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Understanding attitudes towards native wildlife and biodiversity in the UK: the role of zoos

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Abstract

The present paper draws from a study of the role of zoos in forming attitudes towards biodiversity and native wild carnivores that are considered for reintroduction. The project is being developed by an interdisciplinary team (wildlife conservation, psychology, education) working towards the development of a questionnaire to investigate this topic in the UK.

Research suggests that experiences with live animals in zoos may encourage empathy, through personal connection, which in turn facilitates greater concern towards biodiversity. Concomitantly, the reintroduction of wild carnivores to their native habitats may contribute to biodiversity by helping regulate ecosystem dynamics. Carnivores also carry a rich cultural and historical heritage. IUCN guidelines state the need for public support to establish a reintroduced population in the wild, therefore, carnivore restoration efforts benefit from the understanding of the human dimensions.

A pilot study was carried out in Kent (spring 2015) using focus groups and interviews to investigate attitudes towards biodiversity, with particular focus on two species of carnivores native to the British Isles and currently considered for reintroduction (the European lynx *Lynx lynx* and the pine marten *Martes martes*) and the role of zoos in promoting support towards biodiversity conservation. Results suggest an association between seeing native wild carnivore species in the zoo and emotional responses such as ‘breaking down fears’, but also concerns about a disconnect between people and nature, and misunderstanding about the role of zoos in ‘protecting’ species. Below we offer a discussion of the themes that emerged from the analysis of focus groups and interviews in relation to biodiversity.

Introduction: environmental sustainability and biodiversity targets

Since the Convention on Biological Diversity- CBD was created in the wake of the Global Forum Rio 92, international mobilization to address the biodiversity crises is still to meet the targets outlined by consecutive international agreements. In 2010, the worldwide CBD Strategic Plan 2011-2020 produced the Aichi Biodiversity Targets to be met by 2020:

“Meeting the Aichi Biodiversity Targets would contribute significantly to broader global priorities addressed by the post-2015 development agenda; namely, reducing

hunger and poverty, improving human health, and ensuring a sustainable supply of energy, food and clean water. Incorporating biodiversity into the sustainable development goals, currently under discussion, provides an opportunity to bring biodiversity into the mainstream of decision-making” (Secretariat of the Convention on Biological Diversity 2014:10).

The importance of promoting public awareness about the values of biodiversity and actions to support and to sustainably use it has been particularly recognised and comprises the first of the Aichi Biodiversity targets¹.

A growing commitment to biodiversity conservation has also been reflected by zoos and aquaria directives. BIAZA (Britain and Ireland Association of Zoos and Aquariums) actions for the conservation of biodiversity are guided by WAZA (The World Association of Zoos and Aquariums), which formally supports the UN Decade on Biodiversity and has committed to develop a framework for guiding member zoos in meeting the Aichi Targets (WAZA 2005; WAZA 2011; Moss, Jensen, & Gusset 2014).

Within the context of biodiversity conservation, international conventions encourage the use of reintroduction to restore populations of native species (see Bern Convention (1979), Article 11(2); and CBD (1992), Article 9(c)). The IUCN's guidelines for Reintroductions state that to establish a viable, free-ranging population in the wild it is necessary to enlist public support (IUCN 2013). Investigating the attitudes and understanding of diverse interest groups is therefore instrumental to inform strategies for the conservation of biodiversity.

