, as studies measuring human behaviours focused on protecting wildlife were minimal, while attitudes as a whole were being used as an unreliable proxy for behaviours.

Extending the usefulness of conservation psychology, the field of social marketing takes the complete understanding of target audience motivations and constructs clear-cut and persuasive communication messages. Unlike traditional awareness programs, that may often avoid advocating one solution, social marketing interventions are not necessarily designed to represent the advantages and disadvantages of several possible outcomes, directing its efforts at promoting one outcome or modifying one behaviour (Jacobson et al., 2006). In a recent meta-analysis Green et al. (2019) found that conservation social marketing campaigns that integrate behavioural theory resulted in larger overall changes in participants

behaviours compared to traditional awareness raising efforts. Furthermore, social marketing shows a tendency to develop successful messaging strategies with participatory efforts from community members and key informants. Veríssimo (2013) argues that social marketing may be especially capable of harmonizing with conservation professionals unfamiliar to social sciences in general due to its largely quantitative nature (familiar to researchers with a background in biology) and its strong reliance on metrics and evaluation (which it inherited from its past links with the commercial business sector). Once again current literature suggests that despite the common calls from the conservation community, limited progress has been achieved in this area, especially when compared to others such as public health or international development (Veríssimo et al., 2019; Veríssimo & Wan, 2019; Veríssimo, 2013).

2.2 – Exploring conflicts within protected areas

Protected areas have steadily grown over the past decades, taking up more of the world's surface area as time goes on. As of the last available report, terrestrial protected area coverage has reached 15 per cent of the globe (Gannon et al., 2019). These areas are pillars of biodiversity and their proper planning and management have never been more relevant when considering the biodiversity loss, climate crisis and other significant challenges humans must face in the coming decades (MacKinnon et al., 2020). Although of great ecological concern, protected areas are also often of deep cultural importance and support the livelihoods of the people who live within them (MacKinnon et al., 2020). The success or failure of initiatives within these areas, including wildlife conservation, is predicated on local support and influenced by the perceived impacts that communities experience, as well as their thoughts and opinions on management and governance (Bennett & Dearden, 2013).

Zube and Busch (1990) publish a review of the first international survey that studies how local populations and national parks interact, analysing data from almost a hundred parks spanning thirty-five countries. Results provided four theoretical models that framed the relationships between the local communities, park staff and tourists within and around the park. Although the dynamics of each model were distinct from one another, they all showed that the values local populations place on protected areas differed from those who were responsible for park management, due to the former using and perceiving the landscape differently over longer periods of time. They also warn against parks simply engaging populations in superficial or potentially negative ways, such as co-opting inhabitants to the

lowest levels of employment within a park, allowing for essential resource use but only at exceedingly limited amounts, or other forms of tokenism.

What is equally clear, however, is the realization by park authorities and others that local populations can no longer be ignored in the establishment, planning and management of national parks and other protected landscapes, whether in lesser developed or developed countries (Zube & Busch, 1990, p. 128).

Moving towards more recent literature on relations between people and parks, the following four works provide insights about how different areas of research tackle these relationships. Firstly, West et al. (2006) inspect social, economic and political outcomes of conservation projects in protected areas through the lens of anthropology. Their discussions lie somewhat outside the scope of this study, however in their concluding remarks they express an interest in seeing more work focused on the "simplification process that takes place when biologists and other natural scientists write about, think about, and attempt to legislate the social relations between people and their surroundings" (West et al., 2006, p. 265). Already this statement hints towards the shortcomings of researching people-park relationships being similar to those of the wider field of conservation social science.

Secondly, Madden and McQuinn (2014) recognised that the technical measures being taken towards resolving conservation conflicts at the time of their publication were insufficient on their own, proposing instead to concentrate on principles derived from peacebuilding. Conservation conflicts, a common theme in protected area management, are often a surrogate for disputes over more fundamental, non-material unmet social needs: status and recognition, dignity and respect, empowerment, freedom, voice, fulfilment, belonging and connectedness, among others (Maden & McQuinn, 2014). The authors go through two models that conceptualise the different levels at which conflicts may exist, meant to help practitioners orient their interventions towards considering the full range of potential sources of conflict. For example, the Levels of Conflict model puts forth three stages: *dispute*, which is the obvious and tangible manifestation of a conflict (such as a disagreement over cattle grazing rights on public land); the *underlying conflict*, encompassing the past history of unresolved disputes that infuses current ones with added significance; and the *identity conflict* involving values, beliefs and social-psychological desires that define at least one of the parties involved. By integrating this framework or other similar ones, thorough

analysis of all sources of conflict within a conservation area should be an essential first step to support decision-making and to avoid unintended consequences.

Thirdly, Cetas and Yasue (2017) examine over a hundred articles to assess how they either fostered intrinsic or extrinsic psychological motivations to engage in pro-conservation behaviours in protected areas. Analysis indicated that in general, supporting intrinsic motivations translated into more successful socioeconomic and ecological conservation goals. Conducting research to understand the complexity of the motivational landscapes of conservation projects is crucial, given that communities in and around protected areas are motivated by more than simply financial or ecological gain (Cetas & Yasue, 2017).

Finally, Rechciński et al. (2019) critically review the conceptual frameworks applied to socio-ecological conflicts that typically occur in protected areas. What is thought-provoking is that their arguments are somewhat a polar opposite to Cetas and Yasue (2017): frameworks tend to emphasise 'behaviours' and its psychological attributes, overlooking the fact that components of structural conflict are not the same as those of human behaviours; In other words, theories and models that focus on 'behaviours' are too specific to address general community-level attitudes that arise during conflictual situations. These authors propose a sophisticated framework for studying protected area conflicts at four different levels, from the individual person to the regional context. Despite acknowledging the complexity of human decision-making processes, they do not include behavioural considerations in their model (Rechciński et al., 2019).

Europe is the region with the highest proportion of protected areas in the world, yet most research investigating protected area social phenomena and impacts focus on the global South (McKinnon et al., 2016; Naidoo et al., 2019). Jones et al. (2020) have recently provided a comprehensive discussion of the impacts that European protected areas have on their local communities by reviewing current literature. Their results group impacts into seven broad categories: wellbeing and health; human rights and access to resources; knowledge and education; livelihoods; local culture; social relations; and social equity, inclusion and empowerment. Although all of these contribute towards the success of conservation projects within protected areas, social relations and social equity are of increased relevance due to being the source of multiple negative impacts to local communities. Practically a third of the European protected areas analysed by Jones et al. (2020) had significant effects on the social

structure of their communities. Positive impacts included protected areas helping to mitigate conflicts and strengthening cooperation between stakeholders, and in some cases even increasing the level of trust between locals and administrators while improving community cohesion. However, among the most commonly documented impacts of protected areas was the increase of human conflicts. New restrictions and dismissal of local values led to an escalation of tensions and the decrease of trust between stakeholders, consequently weakening social networks. Additionally, a quarter of these areas showed worsening social equity (such as a sense of marginalisation and discrimination of certain groups, unequal effects on local livelihoods and disempowerment). The authors find that there is limited proof that protected areas positively impact social inclusion, equity and empowerment, due to the lack of including participatory management processes. Future assessments of social impacts will therefore be notably useful for informing conservation decisions and mitigating park-people conflicts in Europe.

Turning explicitly to Portugal, not much scientific attention has been given to conflicts that occur in protected area landscapes. Figueiredo (1998) conducted some of the earliest work available, examining the differing perspectives that urban and rural inhabitants had about protected areas. Mainly the results illustrated that most urban visitors of the Montesinho Natural Park agreed with norms and regulations that had been put in place meant to preserve the environment, while park residents were in clear disagreement with them as they restrict and somewhat handicap their daily routines. The same author expanded these topics later when discussing the conflicts that occurred between residents, visitors and the administrative entities of three Portuguese protected rural areas – the Natural Park of Montesinho, Natural Park of Alvião and Serra da Freita (Figueiredo, 2008). Among the summary of perceptions and struggles within these protected areas, the following hold most relevance to this review:

- Conflicts were common between park inhabitants and administrative entities due to regulations imposed on residents' practices and activities.
- Concerning environmental protection and development strategies, the views and needs of local communities are regularly neglected by State agencies and organizations.

- Most inhabitants are not sufficiently informed about the existing regulations due to the absence of communication strategies and pathways.
- Park visitors tended to wholly agree with the management rules put in place, while local communities frequently disagreed.
- Visitor's priorities were silently imposed on park residents by the administrative bodies. Visitor perceptions often transposed into institutional discourses and practices.

The final sentence of the research paper's discussion concisely sums up local perceptions.

One immediate consequence is that local populations, already vulnerable and suffering from a diversity of constraints imposed by their living areas' characteristics and transformation paths, consider themselves not as proud guardians of a common patrimony but instead as secondary actors (…), 'decorative elements' of rural landscaped for recreational purposes (Figueiredo, 2008, p. 31).

To conclude this section of the review, two case studies that encompass the same study area as this dissertation are explored. Carvalho and Frazão-Moreira (2011) carried out ethnobotanical surveys with key informants to see if local knowledge was incorporated in the design and management of the PNDI and the Montesinho Natural Park. The authors argue that traditional mosaic agricultural landscapes are an example of how local knowledge and values can contribute to effective conservation management as they strike a balance between human activities and nature, while being embedded with traditional cultural heritage and intangible values. Upon the establishment of both parks, there was a brief period of vigorous efforts, policies and measures that reinvigorated the regional economy and its cultural context. Later, these programmes were suspended and resulted in the population's disenchantment, which was only reinforced as the increased responsibilities, absence of financial support and reduced political backing began to disable traditional agriculture and weaken the communities' motivation. Survey data indicated that, despite what was initially expected, local communities were never involved in the management of the park landscapes. Both these protected areas showed social impacts arising from measures that do not promote

the involvement of local knowledge and from misunderstandings due to lack of communication between park stakeholders (Carvalho & Frazão-Moreira, 2011).

Pellis (2019) examines the implications and consequences of avoiding social conflict in the context of protected area management. The author analysed how an ecotourism project called Starcamp and Associação Transumância e Natureza (ATN), a conservation NGO based in the Douro region of Northeast Portugal, attempted to avoid conflicts with local communities in order to safeguard their objectives. The four examples given are representative of how ecotourism and conservation entities sometimes opt to deal with emerging or expected conflicts in general:

1) Conflict avoidance by silence – when conservation practices operate in deliberate silence, through literal absence of dialogue or exclusion of opposing stakeholders, in order to minimise heated and unproductive exchanges. An example of this was ATN avoiding certain terms and topics when interacting with local residents.
2) Conflict avoidance by materialisation – taking actions or implementing measures before discussing them with stakeholders that are expected to argue against them, in the hopes that by already being established they will be maintained. For example, Starcamp built semi-permanent tent camps, despite expecting the project's rejection by governmental entities.
3) Conflict avoidance by co-optation – by co-opting/assimilating people who go against conservation initiatives. In practice, this occurred when a former mayor of a local parish, who was vocally against sheep grazing regulations, was employed by ATN to monitor illegal practices around the protected area, essentially subduing his objections.
4) Conflict avoidance by ad hoc manoeuvring – when actions or structures are put in place without being divulged to stakeholders, and if nonetheless conflicts appear then those are subsequently altered to become acceptable. An example was the establishment of fences without approval of the affected landowners, which were later relocated due to complaints.

In summary, due to rigidly internalised conservation plans and visions and restricted expertise on social conducts, conservation NGOs may attempt to avoid and control how conflicts play out. However, such rationalizations cannot guarantee that projects develop

unhindered and paradoxically may trigger more heated conflicts down the road, due to the unforeseeable nature of social systems (Pellis, 2019a; Pellis, 2019b).

