Introduction
Complex Problems
Using a Biosocial Approach to Understanding Human-Wildlife Interactions

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The term 'human-wildlife conflict' is commonly used in the conservation literature to denote negative interactions between people and wildlife, i.e. where wildlife damage property including crops, or threaten the safety of livestock or even people. For many researchers interested in the conservation implications of these negative human-wildlife interactions, the entry point is a concern for wildlife. Consequently, the focus is often on what the animals do, and what people complain about. This perspective has, until very recently, dominated research and the design of conflict mitigation strategies. However, it is increasingly apparent that human-wildlife conflict is normally better understood as conflicts between different human groups, sometimes over how wildlife should be managed, but expressed as a clash between human and wildlife needs and activities (Madden 2004; Marshall, White and Anke 2007; Dickman 2010; Hill and Webber 2010; Redpath et al. 2013).

Increasingly researchers are labelling these human-wildlife conflicts as 'wicked problems' (e.g. Bal et al. 2011; Marchini 2014; chapters 1 and 8, this volume). A 'wicked problem' is one that is challenging or seemingly impossible to solve because of incomplete, contradictory and changing requirements that are often difficult to define. Such problems are characterized as multifaceted, involving multiple stakeholders who hold conflicting perspectives and values. Accordingly, these problems are hard to describe, tend to recur and may change in response to any attempt to solve them (Rittel and Webber 1984). Before such problems can be addressed there must first be some degree of consensus between interested parties as to what the problem is, and achieving this agreement can be a 'wicked problem' in itself (Rittel and Webber 1984). But are human-wildlife conflicts truly 'wicked' rather than simply complex?

A key feature of many human-wildlife conflicts is the involvement of multiple stakeholders whose priorities, perspectives and agendas are often incongruous, as illustrated clearly within this volume. These are common features of 'wicked problems'. However, mitigation attempts to date mostly focus on developing technical solutions to reduce the negative impacts of wildlife behaviour on human property or safety, without recognizing or addressing underlying social conflicts. As a consequence, they are rarely fully successful in addressing these 'conflicts' (see, for example, Webber, Hill and Reynolds 2007). Therefore, perhaps human-wildlife conflicts are perceived as 'wicked' problems because it is only very recently that their complex, biosocial nature has been recognized, and hence attempts to mitigate them have fallen short through a lack of understanding of this complexity rather than the majority of them necessarily being unsolvable. As pointed out by Peter Balint and colleagues, 'not all problems with multiple stakeholders and uncertain outcomes are wicked' (Balint et al. 2011: 30). Therefore, we should be cautious of labelling conflicts around wildlife as 'wicked', because it might encourage the view that these conflicts are unresolvable and thus it is impractical even to try addressing them, further jeopardizing human-wildlife coexistence.

The chapters in this volume span a variety of species, geographical locations and cultural contexts. The details of the case studies may be very specific, but between them they address several themes: that human-wildlife conflict is about power differentials between the different human protagonists and not necessarily about the wildlife per se, and that animals are important as symbols. The first of these themes is beginning to attract attention within mainstream conservation science; the second is largely ignored within this body of literature (Hill 2015), yet is highly apposite when exploring the challenges of facilitating human-wildlife coexistence.

A Biosocial Understanding

Relying solely on observations or reports of human behaviour towards or around animals may tell us relatively little about what animals really mean to people, why people interact with animals or even the value different human groups assign to animals, including wildlife. Instead we need to engage more fully with the ways people think and articulate about animals, animal behaviour or apparent competition between people and animal interests, because animals are 'good to think' with (Levi-Strauss 1963: 101) as well as good to eat, observe, admire and share space with. To develop a truly biosocial approach to exploring and understanding questions about human-wildlife interactions and human-wildlife coexistence requires careful integration of methodological and theoretical perspectives from both the natural and social sciences, and especially better understanding and acceptance of qualitative methods (Drury et al. 2011) and exploratory research models.