Findings from pilot focus groups and interviews in Kent

Methodology

Focus group sessions were 90 minutes long and individual interviews were 60 minutes. Volunteers gathered at Canterbury Christ Church University- CCCU (8 for focus groups, 2 for interviews), Wildwood Trust (**zoo specialised in native wildlife**; 5 for focus groups) and Howletts Wild Animal Park (**zoo mostly focussed on exotic wildlife**; 6 for focus group, 1 for interview). The call for zoo public volunteers was circulated on the Facebook page of respective zoos 2 weeks in advance of event, and participants were offered free family tickets to visit the zoo; for the CCCU based event, invitations were distributed in public spaces, cafes, notice boards in Canterbury and at CCCU. Each of the **22 volunteers (over 18)** was offered a £10 high street gift voucher as reward. Once volunteers made contact they were sent a formal invitation to participate and a letter of information about the study. Some scripted questions were used to prompt discussion, but participants were free to elaborate and deviate. We used an **extended model of The Theory of Planned Behaviour (Ajzen, 1991)** as our theoretical framework to plan focus groups' questions, to elicit the thoughts of participants about the protection and conservation and reintroduction of the focus species, responsibility, action, opportunities and risks posed by their presence. These were intercalated with some information about the species, their ecology, status and threats. **During interviews each participant was asked a single stimulus question “Can you tell me as little or as much as you wish about yourself and your interest in the re-introduction of wild carnivores, such as the lynx and pine martin and biodiversity.”** When the participants had finished talking the interviewer would ask further

¹ Aichi Strategic goal A. Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society; Target 1: By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably. <https://www.cbd.int/decision/cop/?id=12268>

prompt questions about the content of the response. Events were audio recorded and transcribed, with permission of participants. The qualitative analysis that followed aimed to identify key issues that emerged during the discussions, to inform the planning of questionnaires for the main body of this study. Comparisons between the samples in relation to site were not intended considering the scope of this pilot. The following themes relating to biodiversity emerged from this analysis. Quotes are taken from transcription, and the names of participants have been omitted or changed.

Restoring biodiversity: spatial concerns and co-existence

At the beginning of all three sessions focus group participants voiced concerns about humans sharing space with reintroduced carnivores: “*if there were Wolves introduced to Scotland, how long would it take them to come down towards the more urban areas? The more heavily populated areas of the country?*”. Even participants who were enthusiastic about the return of wildlife to other countries had reservations about encountering native predators in their own backyard. There was an underlining sense of fear towards predators that people in the UK did not grow up with:

(Adam) “*People psychologically reject wilfully bringing something in that has the potential to bite you.*”

Participants believed that most people would fear the reintroduction of large carnivores based on preconceptions and economic interests (game and farming). Concerns were also voiced about already established species – if there is not enough space to be shared among all species, we should focus on those already in the wild.

“*it’s also understanding the impact already on the existing wildlife and ecosystems by reintroducing another species that have been dead for... They’re going to need another food source if you start reintroducing these other species....*”

Fears were also voiced concerning the safety of reintroduced animals, based on a long history of retaliations:

(Charlotte) “*...it would be a case of trying to protect us so that they (reintroduced animals) then stay protected.*”

After centuries of intensive persecution, wild carnivores started making a comeback during the last few decades. In spite of localised conflicts, most populations of large carnivores are increasing and spreading through mainland Europe, some aided by successful reintroduction initiatives. There may be concerns that although the reintroduction of carnivores may benefit biodiversity under appropriate conditions, it becomes more problematic in human-modified landscapes such as the ones in most of the UK (Linnell et al 2005). However, Scotland in particular has experienced large-scale reforestation accompanied by an increase in populations of woodland deer, which resulted in large connected areas of suitable habitat for many native carnivores, such as pine marten and for a viable populations of lynx² (Wilson 2004;

² According to population viability analysis over 20,000 km² of Scottish habitat exists and it is suitable to support around 450 lynx (Hetherington et al 2008)

Hetherington 2008; Hetherington, Miller, Macleod & Gorman 2008,). At the moment, herbivory has a high impact on the economy and on the biodiversity of the area, which studies suggest can be much improved by the reintroduction of the lynx.

Biodiversity and wild carnivores

Half-way through the sessions, focus groups were introduced to two news features (2.5 minutes each “Will wild lynx return to Britain?” and “Reds Return” (BBC News 2015, BBC Radio 2015) and to basic information about the ecology of the European lynx and pine marten. Although some participants had previous knowledge, for most the role of native carnivores in controlling ecosystems made sense then (“*Lynx helps to regenerate forest, which is good for people*”; “*Pine martens benefit the native wildlife by controlling grey squirrels*”). Beliefs were also voiced that increased biodiversity means less need for human intervention in management of populations; and that increased biodiversity benefits entire systems - extending to flora and geographical features (e.g., rivers; erosion):

“You could think, well there is too many deer they are eating our plants, why don’t we just shoot them. That doesn’t have the same effect, and part of the reason why it doesn’t have the same effect is because the deer doesn’t really understand being shot and they don’t know how to avoid it, but because they understand how wolves predate on them this changes their behaviour in a different sort of way, so they stay away from certain areas, which regenerates.”