These last scientific works, conducted in and around the PNDI, provide interesting insights into the existing regional social contexts and may help frame some of the discussion of this research.

2.3 – Interdisciplinarity in studies of wildlife poisoning

As has already been pointed out, illegal poisoning is a significant cause of death for many animal species around the globe, most notably exemplified towards vultures and other birds of prey (Guitart et al., 2010b; Pantović & Andevski, 2018; Ogada et al., 2012; Ogada, 2014). Vultures face worldwide declines and extinctions due to poisoning and persecution, yet the most intense cause of their decline can be attributed to humans attempting to eliminate carnivores through poisoned baits instead of directly targeting vultures themselves (Ogada et al., 2012). These are complex conservation issues that require knowledge and practices from multiple fields of science, not being solely reliant on ecology (Fairbrass et al., 2016; Lauret et al., 2020).

Many instances of the interdisciplinarity of wildlife poisoning are toxicological, forensic and pharmaceutical studies that not only investigate how different poisonous compounds harm wild animals but also have consequences towards human populations (Guitart et al., 2010b; Pokras & Kneeland, 2008; Schulz et al., 2019). Pokras and Kneeland (2008) observed that studies on lead poisoning in people, wildlife and domestic animals are published in journals belonging to distinct fields, and as such dialogue between stakeholders to find effective and practical solutions is being hindered. Although referring to lead poisoning (that affects wildlife through ammunition left in the ecosystem by hunters) and not poisoned baits, Arnemo et al. (2016) state the following.

> Our understanding of the deleterious impacts of this form of lead exposure on wildlife and humans will change little with further scientific research, no more evidence is required. The same rationales that were used to remove lead from gasoline, paints, and household items should be applied to lead-based hunting ammunition, nationally and internationally. This is now a socio-political issue. (Arnemo et al., 2016, p. 621)

Schulz et al. (2019) echo the rationale of conservation psychology and social marketing research examined at the beginning of this review, by asserting that current public information campaigns accomplish modest results due to "insufficient funding, poorly conceived strategies and objectives, and unsophisticated use of behavioural models or communication theory" (p. 5). As will become clearer, the scientific community that researches wildlife poisoning and other relevant stakeholders have not entirely recognised the importance of including social sciences in their practices or recommendations.

For example, to decrease the poisoning of wildlife throughout Africa, Ogada (2014) recommends banning certain pesticides and strictly controlling the distribution of others, improving enforcement, inflicting harsher penalties on offenders, calling for more international support and establishing pesticide centres across the continent – exactly the kind of technical measures that, despite having their place, have already been shown in this review to be incapable of tackling conservation conflicts by themselves. Craig et al. (2018) conducted surveys in Namibian farmlands to assess the prevalence of poison use and its motivation, coming to completely different conclusions and recommendations. The authors highlighted the importance of improving the social inequality that comes from unequal sharing in conservation benefits and costs among different stakeholders, as well as involving community leaders in education programmes to strengthen local social norms. More generally, they argue that other African countries can benefit greatly from considering the factors that determine illegal poison use regionally and integrating social dimensions into conservation initiatives.

Spain has already been emphasised as an important global hotspot of illegal poisoning of vultures, yet social science approaches to this issue are not easily found in current literature. Mateo-Tomás et al. (2012) used species distribution models and a database of poisoning events to examine the socioeconomic and environmental factors driving wildlife poisoning in north western Spain. Their results identify the presence of cattle, wolves and protected areas to be the 'main factors underlying' the poisoning incidents, while no socioeconomic variables contributed notably towards them; these conclusions arguably have two flaws. Firstly, although they are correlated, presence of cattle, wolves and protected areas cannot be said to underlie wildlife poisoning. Instead they comprise parallel or accompanying issues which are known to be associated with poison use, such as human-

predator conflicts or protected area disputes. Pointing to them provides no clearer insight towards what motivates illegal wildlife poisoning. Secondly, despite claiming to analyse which socioeconomic factors may lead to poison use, variables included in the methodology seem to be only mean age of individuals, population density and the percentage of population working on industrial activities, which seem to not broadly characterise the social or economic dimensions of the population. Although the intention of this research is a positive step towards viewing wildlife poisoning in a more comprehensive manner, its adequate execution is debatable. Another Spanish study by Mateo-Tomás et al. (2020) shows evidence that poisoning is leading to the national decline of red kites, and that "in the absence of effective measures to eradicate or minimise poisoning, further local extinctions may occur" (p. 2). They do not make mention of what these measures could or should entail. Of relevance towards vulture poisoning, Morales-Reyes et al. (2018) present an interesting study that examined differences and similarities between Spanish shepherds' local knowledge and scientific knowledge concerning services provided by vultures. Compellingly, local and scientific knowledge seemed to be mostly consistent, but the authors largely framed these results through a conservationist utilitarian lens. Recommendations included using local knowledge to better identify certain vulture species or to collect data in more rapid and cost-effective ways than standard scientific methods. However, they did mention that local knowledge could be important in developing positive perceptions towards vultures and it could be said that this research integrates regional communities in working towards a common goal. Therefore, this research definitely represents progress towards tackling the social dimensions of conservation. Still within Spain, Lauret et al. (2020) used interviews to identify the main discourses surrounding the tensions caused by the unintended ecological impacts of rodent poisoning. Farmers need to contend with periodic rodent outbreaks that cause considerable crop damage, but poisoning these species may inadvertently cause the death of other wildlife. The authors prudently state that understanding the views of all stakeholders involved is critical for successful conservation management. By understanding which discourses different stakeholders (in this case farmers, conservationists, hunters and governmental agencies) shared or disagreed on conservationists can now build strategies that reconcile stakeholders and mitigate further conflict. One of their conclusions was that professional, neutral mediators need to be trained in resolving some of the existing conflicts as past decisions and

policies have strongly shaped negative attitudes among stakeholders, inhibiting potential dialogue.

Several countries in the Balkan peninsula show intense illegal poisoning activity that is impacting vulture populations, with several conservation programmes are in place to combat its effects (Pantović & Andevski, 2018). Greece has invested significantly in combating wildlife poisoning, as several animal species are now on the brink of extinction as a consequence of this ongoing practice. However, it is often not possible to confirm what is driving the use of poisoned baits, as motivations for 61% of all documented poisoning incidents in Greece remain unclear. Pantović and Andevski (2018) show that the most common motives for the use of poisoned baits are local disputes between land users, examples of which are targeting shepherd dogs if they pose a threat to hunting dogs or arguments between livestock owners. The other largest driver of poisoning is to minimise damage to animal production by bears and wolves. By far the most afflicted region of Greece concerning poison use is Crete (Pantović & Andevski, 2018), where Sakellari et al. (2016) used surveys to carry out much needed research on the psychological drivers of poison use on the island. The results showed that protected areas were positively correlated with illegal use of poisoned baits, and that livestock farmers and hunters favour their use to control predators but are receptive to alternative methods to address predation impacts. One of the currently common pitfalls in conservation applications of behaviour theory can be found in action in this work: general positive attitudes towards conservation outreach and awareness programmes were said to be encouraging because attitudes are a strong predictor of behaviour. As mentioned towards the beginning of the review, general attitudes do not translate to individual behaviours (St. John et al., 2010) and even specific attitudes towards a behaviour are not a reliable proxy for behaviour itself, as it may not be a strong or significant determinant of that behaviour (Nilsson et al., 2020). Nevertheless, Sakellari et al. (2016) provide important advice for other Balkan regions by clearly stating the need to engage communities and local interest groups in meaningful and inclusive ways to achieve more democratic and effective policies.

Finally, two similar studies undertaken in Portugal regarding compliance with poison use regulation are worth reviewing. Both employed the Theory of Planned Behaviour – a sociopsychology theory that is guided by attitudes, social norms and the perceived control

over a behaviour (Ajzen, 2006) – and a questioning method called the unmatched count technique, that helps to study sensitive behaviours (as is the case with illegal poisoning). The first by Fairbrass et al. (2016) wishes to understand the prevalence and determinants of several illegal bird-threatening behaviours, one of which was poison use, in the Alentejo region. The study found that positive attitudes to poisoning were the most important driver of poison use, and that it was mostly carried out by older non-hunters to control populations of wild animals. The authors also suggest conservationists should ally with licensed hunters, as they showed high levels of knowledge and attitudes and are likely to influence the local community more so than external conservation NGOs. This research could be considered an example of simple yet informative and highly useful conservation social science, that should undoubtably help guide decision-making and outreach design in the study area. The second is a dissertation carried out by Taylor (2016), employing the same methodology that aims to understand poisoning behaviour in the PNDI. Here, the author states that the unmatched count technique was not an adequate tools for that specific context, as those results proved to be largely inconclusive. The behavioural model data suggested that peoples' perception of the control they exerted over whether they could successfully apply poisons was the major predictor of poisoning behaviours, but was also correlated to positive attitudes and social approval from peers. The author also admits that the model framework was only partially utilised, so its results are somewhat limited. Curiously, many qualitative remarks noted during or after questionnaires had been applied, when less structured conversation between researcher and participants took place, provided a variety of pertinent discourses about wildlife and participant's perceptions of the park. Future research is needed to comprehensively understand attitudes, perceptions, target groups of poisoning as well as studying the effects that park conflicts may be having on successful conservation actions (Taylor, 2016).

2.4 – Summary

Hopefully this literature review has made it abundantly clear that conservation practice and research should no longer disregard the importance of considering the human dimensions that underlie many of its issues, or treat them merely as a secondary avenue of action. Experts from both the general field of conservation and its various subcategories and niche areas, as is the case with park-people conflicts or wildlife poisoning, have pointed out

how imperative it is to include insights from social sciences in research in order to achieve more effective interventions and long-lasting outcomes. This is especially the case in regard to outreach and awareness programmes aimed at local/regional communities and policies and legislation that will affect key stakeholders; understanding public perceptions or guaranteeing participatory processes take place is often indispensable for achieving these measures succeed. The argument this review makes can be succinctly summarised as the following:

1) Conservation and environmental protection programmes that integrate social science research into their procedures show more success than the more "traditional" approach of focusing on regulations and technical solutions. Solving conflicts within protected areas and preventing wildlife poisoning benefit greatly from a profound understanding of the past and present social landscape.
2) There are a variety of possible ways to integrate social science knowledge into these programmes, as in the past many distinct approaches and frameworks have been employed and many others remain unexplored. Examples from research in both park-people conflicts and wildlife poisoning adopt concepts from conservation psychology, social marketing, social equity, ethnobiology and conflict avoidance.
3) However, choosing which methodology to use in future social science research or what approaches conservation programmes should take depend largely on adequate theoretical expertise – that conservationists often lack or apply inadequately – and a comprehensive understanding of the local/regional context, including existing attitudes, knowledge, perceptions, social norms, behaviours, traditions and many other factors. The absence of either of these could mean falling short of research goals.