The challenge remains though as how best to promote and foster understandings and synergies between the different disciplinary perspectives, and particularly between quantitative and qualitative paradigms. Helen Newing (2013) suggests that the way forward to facilitate and foster research into biocultural diversity and con-

servation science is the development of scholars who have a basic understanding of other disciplinary ideas and approaches as well as the one they work in. Developing such capacity for truly transdisciplinary skills takes time. However, there is good evidence of increasing awareness and acceptance among natural scientists, social scientists and wildlife managers that to understand the complex, multifaceted nature of human-wildlife relationships and human-human relationships more fully, we need better integration between natural and social science perspectives (Edwards and Gibeau 2013; Inskip et al. 2014; White et al. 2009). Nevertheless, there are still only a few examples where interdisciplinary conflict mitigation is attempted and critically assessed (Dickman 2010). In this volume the various contributors explore these issues, providing unequivocal evidence of the complex nature of human-wildlife relationships, and the value of adopting a biosocial approach to understanding and managing human-wildlife interactions.

'Human Wildlife Conflicts': Do Labels Matter?

There is now a movement in the literature advocating that the term 'human-wildlife conflict' be dropped from common usage (Peterson et al. 2010; Redpath et al. 2013; Madden and McQuinn 2014; Hill 2015). Nils Peterson et al. argue that it is inaccurate as a label characterizing crop damage or livestock predation by wildlife because it implies 'conscious antagonism between wildlife and humans' (2010: 75). It also exaggerates the cognitive capacities of the animals, and masks the multifaceted, changeable nature of these conflicts that occur because of diverse values, priorities and power relations between the human stakeholder groups concerned. Framing these scenarios as human-wildlife conflict draws the focus away from the real identity of the protagonists, i.e. the various human stakeholders, thereby hindering the development of effective mitigation or resolution strategies. Additionally, it influences understandings and methodological approaches adopted in researching these scenarios by 'diverting attention from addressing conflicts within human political systems' (chapter 1, this volume). Accordingly, it focuses attention on changing the nature of the interaction between people and 'problem' wildlife, or changing local people's perceptions of, attitudes towards and willingness to share space and resources with wildlife. Where animal damage is labelled human-wildlife conflict it makes sense for people to direct their antagonism towards the animals involved, as 'perpetrators' of the 'conflict'. In some cases this can prompt retaliatory killings (Dickman 2010). Consequently, where people and wildlife are in competition over resources, the language used to describe these interactions, i.e., 'human-wildlife conflict' and the depiction of the animals concerned as 'pests', may exacerbate the problem and further endanger the long-term coexistence of people and wildlife.

Finding an alternative term to 'human-wildlife conflict' is proving problematic. Suggested alternative labels include human-wildlife coexistence (Madden 2004), human-human conflicts (Marshall, White and Anke 2007), human-wildlife competition (Matthiopoulos et al. 2008), conservation conflicts (Redpath et al. 2013) and human-wildlife interactions (Peterson et al. 2010). A preliminary survey of

citations in Web of Science suggests that many authors publishing papers in this field of study are proving slow to adjust their terminology away from 'human-wildlife conflict' (Humle and Hill 2016). However, more careful analysis of the literature suggests the situation is not straightforward. Of a sample of 1,372 articles, accessed systematically through Science Direct, CAB Abstracts and PubMed, 60 per cent of articles published before 2001 adopted alternative terms to 'human-wildlife conflict' (Webber et al. forthcoming)[1]. By contrast, almost 70 per cent of articles published after 2001 (i.e. 2001–2015) used human-wildlife conflict language. This more recent uptake of such terminology appears linked to certain key publications, including Terry Messmer's 'Emergence of Human-Wildlife Conflict Management: Turning Challenges into Opportunities' (2000) and the International Union for the Conservation of Nature's (IUCN) 'World Parks Congress Recommendation: Preventing and Mitigating Human-Wildlife Conflicts (2003), that used human-wildlife conflict' expressions. Thus, 'human-wildlife conflict' has rapidly become a widely accepted term to denote an assortment of methodological approaches and conservation issues involving apparent competition between people and wildlife (Webber et al. forthcoming). Indeed, the variable terminology used by the authors within this volume is testament to the widespread use of the term, even where authors are specifically analysing 'human-wildlife conflicts' as fundamentally being conflicts between different human groups, rather than as direct conflict between human and animal protagonists.