In fact, wild predators require biodiverse habitats and also help to maintain their integrity by provoking cascading effects that affect the structure of communities; they are sensitive to impacts to ecosystems’ integrity and provide food resources to other trophic groups (scavengers) (Jedrzejewska & Jedrzejewski 2005; Linnell, Promberger, Boitani et al, 2005; McShea, 2005; see Sergio, Newton, Marchesi and Pedrini 2006 for a review). In their absence ungulates overgraze and have a detrimental effect on biodiversity as they impact on plant species and consequently on birds, insects and mammals (see study by McShea 2005; Jedrzejewska & Jedrzejewski 2005). Therefore conservation strategies to protect them also meet the needs of many other species.

Nevertheless, proposals to restore ecological function by reintroduction of wild carnivores are often met by public misconceptions of what pristine environments should be like, modelled on the idea of parks and woodlands that have been dominated by large populations of deer and small predators for many generations (Steneck 2005).

Resigning to the fact that human influence cannot be excluded from natural systems in Europe, Linnell et al (2005:393) suggest that the role of carnivores goes beyond their potential to support ecological function:

“Many view the return of carnivores as highly symbolic, almost as the ultimate test of human ability to coexist with biodiversity. In other words, although we cannot achieve wilderness (...), we can at least restore some of the wildness to the landscape.”

Barriers to understanding why biodiversity matters

In spite of an understanding about benefits of a rich array of species and habitats for healthy ecosystems, the term *biodiversity* in itself was considered abstract and uninspiring by focus groups’ participants. There was a belief that scientific terminology alienates general public and causes disconnection:

“the language around it needs to change because I actually think biodiversity sounds... I feel detached from that term.”

“it's like we are trying to get to something that we have not had before, but actually we had biodiversity for centuries and centuries and centuries until the last fifty years and it was called nature. I wonder whether why we have to kind of keep inventing this language that actually means quite a lot people don't buy into it because they don't think it has anything to do with them and I think that a really important way forward to try and change the language so people can relate to it and feel a part of it.”

“biodiversity I think that most of the time it would just go over people's heads. They'd have to google what the word meant.”

The open-ended narratives also provided a wide range of understandings as to the nature of biodiversity: from seemingly simplistic conceptions to complex notions of the place and role of humans in the wider environment. Sadie's narrative suggested less developed understanding of biodiversity: she was unclear as to what this might be and spent some time discussing wider issues of diversity including cultural and ethnic groups. She appreciated that biodiversity included a mix of animals and plants, that the animals needed to be happy and yet was concerned that even natural predation may upset animals. Equally, she was concerned that a return to a more diverse animal population would threaten both humans and domesticated animals.

Mary acknowledged a degree of confusion about what biodiversity might be but did have a well-established understanding of the complexity of interaction between all species, including plants and animals. She admitted to finding the reality messy as there was still *‘lots that we do not know about’* but despite this was able to articulate about the role of carnivores/predators to *‘keep things in check’*. David's descriptions of biodiversity offer the most complex understanding and were quite clear that *‘whether we are aware of it or not – everything is connected’* and that this involves the whole planet. From the very start of David's narrative the theme of interconnectedness was central to how he conceived biodiversity and he returned to and embedded this with his responses throughout. Both Mary and David articulated the place of humans within the natural environment.