All these points tie back to the purpose of this dissertation, of establishing a solid foundation of information regarding social and psychological factors of local communities in order to benefit future research, outreach campaigns, decision-making, policies and regulations, undertaken or put in place to help prevent further wildlife poisoning

3 – Methods

The absence of studies providing an in-depth understanding on information and context surrounding illegal poisoning and people-park relations in Northwest Portugal make qualitative methods the most appropriate for this dissertation. The few previous research studies conducted in the study area have shown that methodological choices can limit the assertiveness of analytical conclusions. Taylor (2016)[1] aimed to explore the psychological drivers of poisoning behaviour by applying the Theory of Planned Behaviour, a social psychology model which has seen widespread use in other scientific fields. This was accomplished, in part, through administering questionnaires, and adopting an indirect questioning technique designed to study sensitive behaviours (the unmatched count technique). However, the low prevalence and high sensitivity of poisoning use made it difficult to accurately assess what motivated this behaviour. Consequently, relying on a theoretical framework or choosing conceptual models to apply to these issues may not be prudent until they are better documented. Therefore, a somewhat broad qualitative approach was chosen, using semi-structured interviews to focus on examining the social world and participants' interpretations, while allowing for an inductive perspective of theory and data (Bryman, 2012).

3.1 – Study area

The PNDI is a Portuguese nature park (Figure 2), an area predominantly consisting of natural and seminatural ecosystems where the long-term preservation of biodiversity relies on a sustainable human activities and natural resource use (ICNF, n.d.). It covers more than 85,000 ha of landscape adjacent to the Douro river that marks the border between Portugal and Spain, with a low human population density dependent mainly on agriculture and livestock production as economic activities. Both these activities have defining effects on the countryside; for example, cereal production creates important biomes for bird species, and the agricultural practices needed to grow vineyards, olive groves, etc., create a mosaic of habitats that allow for higher levels of biodiversity (ICNF, n.d.). The PNDI has a large variety of nesting bird species, of which the most emblematic are rupicolous (that inhabit rocky areas), several of which are endangered species. Among these are the Griffon vulture, the Egyptian vulture (whose distinctive head is the symbol for the PNDI) and two nesting pairs of the rarer Cinereous vultures (ICNF, n.d.; Palombar, 2020). These vultures,

[1]Research was funded by the LIFE Rupis project (LIFE 14/NATPT/000855 Rupis)

along with other scavenger species represent the most vulnerable to illegal wildlife poisoning in and around the PNDI. Discussing poison use has also led local community members to express the negative attitudes they held towards wolves (Taylor, 2016). Unfortunately, the last national wolf census was conducted in 2002/2003, which reported the existence of around between 200 to 400 wolves in Portugal; although one of the remaining populations is said to be North of the Douro river, exact numbers have not been published and the current ongoing census ends in 2021 (Geraldes, 2020, Rodrigues et al., 2013).

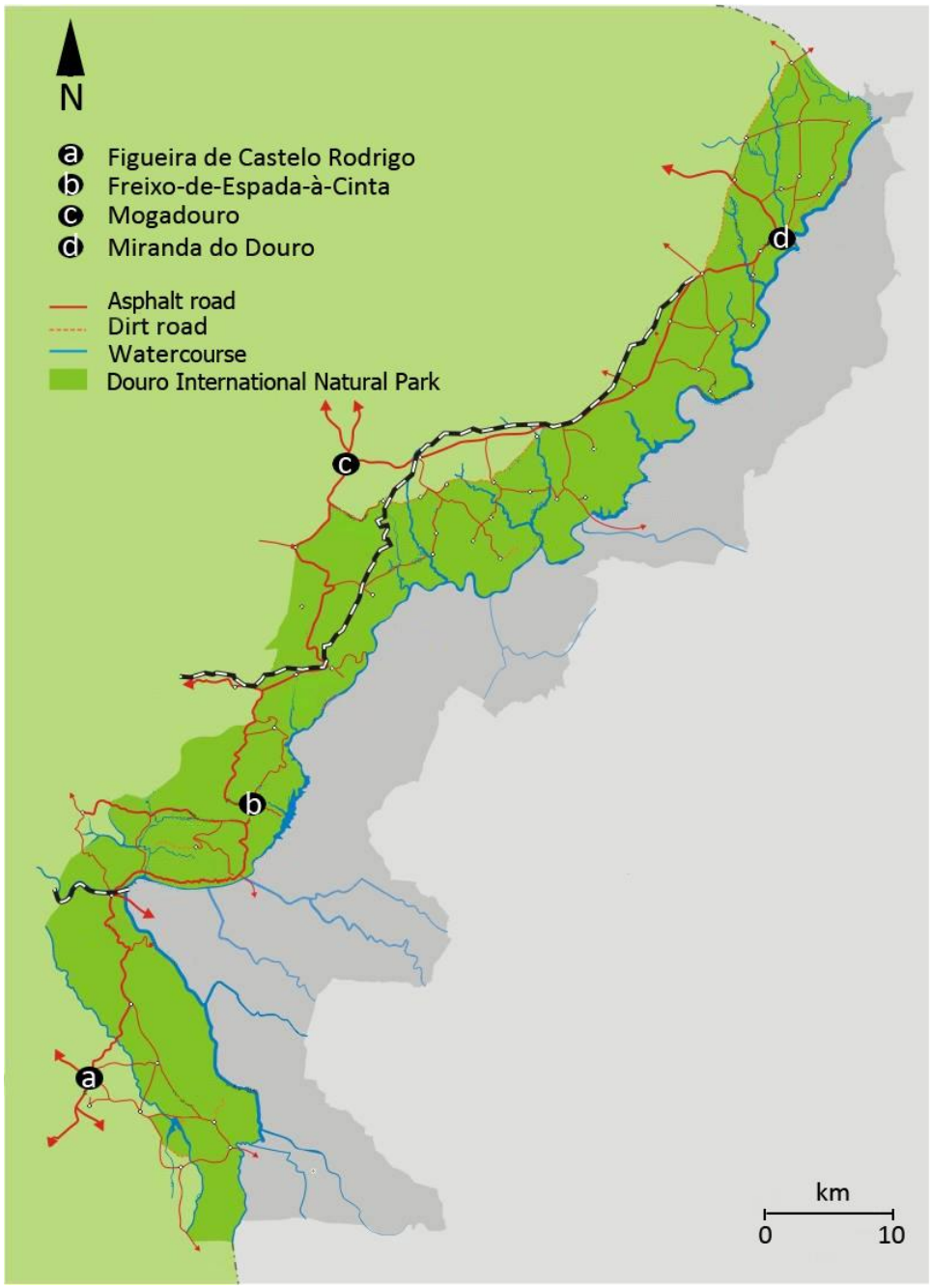

Figure 2 – Map of the Douro International Natural Park.

3.2 – Site selection

The PNDI encompasses a series of villages belonging to four municipalities: Figueira de Castelo Rodrigo, Freixo de Espada à Cinta, Mogadouro and Miranda do Douro (see Figure 2). As such, a total of 12 villages from all municipalities were chosen, including two in which to conduct a pre-test of the interviews – five in Figueira de Castelo Rodrigo, two in Freixo de Espada à Cinta, two in Mogadouro and three in Miranda do Douro. These were chosen due to the existence of reports of illegal poisoning in all of them since 2015 (SPEA, 2020). Both villages selected for pre-testing resembled the size and population of the other villages included in the study, and are situated in the municipality of Figueira de Castelo Rodrigo. The qualitative nature of this research allowed the selection of sites with small populations sometimes fewer than 100 people, whereas previous studies could not include these locations, despite the known occurrence of illegal poison use, due to the adopted methodologies (Taylor, 2016). Given their small population and familiarity between residents, the villages selected for inclusion in this study are not specified as to guarantee participant anonymity (see Figure 3 for an example).

Figure 3 – Example of houses in one of the medium-sized study villages.

3.3 – Data collection method

Semi structured open-ended interviews were used in which participants were consistently asked the same open-ended questions, allowing for answers with detailed and nuanced information. Individual and group interviews were conducted in order to reconcile both their advantages – the personal and detailed answers with fewer social biases of individual interviews and the potential for more dynamic discourses that could arise from group interviews (Bryman, 2012; Newing, 2011). Both types of interviews used the same script, regardless of the number of participants.

The few previous social studies conducted in Portugal concerning illegal wildlife poisoning have focused on using quantitative methods to study predictors and prevalence of poisoning behaviours (Fairbrass et al., 2016; Taylor, 2016). This implies that the present study may be the first attempt to exclusively employ qualitative methods in formal research about poison use in Portugal.

3.4 – Participant selection

The process of selecting participants for interviewing was hard to define prior to visiting the study sites, due to their small size, rural nature and specific setting. However, after conducting field work in both pre-test sites it became apparent that door to door systematic interviews were mostly ineffective, as many houses were empty and most people were found in the village square, streets, surrounding fields or local coffee shop (if one existed). Additionally, many pre-test participants encountered at home had no direct connection to rural activities and limited interactions with local wildlife. Therefore, purposive sampling was used, namely typical case and opportunistic sampling, in order to ensure the collection of data from participants belonging to certain units of analysis. Purposive sampling refers to a non-probability strategy that aims to sample participants relevant to the research question being posed. Typical case and opportunistic sampling are two approaches to purposive sampling, the first referring to sampling participants because they are representative or exemplify a broader category of which they are members; opportunistic sampling takes advantage of opportunities to sample participants with whom interaction is unforeseeable but that may contribute with pertinent data (Bryman, 2012).

Purposive sampling units were as follows: (1) villagers whose activities were heavily related to farming, pastoralism, agriculture and hunting; (2) people that interact with Nature in their leisure time (example: taking walks in the countryside, attending NGO events, etc.); (3) mayors of local parishes; (4) people related to those belonging to other sampling units (example: husbands, wives, sons, etc.). Sampled participants differed sufficiently from each other in terms of key characteristics relevant to the research question, ensuring a variety of results (Bryman, 2012).

These sampling techniques were used to select participants for both semi-structured interviews and group interviews. Semi-structured interviews were used for single participants or even pairs of participants, often neighbours, couples or friends encountered in conversation within the village. Any attempt to separate these pairs in order to perform individual interviews would have been counterproductive or resulted directly in refusal to take part in the study. Group interviews were used in cases where 3 to 4 participants were together. Previous to starting field work, three to five interviews per study site (village) were established as a target sample size. Interviews were then conducted in all sites, reaching the targeted sample size each time, at which point collected data was reviewed to check for data saturation, which was confirmed to have been arrived at. Data saturation is achieved when new information produces little or no change to the patterns in the data and collecting further data would produce little important new understanding of the research question (Guest et al., 2006; Newing, 2011).

3.5 – Individual and group interview protocol

All interviews began informally, with a brief introduction stating the purpose of the study, recording participant's consent, addressing terms of confidentiality, indicating how long the interview is expected to take and clarifying any questions that they may have. Participant's identities remained anonymous throughout the interview and no personal information documented is disclosed in the study. All research practices were undertaken in compliance both with the ICS and EU ethical guidelines (European Commission, 2013; Instituto de Ciências Sociais, 2018).

Interviews were undertaken by two to three researchers at a time: myself, conducting and asking questions, and one to two assistants, responsible for recording the conversation

and taking field notes. Interviews were audio recorded while notes were taken concerning the number of participants, their genders and transcriptions of relevant exchanges or details in the conversation.

The interview script ordered questions from least contentious and/or sensitive to most, grouped into sections. General questions about life in the village and basic background information were asked first in order to build trust and confidence between both parties (Jacob & Furgeson, 2012). Questions then progressed through increasingly sensitive topics, first relating to local fauna, then attitudes and opinions towards the PNDI and finally the use of poison, illegal or otherwise, in or around the village. Wording of all questions was open-ended and as neutral as possible in order to mitigate influenced answers, and were asked one at a time (Turner, 2010). Questions were consistently asked in the same order, except during interviews in which participants mentioned illegal poison use or opinions about the PNDI before the interviewer, without being asked or prompted. In these interviews, due to the sensitive and illicit nature of these topics, question order was altered to fit the participant's chain of thought/dialogue more naturally. The employment of appropriate follow-up questions and probing was necessary in most cases to acquire further information or encourage a hesitant participant, although probing was kept to a minimum as to reduce inconsistencies between interviews (Bryman, 2012).