What can a Biosocial Perspective Contribute?

In this book's first chapter, Phyllis Lee explores how farmers' views of wildlife species that damage crops compare with their perceptions of other animal species, particularly where animals are recognized as having economic, social or aesthetic value. She points out that while human experiences of wildlife behaviour may cause genuine conflicts of interest (e.g. crop losses through foraging or trampling; livestock losses to predators), it is important to be aware that different interest groups may represent 'conflicts' in specific ways to promote their own agendas, or even misrepresent others. This analysis of human-wildlife conflict as a phenomenon subject to political manoeuvrings on the part of different interest groups, creating competing and conflicting representations, priorities and expected and/or hoped for outcomes, resonates closely with later chapters, and particularly those by Ketil Skogen (chapter 3, on wolves in Norway), Angela Cassidy (chapter 4, badgers in the United Kingdom) and Francine Madden and Brian McQuinn (chapter 8, on conflict transformation). The basic tenet of Lee's chapter is that 'conflict' is not just about people-wildlife interactions but also interactions between people; therefore conflict scenarios must be understood within the relevant social contexts, including variable understandings, local value systems and consequent agendas.

In chapter 2, John Knight examines how Japanese farmers respond to the risk of crop damage by Japanese macaques (*Macaca fuscata*). Crop damage by this species is widespread and common in rural Japan, and its increased intensity and distribu-

tion attributed to the depopulation of rural areas (Sprague 2002). Indeed, rather than humans 'trespassing' on monkey spaces, it could be argued that monkeys are encroaching on human spaces because villages become less threatening environments as the number of human inhabitants declines. Knight argues that previously in Japan, crop damage was experienced as a 'human-monkey conflict', but as a consequence of human interference in 'the monkey problem' it is now viewed as a conflict between humans because it is through people's actions that monkeys have changed their behaviour and moved into human spaces. This is a different interpretation to that in other chapters in this volume (see chapters 1, 3, 4 and 8), because here it is the human actors, rather than the researcher, who acknowledge the 'conflict' as one between people rather than between people and macaques.

The Symbolic Nature of Animals

Interactions between humans and wildlife are neither simply a matter of direct physical encounters, nor of the exploitative uses that humans make of wildlife. Humans invest symbolic meaning in animals, and this is central to understanding the human-wildlife relationship. Individuals and groups may, for example, use animals as analogies in the theories and models they develop to explain human behaviour. Nevertheless, such analogies work both ways, influencing how the animals are themselves perceived, and how humans interact with them. In chapter 3, Ketil Skogen describes wolf management systems implemented in Norway, and how these systems neither satisfy the various human interest groups involved, nor provide adequate provision for wolves. He argues that conflicts over wolves go far beyond the economic impact or disputes over management options, and are about the threat of social change as perceived by rural communities. Skogen advises that for rural populations wolves are a symbol of rural decline because wolf presence is now associated with rural depopulation, deterioration in service provision in rural areas and abandonment of fields, which revert to 'nature'. Furthermore, for those involved in rural industries (agriculture, forestry), protection of species through conservation is symbolically associated with loss of control over how natural resources are managed by local people. Consequently, the success of wolves is symbolic of the decline of rural traditions and rural lives, with wolves valued by influential sectors of society above rural traditions, rural lives and therefore rural people.

By contrast, for the increasing numbers of middle class, well-educated people moving into rural areas the wolf is symbolic of 'an authentic, wild nature that preceded the human-dominated (and now partly damaged) landscape' (chapter 3). From Skogen's analysis it is clear that these 'conflicts' around wolves are a result of clashes between the entrenched views about the rural order held by different members of Norwegian society. Consequently, to defuse conflicts (and avoid precipitating new ones) managers need to be aware of the symbolic meanings assigned to wolves within Norwegian society, and understand that conflicts about wolves are a consequence of competing social constructions and value systems. What is really at stake here is not the actions of the wolf. Rather the underlying concern is whether rural Norway should be a wilderness that accommodates large carnivores, or a managed production

landscape for timber and grazing, with little or no space for top predator species. This example illustrates clearly why conservationists and wildlife managers should be aware of the symbolic nature of animals because it affects how people might interpret conservationists' activities, value systems and priorities.