Consistent patterns of biodiversity loss indicate that the message of urgency regarding the conservation of biodiversity is either not reaching the general public, or not engaging them. As highlighted above some of the barriers that may prevent people from engaging with biodiversity issues relate to difficulty in engaging with the term *biodiversity* itself: Novacek (2008) noted that not only there is a lack of familiarity with the word but it does not convey the intricate interconnectedness and interdependence between life forms and their environment

Wild carnivores as a biodiversity conservation tool: connecting people and nature

During focus groups there was evidence that emotion plays a part in how people relate to biodiversity and to its loss. Some participants voiced feelings of guilt over harm caused by humans:

“I think it's always very sad when you hear that something else has become extinct, we are basically becoming poorer and poorer with various... whether it be other animals or plants or whatever, you just realise that your own species is having such a negative impact on the rest of the world and animal populations.”

Other conveyed feelings of excitement:

“I think it makes the environment more exciting as well and I think you know, you have got all these different species and stuff living free within the UK. I think it is quite exciting.”

Michael J. Novacek, of the American Museum of Natural History (2008:1157) argues that it is essential to foster a connection between people and nature to engage them with the biodiversity crisis. He says:

“That linkage should be built from a clear and compelling message about the importance of biodiversity and what we risk in depleting it. “

While studies suggest that a cognitive element bears an important role in attitudes towards the conservation of wild carnivores (Roskaft et al. 2007; Bath, Olszanska, & Okarma 2008; see Consorte-McCrea 2011 for a review), knowledge is not enough to predict attitudes towards biodiversity.

In the Wildwood focus group, although some believed parents with young children feel more negative about danger of reintroduced predators in the countryside or towns, there were also considerations for the long term benefits for future generations:

(Charlotte) “I think for the people with children they’ve got to look at the future of their children as living as part of the planet. That if we introduce these, it will benefit their children because there will be more forests and natural environments for our animals and show that as a positive thing for the adults of children, that’s what they’re going to grow up with, it’s not going to be a major threat to your child it’s going to be a positive step for them in the future.”

Such concerns fit in with findings in cognitive development which suggest that the development of active environmental concern may be influenced by early life experiences (Keliher 1997; Bjerke, Odegardstuen, & Kaltenborn 1998a and b). According to research, the development of appreciation and value towards wildlife in children and adolescents is mediated by frequent access to nature areas (including gardens, parks or wild places) in urban and rural settings; positive messages from relevant adults about wildlife; and opportunities to take part in varied wildlife related activities in a safe and supportive environment. Declining opportunities to engage with nature from childhood, on the other hand, promote a lack of interest in nature and commitment to biodiversity conservation, while misconceptions and negative messages about wildlife may foster negative perceptions and limit their interest in relation to wildlife (Pyle 2002; Kellert 2002; Velsor and Nilon 2006).

Wilson’s *biophilia hypothesis* (1984) proposes we have a connection with nature, both developmentally (Kahn and Kellert, 2002; Clayton and Myer, 2009) and in the way nature affects us emotionally, and the best opportunities to promote our engagement with biodiversity are offered by direct experience with living organisms (Dingwall & Aldridge 2006; Weprin 2007; Novacek 2008). Nevertheless “learning, culture and experience” seem necessary to strengthen our innate bond with living organisms (Kellert, 2002; Hinds & Sparks 2008:110).

Amongst focus group participants, biodiversity was also seen as enriching in itself:

“I think it enhances my life experience to know that if you go down to Worth you might be able to see a beaver. I probably never will, but it is the fact they exist.”

There was also a sense that wild carnivores are charismatic species that can catalyse attention towards biodiversity (“*not just having some nice carnivores around*”), as there were beliefs that “*the lynx benefit biodiversity*”, “*the lynx is a symbol of UK’s biodiversity*” and “*pine martens are ‘a force for good’*”, which go beyond their direct benefits to ecosystem function.

The narratives provided by Mary and in particular David contained very complex thinking in relation to the role and position of humans within the natural world. Mary was unequivocal that all humans and animals are connected – even at the consciousness level - and that humans are part of biodiversity and consequently the food chain. She provides a compelling account of her decision to walk in to the wilds of Canada and despite seeing the signs of bears she was prepared to take the risk of a possible bear attack. It is not as though Mary was not afraid that enabled her to take this risk but rather her deep connection with the natural world and her realization that the potential of becoming part of the food chain was an acceptable stance to take.