After ending all lines of questioning participants were asked if they had anything they wanted to say before thanking them. Villagers who had witnessed the interview briefly or from afar were not considered as potential participants as to avoid influencing their answers in any way. This did not however seem to influence the selection process, as most interviews were set in secluded places where few (if any) other people were present.

Despite the fact that procedures and scripts for group interviews and individual interviews were identical, group interviews sometimes showed the need for direct moderation in cases of tangent discussions between participants, or for intervening in order to encourage less active participants (Bryman, 2012).

3.6 – Data collected

Six pre-test interviews were conducted in July of 2018 in two villages, followed by 41 interviews in the remaining 10 villages during the end of July and beginning of August of 2018.

These pilot interviews did not result in any changes to the interview scripts. A total of 47 successful interviews were conducted with 73 participants (51 male and 22 female). Additionally, 34 people refused to participate, five people were not relevant (due to being foreigners or tourists) and two people could not physically answer (because of health conditions or deafness). The extreme limits of interview times range from just over two minutes to 40 minutes in length, but averaged around 15 minutes per interview. A total of 11 hours and 43 minutes of participant interviews were recorded.

The majority of participants were involved in small scale agriculture, while many also owned cattle such as sheep, goats or cows, as well as raising chickens or rabbits. Fortuitously two participants were heads of their respective parishes, while another was a former head. Of the interviews, five were group interviews, taking place in local coffee shops, in participants' gardens or on street benches. Individual ones tended to take place in quiet streets, village benches, on the outskirts of the community or in crop fields. A local conservation NGO staff member was also interviewed to provide supplementary information. Thus, all participants belonged to one of the purposive sampling units established beforehand.

Results from group interviews did not seem to differ significantly from individual semi-structured interviews. The one notable difference is that group participants more often encouraged or reassured fellow participants (for example if certain participants were initially hesitant to answer), and corrected them if their answers were unknowingly wrong (such as dates or names of places). Therefore, no analytic distinction is made between both these types of interviews.

3.7 – Interview transcription

As all interviews were recorded, complete accounts of exchanges between researchers and participants were available. Transcripts were written for each that translated not only what participants said but the way that it was said, allowing for repeated examinations and subsequent coding. Transcription was an ongoing process that occurred simultaneous to data collection, helping to inform the sampling process and developing theory as it emerged. This was also done in order to prevent the accumulation of overwhelming amounts of data to be transcribed at the end of the data collection period

(Bryman, 2012). Portions of certain interviews were summarised instead of transcribed in their totality, namely the introduction or final remarks (where many exchanges were simply niceties or irrelevant), or answers that digressed too far from the research questions.

3.8 – Coding

The coding process began early on, as basic thematic coding and memo writing initially accompanied transcription. Coding is a systematic form of annotation that entails assigning portions of text with 'codes' that designate the themes the text represents or involves. Codes are customarily hierarchical, with higher level codes representing overarching themes and lower levels consisting of subdivisions. Memos are more developed notes written separately from codes, such as summaries or ideas that are generated when thinking about the data (Newing, 2011). Coding was done in an iterative and inductive manner, as no previously established list of codes existed, instead emerging from the data as the process of coding went on (Bryman, 2012).

In an initial phase the examination of data produced conceptual labels given to many discrete kinds of phenomena, here referred to as categories. Themes incorporate a grouping of various categories that pertain to an encompassing subject relevant to the research questions. Categories and themes went through several revisions and examinations, to ensure that no two described the same or overlapping issues. This continued until they were saturated, meaning that categories and themes were sufficiently well developed, no further data was found to belong to any of them, and the relationships between them became apparent (Bryman, 2012). Coding is merely a mechanism for exploring and interpreting information, and reducing the large amounts of data collected, and does not equate to analysis. Therefore, after coding was finished the relationships between codes were reflected upon in order to form hypotheses about the data (Corbin & Strauss, 1990). This was aided by generating conceptual maps that facilitate the visualization of codes (Figure 4). Coding and mapping was performed using MAXQDA 2020 (VERBI Software, 2020).

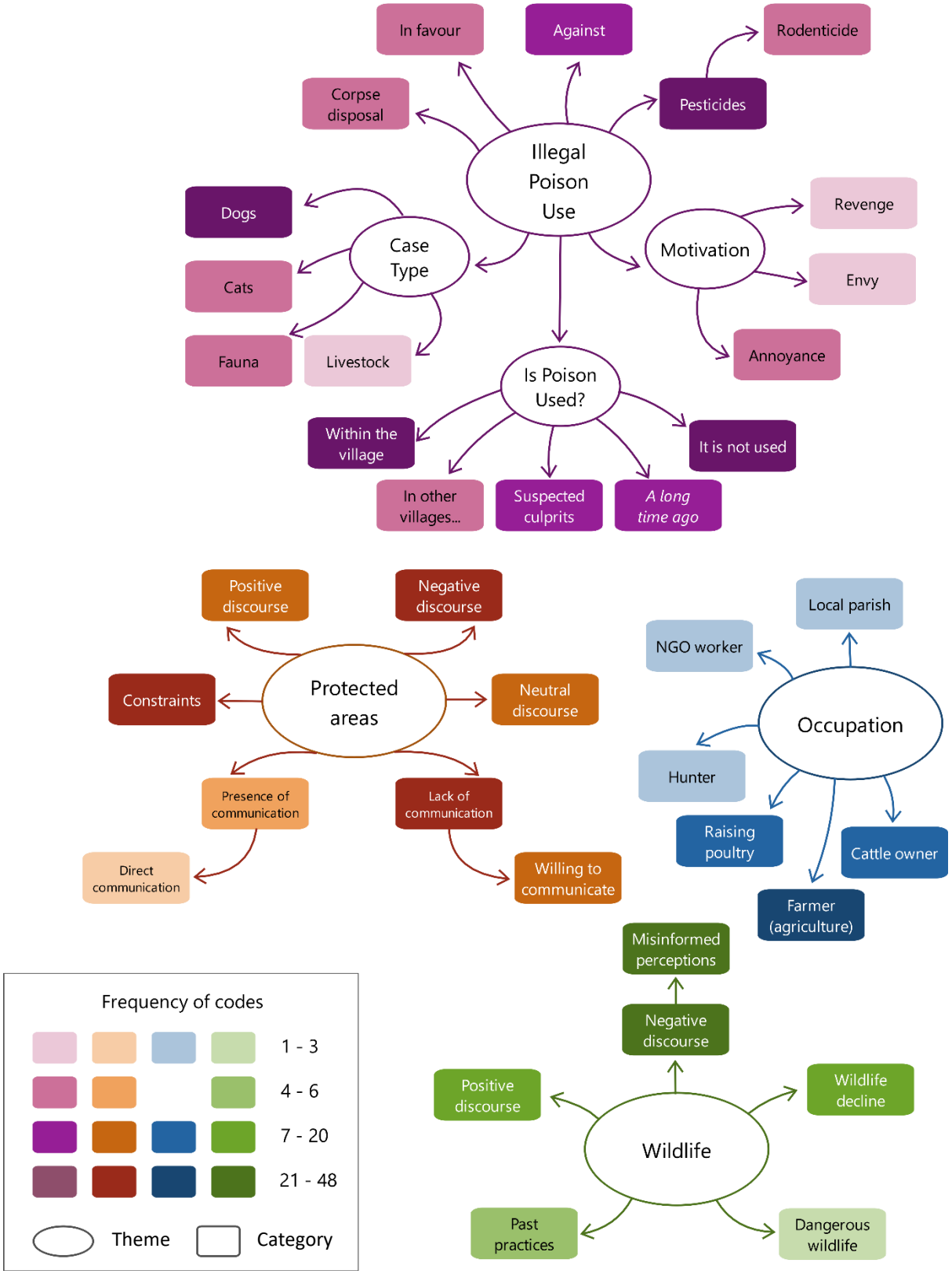

Figure 4 – Conceptual map generated through the coding process, showing overarching themes and the categories they encompass. Frequency of codes are illustrated through colour intensity.

4 – A holistic examination of animal poisoning in the Douro

The purposes of this research are to better understand the large variety of existing social and psychological factors within the context of illegal animal poisoning in the Douro region; to examine the relationships between rural communities and the PNDI or local conservation NGOs; and to help make regional conservation management more socially and ecologically efficient, inclusive and enduring.

Data obtained from both types of interviews almost exclusively revolved around three key themes: (A) knowledge and opinions on wildlife; (B) the absence or presence of animal poisoning in the region; (C) lack of communication within the PNDI. Therefore, this section presents the results and discussion of each key theme individually.

4.1 – Knowledge and opinions on wildlife

Many participants spoke extensively on which animals exist in the region and what their opinions of them are – more than initially expected – and provided plenty of relevant data for analysis. As has been seen, the attitudes, perceptions and views that rural populations (especially those living within or close to protected areas) have regarding wild animals may ultimately be crucial to their conservation, mainly through compliance with regulations that entail their protection. Here, participants' discourses about different species will be explored, how they relate to previously existing studies, as well as what these answers may entail.

4.1.1 – Boars and foxes

When asked broadly about the local fauna most participants were quick to point out their annoyance at animals that cause damage or economic loss, mainly wild boars and foxes. Although both of these species are hunted, some participants said they should be hunted more often and intensely, seeing as they reproduce so fast.

Boars were repeatedly referred to as the most numerous and harmful animal of the region, damaging large crops of wheat, corn, oat, vineyards and almond trees at a fast rate. This appears to be true, seeing as the ICNF has itself recognised the nationwide perception that boar density is increasing, due to more sightings and more hunting permit requests ("ICNF vai permitir caça aos javalis", 2020). However, this increase remains relatively

hypothetical, or anecdotal at least, as no data on boar density or abundance exists and is very hard to obtain, apparently due to their vast mobility (Agência Lusa, 2019).

Foxes inflict less damage, but often kill chickens if they can manage to enter their coups. A few participants mentioned the use of traps to catch foxes, and one admitted to using a cage baited with a chicken or eggs in order to capture them. These complaints are also echoed on a national scale, as prominent members of the Portuguese hunting community have pointed out in the media that rising numbers of foxes are a considerable danger to small scale livestock owners, due to attacking chickens and lambs. Similarly to the reports concerning boars, monitoring of fox abundance and population trends is, as of yet, not carried out (Pereira, 2019). Whether both these species are increasing or not, or to what degree they may be, is a discussion that continues to be a yearly topic in both media outlets and the policy sphere, and data suggests that Douro residents perceive their increases as real.

4.1.2 – Birds of prey

Birds of prey (namely eagles, falcons and vultures) were also pointed out as being adverse/unwanted animals; in fact birds of prey were not discussed positively at all during interviews, with the exception of a single participant. Generally this was due to birds of prey feeding on small game animals, and therefore being perceived to compete with local hunters. This common hunter-raptor animosity has been well documented and often leads to persecuting these species (Smart et al., 2010; Whitfield et al., 2003). They were also said to kill pigeons and other birds that live within the villages, which angered some participants.

Some of the participants did not seem to be able to distinguish between vultures and other raptors, stating that vultures hunt live animals such as rabbits, hares, partridges and cattle. Readers are reminded that vultures, especially those present in the Iberian Peninsula, are almost exclusively necrophagous. Their diets consist mainly of carrion from wild fauna and cattle animals. In other regions, the Egyptian vulture has been documented feeding on eggs, insects and small animals (Hidalgo et al., 2005), but so far in Portugal it has only been seen eating mammal or bird carcasses.