The symbolic investment of meaning in animals is also apparent in the way that people categorize different species, particularly wildlife species. The categories 'pest' and 'problem' animals are especially problematic, as highlighted by Lee (chapter 1) and Sushrut Jadhav and Maan Barua (2012) who suggest that an animal labelled as a 'crop raider' becomes a legitimate enemy. Once a species or animal is 'demonized' in this way it becomes much easier to justify exploiting or extirpating them because they are 'pests', particularly where pests are associated with adverse events, outcomes and consequences.

Competing Constructions as a Source of 'Conflict': The Case of the 'Protected' Pest

As outlined above, animals take on many meanings and values for people. Consequently, it is useful to explore more fully the competing constructions of animals both within and between different interest groups. Angela Cassidy develops this theme in chapter 4, where she examines why culling badgers creates such intense reactions in the United Kingdom. Cassidy explores the dualistic framing of badgers in recent debates about bovine TB in the media, with 'good' badger as a sagacious, respected, woodland dweller, and 'bad' badger as predatory, destructive and a source of pestilence. She demonstrates how disputes over badger culling are 'intertwined with tensions between traditional British rural centres of power and modern urban elites', reminiscent of the foxhunting debate in the United Kingdom (Marvin 2000) and societal conflicts expressed through concerns about wolves in Norway (chapter 3). Cassidy reveals that these competing representations, 'good badger' and 'bad badger', are broadly aligned with environmental and agricultural framings of the bovine TB problem and therefore, anti- and pro-cull sympathies. Thus for some people badgers are pests to be eradicated; for others they are an iconic species of the UK countryside to be valued and protected.[2] In other words, the same animal can mean different things to different groups of people, illustrating the constructed nature of the category 'pest'. In this instance, human-wildlife conflict is not about the animal per se, or even its actions. Rather, it is a reflection of the socially constructed values or meanings a particular animal or species has for different interest groups. Similar findings are evident for a range of 'pest' species, including otters (Goedeke 2005), dingoes (Hytten 2009), possums (Wilks, Russell and Eymann 2008) and chimpanzees (Sousa 2014). So here we have the conundrum of 'protected' pests, animals that are afforded a degree of legal protection yet damage or threaten the safety of people, livestock, pets, crops and property (Knight 2000, 2008).

Animal 'Personhood'

Human-animal relationships are not necessarily simple or clear-cut. The way people perceive animals and understand their relationship with humans shapes their inter-

pretation and expectations of animals and how they behave. In chapter 5, Marc Brightman explores the implications of Amazonian ideas about personhood for human-animal interactions among the Trio of Southern Suriname. Traditionally, the Trio believe people, as babies, have to be moulded into becoming human, and this process continues to be reinforced throughout an individual's life through activities such as 'eating together'. The Trio extend this idea to animals, whereby animals that eat together regard themselves as human, and view humans as animals. Accepting that animals come into people's gardens (swiddens) to eat is, in essence, recognition of these animals' sentience and personhood, and therefore is a symbol of the shared humanity between the Trio and their wildlife neighbours. Brightman argues this idea of animals having personhood is central to understanding Trio responses to wildlife feeding on their crops. Outsiders 'looking in' might well label this 'human-wildlife conflict' but for the Trio there is nothing conflictual about it, providing they are able to 'eat well' with their kin.