David provides a rich narrative that charts his shift from not appreciating the ‘*interconnectedness of everything*’ to becoming aware of ‘*every vibration*’ and the ‘*moveable energies and signs*’ within the natural world. He talks about how this shift to a ‘*deep ecology*’ originated from his past use of psychedelic drugs and encountering traveller communities. What David describes is how, before his drug use, the natural world gave him little or no pleasure but that since this period in his life he is now aware of the ‘*wonder*’ of the interconnections. These views are not held with little awareness of the pragmatics of every day living, as David still grapples with the reality of re-introducing carnivores and their potential impact on both humans and animals. Just like Mary and Sadie, he is worried about the risks to humans and other animal species when re-introducing top predators, alongside knowledge that such animals have a role in maintaining a balance of nature. And also in agreement with Mary and Sadie he recognizes the impact of humans on depleting biodiversity and argues that humans have a responsibility to put right their wrongs.

Although David’s understanding of biodiversity is one of deep ecological interconnectedness with humans as a natural part of this, he is also very aware that it is the action of humans that has put them at odds with the wider ecosystem. He goes as far to suggest that the action of humans, in a bid to ‘*rule*’ the world, such as schools and buildings, have separated humans from their natural world. This act of separation is for David the root cause of the inability for many others to not see the wonder in nature that he does. David describes his relationship with the interconnectedness of the natural world as the source of meaning for his life. Indeed, he actively seeks to reconnect by spending time in the woods, by slowing down and listening to the birds and trees.

When support for the conservation of wild carnivores is considered, however, the experiences involved in a rural upbringing seem to play an important role. Negative attitudes towards carnivores in rural areas may be associated with the expectation that encounters with carnivores put themselves or their families in danger, and may result in financial loss, while positive may be associated to the expectations and with the excitement of seeing animals in the wild (Roskaft, Handel, Bjerke & Kaltenborn 2007; Consorte-McCrea 2013). As well as facilitating connections, emotions also seem to reinforce intentions to engage with the natural environment (Hinds & Sparks 2008). A sense of connection with animal species may be a precursor to

empathy, especially for species that are perceived as similar to us, and to an interest in taking action to protect them (Clayton, Fraser, and Burgess 2011; Clayton, Luebke, Saunders et al 2014).

The role of zoos in connecting people, carnivores and biodiversity

Zoos were seen by participants of the focus groups as a place where safe contact with wildlife takes place. Within this context, seeing animals from a safe distance provides the sense of “wildness” suggested by Linnell et al (2005), an illustration of reality of power, size, danger:

“I think Zoos surely are good things because they must bring up on most people that relationship of potential danger and you get more in touch with your natural – well the past probably when there were Wolves around and things that could eat you. (Elizabeth)”

Over 7000 million people visit WAZA member zoos and aquariums yearly, all over the world, and around 25 million visit BIAZA member zoos and aquariums in the UK alone (WAZA, 2016; BIAZA, 2016). Since the world’s population has become mostly urban, for many people zoos provide the closest encounters they will ever have with wild animals, which may be powerful opportunities to connect with nature (Myers & Saunders 2002; Bowkett 2009; Clayton & Myers 2009; Packer & Ballantine 2010; Vanstreels and Pessutti 2010; Clayton et al 2014). In turn, wild carnivores may help us engage with biodiversity by helping us glimpse into the dynamics and interconnections that are at its essence, as they “put some of the wild back into our lives” (Linnell et al, 2005:399).

Focus groups participants were asked if seeing these animals face to face in a zoo made difference to their point of view about reintroduction. At Wildwood, where both focus species are kept, volunteers suggested that seeing the animals familiarizes people with them, as they believed native species are not usually exposed to the same visibility as exotic ones:

(Ed) *“...if they didn’t see them in zoos they wouldn’t really be aware of countryside animals that are under threat.”*

(Charlotte) *“Being able to see something and know what you’re dealing with (...).The fear can be greater of the unknown than it can of seeing it and learning about it.”*

Others related a break down on misconceptions: *“The lynx is surprisingly small in real life”*; (Diana) *“...you just think it sounds scary but then you look at it and it’s beautiful.”*

Gwynne (2008:51) suggests no media or museums have the “potential for moving people to care about an animal” in the same way that zoos have. As indicated by social development research, experiences with live animals in a zoo may encourage empathy, through a sense of personal connection, which in turn facilitates greater concern towards their conservation and ultimately for their native ecosystem, having an effect in the formation of lasting values (Myers and Saunders, 2002; Falk, Reinhard, Vernon et al 2007; Clayton & Myers, 2009; Clayton, Fraser, and Burgess 2011; Clayton et al, 2014).