One account was particularly noteworthy, given by an elderly female participant (C 3 F1) that said she was afraid of vultures when they circled above the village, and that they sometimes land to eat new-born calves. This hints towards a possible exception to their

normal dietary behaviours, and is not the only data that points towards that possibility. Griffon vultures have increasingly been reported to feed on new-born calves by independent eyewitnesses from various regions in Portugal, being attracted by odours from cows' placentas during birth, dozens of griffon vultures huddle around a new-born and begin to peck and pull it with their beaks. In such large a number, these pecks result in the calf's eventual death leaving it ready for consumption (SPEA, personal communication, May 3, 2019). This could be related to the fact that leaving dead cattle out in the field or in feeding stations has been forbidden for the past years, but used to be a common practice. According to an interviewed local NGO worker, the absence of these carcasses, coupled with a rapid population growth of Griffon vulture populations that became accustomed to feeding on available cattle carcasses, may potentially have sparked these new feeding habits (A. Barbosa, personal communication, August 1, 2018). The case described by participant C 3 F1 could be one of these incidents, while it could also be attributed to other birds of prey such as eagles.

Accounts of vultures feeding on livestock seem to also be increasing elsewhere, such as in Spain and France, even extending to attacks on dogs and humans (Buijs et al., 2012; Margalida & Donázar, 2020). Farmers also mainly attribute these attacks to food shortages and the removal of livestock carcasses from fields. However, food shortages are unlikely prompting these behaviours, as in some of these locations Griffon vultures are increasing in number. No certified cases of vultures killing healthy livestock have been published in scientific, peer-reviewed studies, but dozens of news stories circulated in 2019 alone (Margalida & Donázar, 2020). Whether this is due to false reports or to the fact that scientific research and publishing is a slower process is difficult to know. Nevertheless, the fact that griffon vultures are being perceived as adopting these behaviours more frequently could imply near future consequences in how they are perceived by rural inhabitants, especially livestock owners. This is not only true regarding Spain and France but in the Douro as well, especially seen as all but one participant did not make any positive remarks concerning vultures. Aside from their intrinsic value, necrophagous birds provide important services not only to their surrounding ecosystem but to human communities as well. As mentioned at the beginning of this study, they help keep other wildlife populations healthy by eating animal corpses and therefore preventing the spread of toxins and diseases, which could otherwise even have consequences on human health (Vulture Conservation Foundation, 2019). These

ecosystem services towards society should be familiar at least to rural populations that live close to larger populations of vultures, commonly observing them in large quantities. Social media have an essential role in disseminating rigorous, evidence-based information (Margalida & Donazár, 2020), but conservation NGOs should act pre-emptively to mitigate the spread of misinformation and negative attitudes towards vultures, as to prevent them being directly targeted for poisoning.

4.1.3 – Deer, badgers and others

Two other species were frequently mentioned as being harmful – the roe deer and the badger, although this last species was exclusively mentioned in the northern sections of the PNDI. Deer were described similarly to boars, in that they ruin farmers' crops, although to a lesser extent. Contrary to animals that caused damage to agricultural crops in general, badgers were reported as responsible for heavily damaging pumpkin plantations specifically, and were only spoken of by participants that cultivated that plant. Other detrimental animals sporadically mentioned were the common genet, Egyptian mongoose, snakes, horses, wild dogs and cats, rats, and small birds that eat fruit from residents' trees.

4.1.4 – Wolves

A particular animal that occasionally produced vigorous discussion by participants was the Iberian wolf. There was no consensus about whether the wolf still exists in the region or not. Some participants agreed that wolves no longer existed in the Douro region, while others said they still attacked cattle or roamed the valleys. This discrepancy was not related to different villages or municipalities, nor to particular occupations such as hunters or cattle owners. In reality, only the northern sections of the PNDI (Mogadouro and Miranda do Douro) are considered to be wolf habitat while the southern parts (Figueira de Castelo Rodrigo and Freixo de Espada à Cinta) have not had wolves for the past few decades (Lopes, 2017). Their continued perceived existence in southern areas may be due to them being so ingrained in regional culture. Nevertheless, all participants who mentioned wolves held negative views of them, and could recall events in the past in which wolves killed livestock belonging to villagers. One group interview that included a parish mayor attributed the absence of wolves to wild boars which, according to the participants' answers, attack and possibly feed on wolves.

> Nowadays thankfully wolves haven't been seen because we have boars. And where boars exist, the wolf isn't spotted. . . . Boars are as much herbivorous as carnivorous.

> The pig is an omnivorous animal. Here it attacks, and so thankfully we haven't had any complaints [of wolves]. (Participant C 4 M1)

The participant reasoned that because wild boars exist and are multiplying they kill more wolves, causing them to disappear. This is a very interesting point of view for two reasons. Firstly because it stems from the inability to establish an accurate cause-and-effect relationship; participant C 4 M1 correctly observed that as boar numbers have risen wolf numbers have fallen, but in doing so mistakenly confused correlation with causation. Secondly, because it actually inverses the cause and the effect: in reality, larger numbers of boars in recent years could be attributed to dwindling numbers of wolves and their ranges. As wolves prey heavily on wild boars, the absence of their predation as a population control mechanism could be one of the reasons boars have increased. This logic could be considered simply an outlier, but it is relatively distressing that it was corroborated by the local parish mayor; during the group interview the other three participants also agreed and supported participant C 4 M1 as he explained his thought process.

This dialogue exchange, along with the results from other discourses concerning wolves, also adequately portrays how a majority of rural inhabitants do not realise that some of their main concerns could be mitigated if wolf populations were preserved. Both wild boars and foxes were pointed out as being the most unwanted animals by farmers, livestock owners and hunters. Resident wolf populations could help control both these undesirable and 'harmful' species. Boars, especially piglets, are controlled through hunting, as are deer; fox numbers are supressed by the presence of an apex predators such as wolves (this phenomenon is known as mesopredator release). Also worth mentioning is the fact that feral dog populations inflict losses to livestock that are subsequently mistaken for wolf attacks by inhabitants. Wolves however supress feral dogs and indirectly lead to larger populations of hares and partridges (Grupo Lobo, n.d.). Wolves on the other hand do not feed on hares or partridges at all, two game species that hunters expressed were sadly decreasing.

Services provided by wolves are well known to scientists and conservationists, and some NGOs do exist that communicate them to both the general public and specific target audiences. In the case of this study, advantages provided by wolves were never mentioned by any participant. Recent research conducted within the same district as the PNDI has shown that communities continue to fear wolves, driven in part by a lack of knowledge regarding the

species, weakening conservation success (Lopes, 2017). It seems clear that future conservation projects and outreach programmes should attempt to address these gaps, in and around the area of the PNDI (communication between the park and its inhabitants is explored later on in this chapter).

4.1.5 – Reintroducing animals into the park

Ten participants from several villages mentioned that the PNDI regularly released wolves in and around the park's territories. Participants from separate interviews even depicted these released wolves as inept and unskilful hunters, having been raised in captivity. One stated that those truly responsible for wolf deaths are the administrative bodies of the park, releasing them into areas with low abundances of wild prey. Another explained that the Iberian wolf had died out, and that these released wolves were of a different species. This same participant described how cattle owners used to come together to kill newly released wolves, and then bury them due to carrying tracking chips implanted by the PNDI management.

> The Iberian wolf disappeared. There are still the ones they [the park] introduce, but they aren't Iberian wolves, they're . . . I don't know. They put them, I don't know where they bring them from but farmers then get together, two or three, and shoot them. They [farmers] know where they are, they place a lure and shoot them. . . . One shot, then it has to be buried, they have [electronic] chips. Everyone knows that they have a chip and it's dangerous. (Participant H 1 M)

Another participant, a prominent sheep farmer, recounted how several of his sheep were killed over a period of a few days. After contacting the park staff, they took photos of the dead animals and conducted molecular analyses, both confirming the attacks were not wolf related. Continuing to suspect the PNDI's involvement, one night the participant encountered a vehicle belonging to the park inside his sheep enclosure, which he said was used to transport a wolf from location to location. After threatening them, he never saw them again and the attacks on sheep stopped altogether. In the participant's mind, this confirmed beyond a doubt that the park was responsible for the 'wolf' attacks. He stated 'The animal is obedient, it obeys them. They bring him and take him away' (Participant F 4 M).

It should be highlighted that in fact neither the park nor local NGOs are involved in reintroducing animals back into the wild. Although currently being considered in some countries, wolves have never been reintroduced anywhere in Europe (Grupo Lobo, n.d.). Similar reports were documented by Taylor (2016) among PNDI residents, when participants also claimed wolves were being reintroduced back into the wild. This range of beliefs is hinted at in other ethnozoological research in the Iberian Peninsula, but not expanded upon (Álvares, 2011). Fascinating sociological research by Skogen et al. (2009) found that in both France and Norway rural communities were fully convinced wolves had been reintroduced to their regions by the government, conservationists and protected area administrations, by breeding them secretly in captivity. This explanation for the reappearance of wolves, held by hard-core wolf adversaries but also regular farmers and hunters, was found on websites, anti-wolf publications and even national television. French locals told stories of wolves that after being illegally shot by hunters had been found to have microchips implanted in them by whoever released them, practically identical to the perceptions held by participants in the Douro. Speculations that current wolves are somehow less adapted than previous generations because they are 'introduced', 'raised in captivity' or from an entirely different breed are also present in the study by Skogen et al. (2009). The recently arrived wolves did not always kill prey for consumption, instead sometimes only taking small bites, unlike 'real' wolves which attack and kill to eat. The new wolves were also reportedly a different colour than they used to be, allegedly showing coloration from other parts of the world (from which they originate).

This theme of the PNDI's involvement in releasing or reintroducing animals back into the wild was common and not limited to wolves, openly spoken of by a total of 18 participants and implied by several others. Alongside wolves, birds of prey were the other main type of animal said to have been released throughout the Douro landscape, although this was mentioned at least once of many other animals deemed undesirable (wild horses, deer, boars, wild dogs, mongooses, snakes, mice) as well as game animals (partridges and pheasants). A few of these participants could not understand the reasoning behind releasing animals into the wild, and their logic would vary throughout the interview. For example, on the one hand some stated that predators such as eagles would not have sufficient prey in the wild to survive; on the other, they pointed out the unfairness of releasing prey animals such as partridges, seeing as they would be hunted by predators. In other words, it is unfair to release

animals if they do not have enough food, but it is also unfair to release animals if they are going to be eaten. Some said releasing birds of prey did not make sense, as hunters already struggle to find game animals and these birds would make it even harder. Three group participants explained how snakes and mice have started to come into people's houses, whereas before they weren't ever seen. Neither of the three had ever seen park staff release any animals, but reasoned that 'they did not use to exist, and now they do'. Despite these claims, not a single participant could recount having personally seen park staff or vehicles releasing animals around their villages. Instead, the reality may be that some species have become more prevalent due to measures taken within the park to protect flora and fauna, or it may simply be a perceived increase in these animals and not an actual one. The belief that animals (other than wolves) are being reintroduced has also been documented in Spain, where rumours about pests/vermin being released into the wild are accompanied by negative views towards conservationists and the government (Delibes-Mateos, 2017; Lauret et al., 2020). More often than not such rumours are refutable due to scientific evidence to the contrary, but conservationists should be careful when dismissing these accounts as they may be somewhat meaningful or accurate; local rumours about rabbit reintroduction by environmentalist NGOs in Spain may hold some validity, as in fact hunters (not NGOs) have been known to release domestic rabbits in an attempt to restock wild populations (Delibes-Mateos, 2017).