Conflict Narratives as 'Weapons of the Weak'

James Scott, in his seminal work *Weapons of the Weak: Everyday Forms of Peasant Resistance*, proposed that everyday forms of 'resistance' can be viewed as political action (1985). The kinds of behaviours he was referring to as indicative of resistance include 'foot-dragging, dissimulations, false compliance, feigned ignorance, desertion, pilfering, smuggling, poaching, arson, slander, sabotage, surreptitious assault and murder, anonymous threats' (1989: 5). Such actions allow individuals or groups to express discontent or disagreement without drawing attention to themselves, thereby avoiding the risk of incurring negative consequences associated with overt dissent (Scott 1985). This acts as a mechanism by which low-ranking individuals may obstruct mechanisms that favour more influential members of the society (Scott 1989), and/or may 'act as a safety valve for social discontent' (Adas 1986: 82, cited in Korovkin 1999). As Lee suggests in chapter 1, farmer and livestock herder discourses of conflict could be better understood as a 'weapon of the weak'. People could be venting their fury on the animals for a variety of reasons, including because they feel unable to express or direct their anger and frustration towards the underlying causes of social 'conflict', i.e. other people such as wildlife authorities, researchers and even conservation groups. For example, small-scale farmers in Uganda express a sense of being powerless in situations where their interests and rights clash with those of officialdom and/or outsiders. So, these farmers may use a human-wildlife conflict framing as a vehicle for expressing anger, frustration and a sense of dispossession of autonomy without entering into direct conflict with authority figures that might prove damaging or threatening to them (Hill 2004). Indeed, human-wildlife conflict narratives could be understood as resistance to local conservation agendas, particularly if they become more prevalent with the arrival of outsiders and/or figures of authority. Furthermore, disenfranchised farmers, herders or even landowners may use human-wildlife conflict narratives as a coping mechanism – partly as a way of dealing with the nuisance value of wildlife but also as a way to resist the imposition of conservation ideas, projects, personnel or even the barrage of conservation

narratives they are subject to that are often counter to their own interests, priorities and sense of equity.

Attitudes and Perceptions Are Not Necessarily Fixed

Attitudes are an important component of people's willingness or capacity to 'tolerate' sharing landscapes with wildlife, particularly predators (Treves and Bruskotter 2014), hence the idea that we need to identify, understand and change attitudes. However, research suggests that people's attitudes are shaped by underlying values and therefore tend to change slowly (Manfredo 2009; Heberlein 2012). Consequently, understanding more about the complex nature of attitudes and how, when and why they change may improve our understanding and capacity to manage 'conflict' situations more effectively.

The concept of Wildlife Value Orientations (WVO) draws on the cognitive hierarchy framework from social psychology, and provides a useful tool, and theoretical structure, for understanding different viewpoints about wildlife (Fulton, Manfredo and Lipscomb 1996). In chapter 6, Alia Dietsch, Michael Manfredo and Tara Teel affirm that people's reactions to human-wildlife conflict are chiefly determined by their underlying WVOs. Consequently, WVOs can be used to explore and predict likely public acceptance of 'conflict' mitigation strategies pre-implementation. Using the recovery of the wolf population in Washington state, the authors demonstrate there is a high level of support for wolf recovery in more urban areas where the likelihood of encountering wolves is very low and mutualism WVOs are prevalent. Mutualists are defined as those having an egalitarian ideology that extends ideas of social inclusion to animals, emphasizing animal equality and welfare (Wildavsky 1991, cited in Manfredo 2009). Mutualists view wildlife as having rights and as being something to be cared for. By contrast, people living in more rural areas, where the likelihood of wolf encounters is higher, express much lower support for wolf recovery. Here there are more people identified as Utilitarians. These people are characterized by being more accepting of lethal means of control of animal populations.

However, Dietsch, Manfredo and Teel demonstrate that WVOs are not fixed, and can change over time. The authors link societal changes in the United States with changing views towards wildlife and management options. For example, hunting has a long history of use as a wildlife-management strategy in the United States but is increasingly becoming unacceptable to particular groups of people (chapter 6). This could, for example, have significant implications for future management of deer populations if lethal options become much less acceptable to the wider public, causing increased numbers of deer-vehicle collisions and increased damage to agricultural crops. This switch from a domination to a mutualism orientation within the United States occurs in association with changing socioeconomic status and associated cultural change. While there is no guarantee that different societies will show similar responses of societal WVOs to increasing wealth, the authors identify this as an area worth exploring further, particularly in the context of countries like China that have a strongly Utilitarian view of wildlife. Perhaps then, as societies

become increasingly wealthy and exposed to external views, societal WVOs will also change, with implications for wildlife conservation more globally.