Furthermore, research suggests that zoos still “support and reinforce” the positive values and attitudes of visitors who already have environmental identity and values (Falk et al 2007:3; Sterling, Lee, Jimin and Wood 2007). While direct experience may promote a more affective evaluation of an object, repeated exposure to that object may strengthen the affective connections with it (Hinds & Sparks 2008). A sense of connection to animals and nature; an

understanding of the ecological role of the reintroduction of carnivores; and support towards it, seems to increase with frequency of visits and membership to a zoo, suggesting a cumulative effect that builds on visitors' capacity for future learning and for action (Rounds 2004; Falk et al 2007; Packer & Ballantyne 2010; Reading & Miller 2008, Clayton et al 2014). The higher their sense of connection, the more visitors may use the zoo visit to reflect on their relationship with nature and concerns for the animals in the wild, suggesting that close associations with the zoo, through membership or frequent visits relates to positive emotional and cognitive responses to wildlife.

Linking knowledge, responsibility, and action

Participants also recognised the education role of zoos, and there was an attribution of “good zoo” value to zoos according to their work in education and wildlife conservation: ‘Good zoos’ educate visitors about conservation work and status in wild. ‘Bad zoos’ just show off their animals.

“I have certainly been to other zoos, where the ethos is simply if you want to see the animals that you won't find in the wild, then we can show you some if you pay us enough money. So you see animals in cages, with no education going on”

“I get the impression that some other zoos they've only got interest within themselves, it could be money making, it could be profit making.”

Amongst focus group participants, seeing animals in the zoo was considered as an educational experience for children:

“There is probably a role for places like zoos, parks and things, to give children a face to face encounter with these other creatures. Partly to challenge some of their stereotypes they have already picked up. Challenging some of their ideas you know.”

Sadie's narrative interview response also argued that humans need to prevent further species becoming extinct and saw this as one of the roles of ‘good’ zoos. During our interview that took place within Howletts Wild Animal Park, she made repeated links between the animals in captivity and successful breeding and re-introduction programmes. Howletts was a ‘good’ zoo in Sadie's estimation due to their successes in re-introducing gorillas and rhinos and that the animals appeared to be happy enough to breed. Another strength identified by Sadie was the role of Howletts to provide quality information on each animal and their natural habitat.

Overall, zoos offer a wide range of learning experiences which can involve “reflecting, thinking, and acting” (West and Dickie 2007; Packer & Ballantyne 2010:31). This is particularly relevant in the current environmental climate when we consider that adults must engage with biodiversity issues right now and may have already left formal education streams. Visitors seem to particularly remember sights, sounds, smells, emotional affinity and connection, feelings of protectiveness, associated with being in close proximity of the animals, and the information about human caused threats to their survival (Packer & Ballantyne 2010). For some these resulted in reflection about their own responsibility and connectedness with nature and wider global issues and an increased desire to learn more, which impacted on their understanding, attitudes and behaviours towards the environment.

Some participants voiced a sense that humans need to work for biodiversity because we are responsible for its decline:

“I personally think it is about the bigger picture in a kind of way, I think you know, we do share this world I suppose with many different species and many different animals. I think we have a right to conserve as much as possible, we probably do more damage than anyone, I think it’s more about doing what I think needs to be done, not me personally thinking it should be done so we should do it... we are going to want to look out for our best interests but when are looking at animals that are going extinct, largely to what we have done, I think it is our right to help out as much as possible and we are in a place to do that.”