4.1.6 – Positive discourse about wild animals

So far we have discussed the negative attitudes concerning fauna that were prevalent throughout the collected data, but a minority of participants did respond with positive opinions or comments about regional fauna when asked. The reasons given for appreciating wildlife were their beauty, that seeing them is an enjoyable experience, and the fact that they belong in the wild. However, unlike the very defined and strong negative discourses, these positive ones were short and vague – several of these answers were simple statements such as 'I enjoy them [wild animals], they don't bother me' (Participant B 3 F). Also, of these positive answers many were accompanied by adverse remarks about troublesome animals.

Only three participants singled out species they enjoyed seeing and made specific remarks about them, which concerned seeing the golden eagle, the Egyptian vulture, partridges and listening to foxes bark.

> Oh I find it beautiful. I like to watch them [birds of prey] and I like to appreciate them, especially the golden eagle when we go down [to the valley] and . . . well, you lose sight of them but it's formidable isn't it? As the saying goes 'you've got to see it to believe it'. (Participante L 2 M)

These emotional responses to wildlife certainly have a positive impact on human-wildlife interactions. In some cases emotions have been shown to explain intentions to support or oppose conservation initiatives more than knowledge and beliefs, and are integral to studying human-wildlife conflict (Hudenko, 2012; Slagle et al., 2013). Ultimately though, these limited amounts of affection shown towards wild animals contrasted highly with the extensive and detailed negative comments made by the majority of participants interviewed. Further considerations about reconciling these strong unfavourable attitudes will be made later in this chapter, but so far the results point to an underlying need to improve communication with park residents if their perceptions about fauna are going to change for the better.

4.1.7 – The decline of wild animals

Whatever the opinions about the surrounding fauna, participants agreed that most animals were decreasing in number. Rabbits, hares, partridges, cuckoos and lizards were said to have dwindled over the past decades due to forest fires, the use of herbicides and the myxomatosis virus (a usually fatal disease that afflicts European rabbit populations) . Just as unanimous was the understanding that wild boars have multiplied immensely. Some participants stated fox numbers were decreasing, while others said the opposite.

4.2 – The absence or presence of animal poisoning in the region

In order to properly frame this section of results, it is important to reiterate that all villages in which interviews were conducted were selected as study sites due to having confirmed animal poisoning incidents since 2015. Practically half of all participants denied or were unaware of the existence of illegal animal poisoning in their village in the present and recent past. After probing, some of these participants would admit to the existence of poison use in the past (over 10-15 years before the interviews), or in nearby villages. Contrastingly, the other half were aware of recent cases of illegal poisoning in their own village. Despite this,

very few participants were aware of cases involving wild animals and spoke almost exclusively of domestic dog poisoning.

4.2.1 – Domestic animal poisoning

Answers with regard to domestic animal poisoning were widespread, being reported in every village. In fact, 15 participants used to personally own dogs or cats that suffered poisoning, while others knew friends or relatives in the same situation. Some of these participants took their pets to a veterinary clinic while others attempted to treat them with household remedies (such as forcing them to ingest olive oil in order to vomit). Cases in which pets died were sometimes communicated to the police, but often were not reported at all. In some cases the animals' corpses were merely discarded in the local waste container. The remaining participants, who did not personally own poisoned domestic animals, knew of animal poisoning by talking to neighbours or other villagers. Although none of the perpetrators' identities were known for certain, participants aware of these cases stated that the culprits were from inside the village, not outsiders, and in some cases had specific suspicions.

The existence of considerable accounts regarding poisoned dogs paired with the simultaneous lack of awareness of wildlife poisoning is a fairly unexpected result. It seems that cases involving poisoned dogs may currently be more widespread than previously thought or documented by authorities. In the past there have been years where dog poisoning cases in the PNDI were more intense (26 dead dogs were documented in 1999 and 13 in 2002, confirmed to be poisoned), but in recent years such cases have been reported less frequently. In this study, almost half of all participants spoke to some degree about this subject, and of the 73 people that were interviewed 15 of them personally owned domestic animals that suffered poisoning, lethal or not. That number alone represents more than the total number of dogs confirmed to be killed by poisoning in the period between 2015 and 2018 within the study area (SPEA, 2019). The amount of confirmed cases may not accurately reflect the current reality. It would not be surprising that more domestic animals are victims of illegal poison use than wild animals, as Barosa (2018) found that 81% of animals involved in possible poisoning cases in Portugal were domestic; however, that result may partly be due to poisoned domestic animals being much more likely to be detected and documented than wildlife poisoning events (Mateo-Tomás et al., 2020). Current research in Spain suggests the

regional number of poisoned dogs is a good indicator of poison incidence and changes in breeding populations of a scavenging bird of prey, the red kite. Poisoned domestic animals were therefore put forth as a reliable index of the actual incidence of poison events afflicting wild species (Mateo-Tomás, 2020).

Possible motivations driving domestic animal poisoning were described similarly between all interviews: perpetrators may attempt to poison other people's dogs out of vengeance or retribution (for example if a dog attacks the perpetrator's dog), out of envy of another dog's hunting abilities (if another hunter's dog is better at finding game animals, or another farmer's dog is better at herding cattle), or if the perpetrator finds dogs/cats irritating or a nuisance (for example if a neighbour's dog barks loudly and frequently).

These results point to stronger and more specific measures being needed to address poisoning of domestic dogs. Firstly because it seems poisoning is more frequently targeted at dogs than at fauna, so mitigating the accidental or secondary exposure of wild species to toxic substances implies reducing domestic animal poisoning. Secondly, due to the number of poisoned dogs being a strong indicator of wildlife poisoning events, it is important that dog owners understand the importance of reporting these cases (fatal or not) to pertinent institutions, whether the park's management, local conservation NGOs, the National Republic Guard (GNR; responsible for performing national enforcement of legislation pertaining to the protection of nature or the environment), or at least a veterinary clinic, and that the remains of domestic animals killed by poisoning should be adequately disposed of. All these mentioned groups need to articulate with each other, as to guarantee a unified database of poisoned domesticated animals.

4.2.2 – Wildlife poisoning

Only four interviews pertained to cases involving fauna: two interviews contained general mentions of how poisoned baits can be used to attempt to kill foxes, while the other two concerned the same poisoning event in which a bird of prey, a fox, a domestic dog and a mole were found dead. One of these participants was the dog's owner, while the other was a former worker for one of the regional conservation NGOs. Curiously, although the later participant was personally involved in the case and collaborated with the GNR sniffer dog team, he was not convinced the animals had been victims of poisoning, stating that they could have all died of independent causes (such as the bird of prey being shot by hunters, the dog

owner being displeased with it and thus killing it, etc.). This discourse points again to a lack of any substantial communication regarding poisoning within the study area. Practically no participants were aware of the recent wild animal deaths linked to poison usage within their own villages, and of the four that were, two only knew due to being personally involved. Furthermore regarding that particular case, all animals concerned were proven to have been killed after having ingested metaldehyde (used to eradicate snails; SPEA, 2019), yet despite this a participant that was involved with the aftermath of the poisoning event – that worked for a conservation NGO – was reluctant to believe they were poisoned. All this provides sufficient basis to declare a considerable lack of top-down information, that people related to animal poisoning events are not being provided sufficient feedback about the circumstances, and a need for more open dialogue between all stakeholders involved.

4.2.3 – Pesticides (herbicides, insecticides, rodenticides)

The possible relevance of animal poisoning through repeated consumption of plants treated with pesticides became apparent during interviews in one of the villages, where pesticide use was widespread, and participants attributed both wild and domestic animal deaths to them. To be clear, this does not pertain to the intentional use of pesticides to poison an animal (for example, by poisoning a bait with pesticide), but to their intended use (when sprayed on plants, applied on roadsides and so on).

Although not due to intentional behaviour, many participants considered herbicide and insecticide use, two types of pesticide that target undesirable plants or insects respectively, to be the main cause behind the decrease in wild fauna. Some participants mentioned animals such as foxes, rabbits, snakes, partridges and other birds that die or become feeble by consuming plants treated with pesticides. Others, especially farmers, spoke of how sheep and goats can waste away and die through prolonged consumption of those plants. Because these animals often eat while being herded, some participants who held livestock showed anger at other villagers for not marking lands that had been treated with herbicides. Farmers owning livestock killed by pesticide consumption mostly said they reported the situation to the authorities and buried the corpses, although one participant said he simply left the body on the hills nearby. Similar to how data showed poisoned dogs may be disposed of inappropriately, livestock animals that die from toxic substances should not be abandoned in the countryside as it could likely be fed upon by scavenger species.

Consequences of pesticide consumption have been documented in European countries and has shown pesticides being a cause of death for a variety of wild animals, cattle, poultry and domestic animals. Partridges have been shown to be particularly susceptible to certain insecticides (Guitart et al., 2010b), and large livestock animals such as sheep, goats and even horses are often victims of pesticides (Guitart et al., 2010a; Cortinovis et al., 2015). However, lack of scientific data about toxic levels and appropriate methods mean that toxicological analyses on pesticide poisoning is rarely done. In general, limited attention has been paid to pesticide poisoning of livestock except when economic losses are high (Guitart et al., 2010a).

As for dogs, a participant pointed out how they also can ingest toxic substances that have been applied to plants, as they may eat grass to improve digestion or fulfil nutritional needs. In many European countries dogs are the most frequently involved species in poisoning episodes, and this is largely due to consuming some kind of pesticide (Berny et al., 2010). However this seems almost certainly due to them ingesting baits that have been purposefully poisoned and not through ingesting plants treated with pesticides, therefore it remains unclear whether dogs are affected in this way. Additionally, another participant discussed how she used herbicides near a water spring, despite being told it was forbidden. She reasoned that with the widespread availability of public water supply and indoor plumbing people no longer needed to drink from springs and therefore this behaviour was not a problem. Even though not overtly related to wildlife poisoning, this behaviour poses a threat nonetheless. When toxic compounds such as herbicides enter aquatic systems they can result in the death of various species that inhabit those bodies of water, such as fish, amphibians, invertebrates, plants and even plankton, even extending to predators that feed on these animals such as endangered raptor species (Mahmood et al., 2016).

A less common method of poisoning was also mentioned – animals that ingest rodenticides. Some participants explained that rodenticides may be placed among haystacks to eliminate rats and mice, but sometimes end up being eaten by dogs and cats. Livestock animals are rarely victims of rodenticides, but domestic animals (specifically dogs) and wild mammals are highly affected by them (Berny et al., 2010; Guitart et al., 2010b). Again, it is hard to tell how many cases are due to consumption of rodenticide placed to exterminate rodents or to ingesting poisoned baits using rodenticide as the toxic substance.

4.2.4 – Types of poisoning events

Collectively, eight distinct ways in which animals were currently being poisoned were explicitly conveyed in the interviews:

1) intentional poisoning of domestic dogs or cats with bait due to conflicts between people.
2) involuntary poisoning of domestic dogs through consumption of bait laid out for wild animals (foxes).
3) possible involuntary poisoning of domestic dogs through consumption of plants treated with pesticides.
4) involuntary poisoning of domestic dogs or cats that ingest rodenticides placed to eliminate rodents.
5) intentional poisoning of wild animals (foxes) with bait.
6) involuntary poisoning of fauna (in general) through consumption of plants treated with pesticides.
7) intentional poisoning of wild animals (mice and rats) with rodenticide.
8) involuntary poisoning of livestock through consumption of plants treated with pesticides.