Narratives of change feature strongly in chapter 7. Here Lisa Naughton-Treves and co-authors examine farmers' perceptions of crop loss to wildlife among people living around the edge of the national park, comparing the results of two data sets collected at two points in time, seventeen years apart. Animals are reportedly now travelling a little farther out from the park edge than they did seventeen years previously; some species are foraging in areas they did not visit formerly; and latterly wild pigs, previously labelled as highly troublesome, rarely figure in current 'conflict' narratives. Legislative changes have legalized hunting of wild pig, perhaps enhancing their status locally whereby they could be valued as a resource rather than regarded just as a 'pest' species. The same cannot be said of baboons however, who even though they can now legally be hunted, continue to be regarded with fear and loathing. Additionally, the authors report that irrespective of whether family farm locations have changed between the two study periods, family members were more likely to demonstrate consistency in the views they express than were unrelated respondents, irrespective of location, perhaps reflecting more closely shared WVOs among relatives.

The Way Forward: Conflict Mitigation or Conflict Transformation?

As outlined earlier, participatory processes are a necessity when delineating and addressing complex problems including those labelled 'human-wildlife conflicts'. Francine Madden and Brian McQuinn describe just such an approach to conflict mitigation in chapter 8. They explain how until very recently the focus in conservation efforts to reduce human-wildlife conflicts has been directed towards changing physical interactions between the animals and the people, rather than looking beyond the immediate, proximal evidence of conflict (e.g. complaints about crop damage or livestock losses) and identifying, acknowledging and addressing underlying social conflicts between different human groups. Madden and McQuinn discuss the limitations of prioritizing interventions focused solely on technical solutions promoting change to human or animal behaviour. They suggest an alternative model for identifying the different types or levels of conflict, and describe an innovative approach, Conservation Conflict Transformation (CCT), which is currently being adopted across a range of different wildlife-related conflict scenarios. This approach fosters a more nuanced analysis of conflict, and the recognition that different types of social conflicts may affect mitigation processes differently. Consequently, the CCT approach facilitates better understandings of the underlying causes of conflict and their visible manifestations, and helps identify when conflict narratives are likely to be a proxy for the expression of underlying or deep-rooted social conflicts (Madden and McQuinn 2014).

A common assumption within the literature is that by reducing the negative impacts and nuisance aspects created by wildlife in shared landscapes, one fosters and encourages people's tolerance of wildlife – i.e. one promotes coexistence.

However, a failure to recognize or acknowledge existing intra-human social conflicts may mean that tools or procedures to reduce nuisance aspects of sharing landscapes with wildlife, however effective and easily applied, do not necessarily reduce local conflict rhetoric or conflict experience. As Madden and Quinn argue, existing intra-human conflicts need to be resolved before shifting to focus on technical solutions. Such an approach is more likely to get better community buy-in to implementing and maintaining technical solutions, therefore implementing CCT where appropriate, as a precursor to applying technical solutions, is likely to enhance their effectiveness and their uptake locally.

However, technical approaches that reduce the practical challenges of sharing landscapes with wildlife do have their place. Careful analysis of livestock husbandry practice, crop choice and planting patterns, proximity to wildlife refuges and wildlife behaviour will highlight points within livestock and farming systems that render domestic animals or crops vulnerable to predation by certain species. With those things in mind, it is often possible to suggest alternate husbandry strategies or farming practices, i.e. technical interventions that effectively reduce losses to wildlife (Jackson and Wangchuck 2004; Graham and Ochieng 2008; Davies et al. 2011; Hill and Wallace 2012; Potgeiter et al. 2013). However, such approaches should take into account additional factors relating to target user groups, including their priorities and concerns, competing labour requirements, cultural/social factors and user-group expectations of outcomes (Hill 2004; Webber, Hill and Reynolds 2007). Accordingly, technical solutions to reduce crop or livestock losses for example, should take account of what farmers expect of any intervention, making it clear from the outset who will be responsible for implementation and care of deterrents afterwards. Otherwise, irrespective of the effectiveness of any tool or strategy, where end-user groups' priorities and expectations are neither understood nor accommodated, any intervention might fail to reduce crop or livestock losses for example, through lack of uptake and engagement by farmers (Hill 2004; Webber, Hill and Reynolds 2007; Hill and Wallace 2012). Consequently, deterrent value is also affected by user opinions and expectations as to how likely they are to work, as well as by opportunity costs involved in having to set up, use and support any technique (Osborn and Hill 2005; Graham and Ochieng 2008). The last two chapters of this volume discuss the challenges of engaging with end-user groups to ensure their adoption of technical solutions, and consider how to scale these responses up for effective management of existing issues and prevention of future problems at the landscape level.