A ‘duty of care’ reflected beliefs that humans must look after animals

“Us human beings do have a duty to look after these animals, you know however many there are in the world or however many there are not.”

This duty of care was reflected in the narrative interviews that shared a common theme between all three participants related to the impact of humans on biodiversity and as a consequence the responsibility for humans to correct the damage caused by their actions. Mary commented on how biodiversity and food chains are threatened by human egos and the whole planet was now in need of our help – she was quite strident that ‘if we had ruined it then we should fix it’.

People’s duty of care about environmental degradation and loss of wildlife may relate to a sense of responsibility and stewardship towards nature and concerns for future generations, which can be motivated by “aesthetic, ethical, patriotic, familial, and religious values”. (USA Biodiversity Project, in Novacek 2008:11572). A *moral purpose* may be necessary to motivate *society* to meet challenges such as the ones presented by biodiversity loss, shifting the focus from individual moral choices to “our collective ability to recognize, reflect upon, and reasonably address the value questions we face.” (Clayton and Myers 2209:53). Biodiversity loss affects people directly and play a great role in health, economy, migration and political stability- areas that may be more readily prioritised by society, rather than being in competition with them (Novacek 2008).

Misconception about the role of zoos in biodiversity conservation may lead to the belief that species are being ‘*saved by the zoo*’ simply because individual animals are looked after and are ‘*protected*’ from lack of food, attacks or threats they would face in their natural environment, whether caused by human pressure or by a natural fight for survival. There were worries that having species preserved in zoos may lead to lack of concern / involvement with conservation as it may be seen as enough in itself:

“I guess the dilemma with the zoos is the implication in a way, that we have these animals packaged for you and that’s because in zoos you don’t have to go see them in the wild, or it doesn’t really matter if they die off in the wild because we can still home them here.”

Some misconceptions were associated to beliefs that caged animals can convey a sense of security - behaviours are not natural (e.g., hunting for food), which does not represent their ecological roles in living systems:

“I don’t think zoos necessarily convey how difficult it is for species to survive and I think people are generally disconnected from any sort of understanding about their own survival.”

It is uncertain the worth of assessing the value of individual species or groups, such as carnivores, considering the importance of interconnectedness and the interdependence of each species within whole functional ecosystems (Gascon, Brooks, Contreras-MacBeath et al 2015). In view of the intricacies, the most valuable aspect of the conservation of wild carnivores may be its potential to promote the protection of all biodiversity.

Conclusions

Prompted by our schedule of questions, participants reflected extensively on the impact of people in the natural environment and their responsibility for the survival of species. Although the term biodiversity in itself was not familiar, connections were made between native wild carnivore species and their benefits to the natural environment and ultimately to people's lives. Fears emerged, in relation to the long absence of these carnivores and associated lack of knowledge and familiarity with their needs and impacts, as well as feelings of longing for a connection with the living world. Participants' responses to their own zoo experiences indicate that zoos can help to dispel 'fear of the unknown', but raise questions about captivity creating 'false ideas' about wilderness and wildness.

Our findings also raise questions regarding an apparent dichotomy between feelings of 'stewardship' towards the living world and feelings of connection and of 'belonging to nature', and the implications these may have on attitudes towards biodiversity, which require further investigation. Other areas for further investigation include associations between attitudes and proximity of residence to areas of species recovery; the role of frequent visits/membership to zoos as opposed to sporadic/no visits in local people's attitudes, as well as interactions with the focus/native species rather than other/exotic species.

Our preliminary results support beliefs that humans have an innate emotional bond with living organisms, which can be nurtured by learning, culture and first hand experiences of wild animals in the zoo setting. Such experiences may foster empathy and an interest in finding out more about the animals. By incorporating rich affective experiences and social reinforcement with poignant information 'good zoos' can help people reflect on their own role in the natural environment, and wider biodiversity issues during and after visits. They can thus empower people to take action to protect biodiversity. Results will inform the design of questionnaires and interviews to be carried out in the UK to help identify key areas that must be addressed by plans to reintroduce native wild carnivores to benefit biodiversity, and to suggest ways in which zoos may support such plans.

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Final Version