This listing of specific ways wild or domestic animals can be poisoned within the study area could potentially be a useful result for conservation practitioners. A short list like this one is especially helpful for NGOs planning to undertake outreach/awareness campaigns or field work involving the local communities. It can reasonably be assumed that most rural villagers are not consciously aware of every one of these poison “pathways”; it is also likely that different social groups (hunters, farmers, livestock owners) are more connected to some pathways than to others. For example, hunters are probably more associated with poisoned baits placed for wild animals such as foxes (5), farmers may be more closely linked to herbicide use (3, 6 and 8), and the intentional use of poison to eliminate dogs/cats could be ubiquitous between groups. Many different correlations could exist but whatever the case, knowledge of these various pathways could allow specific communication programmes to be better tailored to different target audiences. The list may be incomplete, but can be used as a starting point and added on to if new data emerges in the future.

4.2.5 – Justifying animal poisoning

When asked if poison use is justifiable in any circumstance the vast majority of participants objected, sometimes condemning it outright and describing it as 'unnecessary' or 'bad'. There were five perceivable exceptions from these answers, in which participants agreed that poisoning on some level could be beneficial. Although unrelated to the circumstances of this study, one female participant acknowledged that in some cases it may be necessary to take drastic measures, such as using poison to decrease the large numbers of seagulls at the docks in the city of Porto. One male and one female participant from the same interview pointed out that their villages had what they considered to be an overwhelming number of stray cats, and as such could possibly be poisoned or otherwise eliminated in some way. Reasons for this were that cats urinated or defecated on people's property, and thus they were 'fed up of cats'. Two male participants from separate interviews said poison could hypothetically be used to eliminate wild boars or foxes, but each indicated a limitation that prevents the usage of toxic substances: one stated quite simply that it is illegal, and the other said baits placed can be found and ingested by domestic dogs. This seems to relate significantly to findings in Taylor's (2016) study, that stated peoples' perceived behavioural control (a belief in the existence of barriers that deters certain behaviours) played a key role in whether people engaged in poisoning behaviours. Unfortunately, these two answers alone cannot confirm that perceived behavioural control appears to be a central determinant of poisoning behaviour.

The most meaningful answer on this topic however was given by a vocal and outspoken participant in a group interview, spurred on by two friends. In his answer he initially affirmed he was against poison use, but then went on to describe how poison could and should be applied to eggs belonging to birds of prey. As these birds (providing eagles as an example) kill other smaller birds – while in turn nothing hunts them – they should be controlled/culled. He maintained that eagles should indeed be protected, only that it is not fair that they kill other birds while not being hunted themselves.

> M3: For example, there are nests aren't there? They [the park] watch and spy on the birds, so people find their nests, isn't that right? And that they put some product – an insecticide [for example] – on those eggs, I agree with. . . . On those birds that are causing [economic] loss. The eagles for example. There used to be so many pigeons

and everything. They come here, we're sat down here, and they have so little shame they go to those finch nests over there, in those trees, and take the whole nest. There are no little birds [left]. There used to be so many little birds here, now there aren't, there aren't any birds.

M1: They [eagles] take everything. And a man will go to jail if he kills one of those eagles. He won't go to jail if he kills a person.

M3: What animal is going to hunt them [the eagles]? There aren't any. So they are the queens of all this. I mean . . . they ruin everything! And is it fair? It's not. Allowing – just to protect an eagle (which is right) – allowing it to eat all the other animals. They're there circling around the village. Always after snakes. (Interview E 5)

The perception that wildlife is being valued over people has also been found not along ago within the PNDI (Taylor, 2016) and in other protected areas in Portugal, relating to birds and boars (Figueiredo, 1998; Figueiredo, 2008). Curiously, Participant E 5 M3 mentioned how it was unfair that eagles fed on snakes, despite having complained about snakes previously in the interview, saying he hated them.

M3: There didn't used to be snakes, now snakes are in peoples' homes and people are screaming at snakes in their bedrooms that didn't used to be there.
M1: It's true, it's true, just now my grandson had one in his bedroom.
M3: It's them [the park] that puts that shit here, that didn't use to exist. These vermin didn't use to exist. And now they do, why?. . . What they [the park] are doing doesn't make any sense. (Interview E 5)

How this interview unfolded also served to portray how positive attitudes towards poisoning may be hard to detect, and how one individual's attitudes can have a knock-on effect: interviewing began with only two participants (participants E 5 M1 and E 5 M2), who gave no mentions or hints of viewing poisoning behaviours positively. After the interview had finished, researchers were moving on to a different area of the study site when they were called back, as a third person had joined the two participants and wanted to be interviewed, stating he had strong opinions on the subject matter. The interview was re-administered to all three participants (now with participant E 5 M3), and the resulting data changed significantly due to a new, more outspoken individual. When in the presence of this third

participant the first two felt slightly more emboldened to answer candidly, subsequently showing they found poisoning behaviours agreeable and expressing more negative opinions of the park.

Both this research as well as Taylor's (2016) suggest that poison use occurs at low prevalence in and around the PNDI. Nonetheless, as has been explained in the introduction, relatively few poisoning events can result in extensive consequences to wild animals. Despite not being able to interview anyone who admitted to personally using poison illegally, individuals who do so are expected to show one or more of the traits displayed by participant E 5 M3, who encapsulated a variety of sociopsychological factors: Negative attitudes towards wild animals (typically birds of prey or other predators), a certain degree of willingness to eliminate them, animosity towards the PNDI's regulations, misinformed judgements of their policies, and positive social norms in the form of support from friends/colleagues/neighbours.

4.3 – Relationships between the PNDI and local communities

Lastly, a considerable amount of data was collected concerning participants' opinions and relationships with the PNDI and other local conservation NGOs. These were tangibly different depending on whether participants lived inside the park's boundaries or near its outskirts. Dialogue about the park tended to be slightly positive or neutral in outskirt villages. If participants who lived outside the park did have negative views about it, they were based on conversations and interactions with inhabitants of the park. Contrastingly, a majority of those that lived inside the PNDI spoke negatively of it.

4.3.1 – Neutral discourse

Participant's neutral or indifferent answers stated that the PNDI or conservation NGOs have not affected the villagers' lives in any meaningful way. These entities resulted in neither advantages nor disadvantages for participants. Participants outside the park said its presence did not hinder their daily activities, although some were aware that it restricted such activities inside its territory. A few of these participants speculated the park may attract tourists to the region (but never to their own villages), while others said it must have advantages and disadvantages that they simply were not aware of: 'There must be some good things [about the park] and other not so good things. Don't know, I don't know.' (Participant G 1 M2)

4.3.2 – Positive discourse

Positive perceptions about the PNDI were fewer than neutral ones, and were noticeably vague. For example, some of these positive answers were limited to 'I think the park is good, it's good'. Other times participants expressing specific negative views of the park or wild animals would preface their answers with statements such as 'the park is good, they should protect certain species. However . . .' and then proceed to make their negative comments (Participant C 3 M1). Certain participants mistakenly presumed the researchers conducting the interview were park staff and tentatively gave short positive answers. After concluding researchers were independent they then elaborated on their underlying negative thoughts on the park. Excluding these ambiguous types of answers, eight straightforward and clear positive opinions about the PNDI/NGOs remained, mentioning the following aspects: parks are places to enjoy Nature, they help protect wildlife, they attract visitors and tourists, they help prevent land abandonment, and the PNDI directly attributes money to its inhabitants. Some participants were aware these were its supposed advantages, but did not attribute much (if any) value to them, stating that the disadvantages of the park's presence far outweighs them. These are indeed some of the intuitive benefits of the park and should be adequately reinforced. Protected area values can be grouped in different ways, but an easy and practical interpretation is the distinction between 'instrumental values' or 'intrinsic values', the former being practical benefits and uses which people may have from protected areas and the latter consist of values separate from human interests that are harder to define (Stolton et al., 2015). Most of the benefits acknowledged best fit the mould of instrumental values, but a large degree of overlap exists when analysing ecosystem services; for example, protecting wildlife can be considered both intrinsic, recognizing the inherent value that biodiversity has, but also instrumental as animals are hunted for both sport and food, or can provide a Nature-based sense of mental wellbeing (as was seen with participants who enjoyed seeing birds of prey or listening to foxes bark; Stolton et al., 2015). Future outreach programmes could review more complex frameworks of ecosystem services from existing literature, to then communicate further values and expand communities' knowledge on the benefits the park provides. Ultimately though, that could prove to be more of a burden than just focusing on the advantages already mentioned by participants, which may yield the best results as they are already recognised as existing park benefits in this specific regional context (Coad et al, 2008).

4.3.3 – Negative discourse

By far the most common exchanges about the PNDI were negative to some degree, ranging from pointing out the park's disadvantages or inconveniences in participant's lives to expressing deep discontent towards it being established in the region. Many participants argued that the PNDI was established without villagers consent, or that initial promises and expectations of what the park was going to be had not been met. Several people mentioned they attended meetings that incorrectly relayed what the park was going to become. What these initial commitments were specifically was not made clear by participants, so it may be hard to resolve this sense of discontent.

> '[The park] should never have existed. It was carried out with incorrect information. Incorrect information given to farmers. They said it would be one thing while it became another'. (Participant F 1 M2)

The perception that the PNDI released wild animals has already been discussed, was a frequent point of debate, and often the first thing participants correlated with the parks existence. Another already mentioned point of contention that participants brought up was that the park seemed to value animal protection and conservation over the lives of its inhabitants. Similar remarks have been documented throughout the years in previous studies in the nearby Montesinho Natural Park (Figueiredo, 1998; Figueiredo 2008) and in the PNDI (Figueiredo, 2008; Taylor, 2016), so it seems these feelings of being marginalised have not been addressed in Douro communities. It should go without saying that, be it in the PNDI or in any other protected area, emotions such as these should be dispelled seeing as how it could lead people to become embittered towards the park in general or the management regulations put in place to protect endangered species, and therefore be detrimental to their conservation.

Some participants felt that the *de facto* animal protectors are not the park's administration or conservationists but instead farmers, and if nobody ensures that farming continues to exist in the region animals will eventually disappear. While this was voiced as a criticism towards the PNDI, it could serve as a purpose that bridges the divide between it and its inhabitants; farming practices are in many cases beneficial to wildlife, by creating a mosaic of habitats that favour a diversity of species (Sokos et al., 2013). This should serve as a shared meaning for the park and its farmers, helping towards a sense of unity. Research elsewhere

in Portugal has shown similar accounts of rural residents criticising environmental experts for their ignorance of rural practices, and taking pride in their knowledge drawn from experience (Castro & Mouro, 2016). Ethnobotanical research done in the PNDI by Carvalho and Frazão-Moreira (2011) concludes local populations are necessary for wildlife conservation and management, and that their traditional activities should continue in the long term; however, in order to succeed people must be made active participants of conservation strategies, not merely acknowledged due to formality or correctness. This present research would also add the following: if simply told their knowledge and practices are important towards biodiversity conservation, farmers may not know to distinguish between their beneficial knowledge and the misinformed views we have reported so far – such as their contempt towards wolves, the inadequate disposing of poisoned livestock, unintentionally poisoning bodies of water, etc.. Studies have previously shown that conservation awareness campaigns can communicate certain information and promote behaviours meant to protect wildlife while inadvertently creating opposing meanings and unexpected consequences (Douglas & Winkel, 2014). Care should be taken by conservationists to not simplify key messages so much to the point that they only convey ideas like 'your daily practices are beneficial to conservation' or 'keep doing what you have always done' (just as examples). Traditional rural activities benefit the environment the most *when aided* by scientific knowledge; these recommendations again rely on open dialogue between different stakeholders.