In chapter 9 Graham Wallace and Catherine Hill describe the process of developing a series of crop-protection tools (e.g. fencing, early warning systems and chemical repellents) in partnership with small-scale farmers in Uganda. Additionally, they reflect on factors influencing the degree to which farmers take ownership of such interventions. All farmers involved in the study requested that installations remain on their fields at the end of the project. Most of these installations were in use a year later and, in addition, neighbouring farmers not in the original study were recorded having installed similar or modified versions of the trialled deterrents on their own farms (Hsiao et al. 2013). Farmer engagement was achieved by involving

end-user groups at all stages of the project, from identifying key issues, design of tools, data collection and evaluation of their utility. Such involvement on the part of the farmers ensures that tools and techniques address their concerns and priorities and methods are locally acceptable and manageable, and it encourages farmers to assume ownership of the project and thus responsibility for its evaluation, extended use and further refinement and development within the wider community.

In the final chapter Amanda Webber and colleagues explore the uses of Geographic Information Systems (GIS) tools to help researchers, local people and wildlife agencies predict areas vulnerable to wildlife foraging activity, identify key locations in which to focus crop-protection activities and visualize the 'problem' through maps of risk hot spots. They point out that risk maps generated through GIS data are useful as visual prompts to elicit discussion of issues and likely solutions. In this way, GIS becomes more than just a mapping technology and actively contributes to encouraging stakeholder engagement, shifting the focus from 'problem' to 'solution'. Simultaneously, it can be used as a tool to encourage more open discussion and consideration of the different stakeholder viewpoints as part of a trust and respect-building process, both of which are central components to 'transforming conflict', as per Madden and McQuinn (chapter 8).

Conclusion

This edited collection reflects our insights as researchers who over the years have shifted our thinking to an approach more firmly embedded within the social sciences. This shift in focus facilitates a more detailed and nuanced understanding of the relevant issues, both at individual and societal levels. As demonstrated in this volume, the nature of these conflicts around wildlife is complex and stems from misunderstandings, lack of awareness, acknowledgement and respect for alternative viewpoints, value systems, priorities and needs. However, to fully understand and manage, mitigate or even transform these 'conflicts' requires close examination of different scenarios through a biosocial lens. Technical solutions can be applied in tandem with conflict transformation processes, to reduce absolute costs to people of sharing landscapes with wildlife, but even these warrant a more detailed biosocial approach that incorporates careful analysis of wildlife ecology and human behaviour to develop effective and humane methods of protecting human property from wildlife actions. As stated by Madden and McQuinn (chapter 8), 'The future of conservation for many wildlife species relies not just on innovative solutions, but also on an increased tolerance and social carrying capacity that cannot be achieved by laws, science, money, or fences alone'. With this book we hope to contribute to this by encouraging a radical change in understanding, expectations and approaches as adopted by researchers, wildlife managers, conservationists, policy makers and funders alike, all of whom influence understandings, priorities, interventions and outcomes.

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Notes

1. Human-wildlife conflict terms monitored were 'human-wildlife conflict/s', 'crop raid/er/s/ing' and 'human-animal conflict/s'. Alternative terms monitored were 'conservation conflict/s', 'human-human conflict/s', 'human-wildlife interaction/s', 'human-wildlife coexistence', 'human-wildlife relationship/s', 'human-wildlife competition' and 'human-wildlife impact'.
2. The European badger (*Meles meles*) is protected in England and Wales under the Protection of Badgers Act 1992.

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