Communities could further contribute to more efficient management in another way – by being incorporating residents as protected area workers, in a variety of roles. Embedding locals as protected area employees has been demonstrated to diffuse conservation values among their communities, despite them being a minority compared to the total population (Buijs et al., 2012).

4.3.4 – Park regulations and constraints

The most prevalent response to questions about the park pertained to limitations and restrictions the park imposed on its inhabitants. These continue to be the source of a very common type of conflict that occurs between the PNDI governing bodies and the park's occupants (Figueiredo, 2008). The following quote by Jones et al. (2020), relating to increased prohibitions in protected areas, helps frame the importance this matter holds to maintaining positive relations between a park and its inhabitants

‘Restriction on human rights resulting from the designation of a PA [protected area] has become one of the most crucial barriers for their effective management. The extent of these restrictions often determines the magnitude and direction of the wider social impacts on multiple levels. When access to natural resources and human rights are not negatively impacted this can lead to synergies among different stakeholders’ (Jones et al., 2020, p. 136).

Regarding the perceived lack of the park territory’s governance and supervision, one participant said ‘Forget the park, the park doesn’t exist’ (C 6 M2), a judgement echoed in a few other interviews. Various answers stated the PNDI does not carry out any land management. Frequent complaints were made of regulations that do not allow people to clear pathways or widen existing ones for farmers and their vehicles to use, or to cut down plants, bushes, branches or trees (to clear land, to use as firewood, etc.). This includes the creation of firebreaks around the village or participants’ properties (gaps in vegetation that act as a barrier to slow down or stop wildfires from spreading). People are also not allowed to clean dirty watercourses, and have to wait for permission from park authorities that may come too late. Participants further complained they could not build any structures on their land without approval, such as houses, walls, wells, stables or animal enclosures.

> The local parish needed to create paths, to have access because of wildfires and those kinds of things. Well, they [the park] is against that. When in reality those paths won’t harm anything, on the contrary they will benefit us. . . . So if they would let us – because they [the park] don’t do it, which they should. Because at the time when the park was created they said they would, they were going to open paths, make firebreaks, they were . . . No, that’s a lie! Absolutely all a lie! They forbid paths, they forbid firebreaks they forbid everything. (Participant (L 2 M)

Many of these criticisms were aggravated because the PNDI not only prohibits these actions but also does not perform them themselves.

> ‘You can’t touch the watercourse otherwise someone will come and tell you off. . . But, the watercourse is dirty yet they won’t come. Nobody cleans it: they don’t come to clean it up, but they won’t let anyone else do it either.’ (Participant C 6 M2)

> ‘They act as if they own that which is ours’ (Participant F 1 M3)

Research has shown that when protected area residents directly suffer from impacts of regulations imposed on their daily land usage, pride of living in a protected area is especially relevant to maintaining positive outlooks on environmental legislation (Mouro & Castro, 2010).

Another participant criticised the park for not establishing routes for hikers and providing adequate signposts, or providing novel areas for off-road biking or boating.

> [The park] could eventually draw people here to visit, and I think that is the purpose of creating a park, a protected area. But they need to signpost it properly. They need to create pedestrian paths, pedestrian routes, mountain bike routes, to also attract something, because like this it's not worth it. (Participant L 5 M)

Whether some of these measures are the PNDI administration's responsibilities or up to each individual (such as clearing pathways for farmers), whether some operations are purposefully not carried out (such as deciding not to create firebreaks or clean certain watercourses), or whether some actions have been performed but communities may not be fully aware of them (such as establishing hiking routes and signposting), simply indicates that communication pathways between the park and its residents are not working as they should. This will be further elaborated on in the subsequent section.

Another limitation certain participants objected to was not being able to kill certain wild animals such as wolves or eagles due to the park's presence, or to catch other animals such as sparrows, although this latter objection was only documented once. Regarding the lack of compensation for cattle killed by wolves, one participant thought the previous generation's solution was more adequate.

> M: That's what I'm saying, they [the park] should pay like they [farmers in the past] used to. I mean, you would kill a wolf, and then go around with it asking for money.
> F: Farmers used to give a bit of money, for someone having killed a wolf.
> M: Farmers would give an X amount and say 'okay, you killed it'. That would be okay. But not as it is now, as it is I say the people who run this aren't running it well. . . Okay, so they wouldn't pay anything for a dead calf, but they should let it [the wolf] be killed. If a man wanted to and could kill it he would kill it. (Interview J 1)

This seems to be an irregular discourse among the population, but nonetheless another distressing attitude towards apex predators, that in this case may be held more so by those people who can recall wolves having a stronger regional presence in the past (Rodrigues et al., 2013).

4.3.5 – Communication between the PNDI and its inhabitants

When asked if the PNDI, conservation NGOs or the GNR ever organised outreach campaigns or came to participants' villages to raise awareness and discuss matters concerning the native fauna, animal poisoning or park/NGO activities, every participant answered that they did not. The only potential exception to this was of a farmer whose dog was poisoned, who said the Portuguese Society for the Study of Birds had very recently organised an event in his village, although he did not attend and was not aware of its purpose. Additionally, three other participants belonging to the same village mentioned that a member of the park's staff also lived in their village, and they sometimes spoke to her about Nature related topics. All other interviews alluded to the absence of communication between the park/NGOs and participants. Informal interactions between park/NGO staff and rural inhabitants about wildlife conservation, park management regulations, etc., may lead to important bilateral exchanges of information, but cannot be relied upon as the sole pathway for communication. Research conducted by Carvalho and Frazão-Moreira (2011) showed that many PNDI occupants were not informed about the purpose behind the established management regulations due to a lack of organised communication between stakeholders, which has led to misunderstandings about land ownership, access and resource use. This same lack of structured dialogue has not been addressed since, and appears to be having repercussions across the board, extending towards wildlife poisoning, human-wildlife conflict and conservation knowledge in general.

One participant, a former employee of a conservation NGO, when asked if awareness programmes were being conducted answered 'It is a bit difficult to deal with these people [inhabitants]. . . . It's a bit difficult to deal with peoples' opinions here. I've become tired, it's not worth it anymore.' (Participant E 2 M). Although this may be a common sentiment among conservation practitioners, it should not justify neglecting the implementation of proper platforms for communication and raising awareness. Similar studies have found reports of purposeful avoidance of dialogue between environmental experts and local people, which

frustrated these communities and only served to aggravate conflicts (Castro & Mouro, 2016). Further research on how disillusionment among professional conservationists may be affecting the kind of initiatives they undertake may offer interesting insights about the shortcoming of outreach projects.

A number of participants affirmed park staff would only come to their village to inspect or fine people who disregarded park regulations. A few participants jokingly replied 'if I start operating a machine they'll quickly appear' (Participant F 1 M3). This perception was in some cases so imbedded that a few people described how the park sent out aeroplanes daily to inspect their lands. Many participants said their only significant contact with these organizations was seeing their vehicles drive by (mainly ICNF pickup trucks), talking to police officers about forest fires or being fined by the authorities for violating park rules.

Remarks about aeroplanes further illustrate how, when information is limited and stakeholder relationships are unfavourable, alternative explanations can be fabricated and circulated among communities. Taylor (2016) made note of similar suggestions as people reported the PNDI released snakes throughout their territories by plane. But this is not a unique situation to this study area. Skogen et al. (2009) said about their research in Europe concerning wolf populations, 'whereas popular lore often ties small aircraft appearing in remote places after dark to drug trafficking and espionage, in our study areas they are tied to the secret introduction of wolves' (p. 113).

Despite all this, several people said that they would welcome dialogue with the PNDI, emphasizing the need for two-way communication. One particular participant questioned why the Portuguese side of the park did not have an interpretation centre, while Spain had several. Some of these exchanges were simply participant's expressing how they would like the park staff to come to their villages to 'listen to the people' and 'feel their needs', which continue to be neglected (Figueiredo, 2008). Others, interestingly, were about desires to understand the park's purpose and the reason behind its different guidelines.

> I want to know what the park's function is, that's what I want to know!. . . Tell me, what are the advantages? I want you to tell me like this: 'But isn't *this* good as it is?' Tell me! I don't know. I don't know where the good is, I don't. (Participant E 5 M3)

Throughout this discussion many points of contention between the park and its occupants have been raised, and several of them can likely be attributed to improper communication between stakeholders – notably, misunderstandings and misinformed beliefs about wild animals or environmental regulations, and distrust of protected area management and NGOs. This is corroborated further by the past studies conducted in the PNDI, pointing to similar absences of dialogue and perceived neglect of local opinions and knowledge by the park (Carvalho and Frazão-Moreira, 2011; Figueiredo, 1998; Figueiredo, 2008; Taylor, 2016). However, that discourses such as the last quote exist, and that communication is being called for by some residents, is an encouraging positive sign and should be one of the PNDI's major future priorities.

5 – Conclusion

The illegal use of poisons has a vastly detrimental impact on global biodiversity, threatening many endangered species with extinction. Within protected areas, local negative perceptions and social conflicts have been linked to complying with conservation management, including regulations related to wildlife poisoning. This research aimed to understand the various social and psychological factors connected to illegal poisoning, to explore relationships between the PNDI and its population, and in doing so attempt to contribute to more socially and ecologically efficient conservation.

Perceptions and discourse about wild animals were mostly negative or neutral, with some rare cases of beneficial values being mentioned. Negative attitudes towards animals stemmed from their interference with human activities such as hunting, agriculture or livestock ownership. Some of the underlying beliefs are founded on misinformation or misunderstandings, and should therefore be addressed through specific outreach activities. Multiple examples were shown throughout the study, but one important example was the belief that vultures are increasingly preying upon live animals, notably livestock. Whether these accounts are true or not, conservationists should stay ahead of these rumours and pre-emptively mitigate their impacts on rural attitudes.

Poisoning seems to be of a low prevalence, as hardly any data was collected regarding those who are directly involved in this behaviour; however, this is also likely to be due to the sensitive and illicit nature of poison usage. In some cases, poisoning may be considerably higher than records show, such as with domestic dogs, which seem to be relatively common targets of poisoned baits. This seems to be motivated by social conflicts between local inhabitants, related to hunting, farming and overall living in close proximity (such as neighbours). Owners should be informed about the correct procedures to follow if their animals are poisoned, in order to increase the detectability of these cases. Accurate knowledge about domestic animal poisoning could, by extension, provide important insights into wildlife poisoning.

Finally, the lack of structured communication between the PNDI and its residents appears to be detrimental to conservation as a whole, as well as wildlife poisoning specifically. Repeated studies have now shown that local communities are not adequately informed about the park's

policies, projects and often even its purpose, feeling neglected and unimportant in comparison to conservation goals. Aside from investing in disseminating this essential information (in whatever format is most adequate), the PNDI and conservation NGOs would likely benefit from making an honest and tangible effort to include these communities in the several stages of conservation management and decision-making. Such participatory processes could provide new understandings of existing problems, and conservation in protected areas tends to be more successful when a variety of relevant stakeholders are actively involved.

Overall, there seem to be several different avenues to be explored, individually or simultaneously, in regard to addressing the human dimensions of illegal poisoning and conservation in the PNDI. Future efforts should regard this study as a comprehensive baseline of social data, on which to build upon and measure the success of upcoming interventions. Doing so would contribute to a more integrated and interdisciplinary practice of conservation, which current literature agrees has become an ideal worth striving towards.

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