

THE ROLE OF ONE HEALTH IN WILDLIFE CONSERVATION: A CHALLENGE AND OPPORTUNITY

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ABSTRACT: Numerous emerging infectious diseases (EIDs) have arisen from or been identified in wildlife, with health implications for both humans and wildlife. In the practice of wildlife conservation, to date most attention has focused on the threat EIDs pose to biodiversity and wildlife population viability. In the popular media and public eye, however, wildlife is often only portrayed as the cause of EIDs and resultant human health impacts. There is little coverage on the roles of human-induced habitat destruction or wildlife population stress in EID spread, nor the negative impacts of disease on wildlife. Here, we focus on a little-studied and seldom discussed concern: how real and perceived risks of wildlife-associated diseases for human and companion animal health might erode public support for wildlife conservation. We believe that wildlife-associated EIDs and public perceptions of these risks are among the most important threats to wildlife conservation. In light of this concern, we explore the challenges and opportunities for addressing this situation in a One Health context that emphasizes the interdisciplinary collaboration and the inextricable nature of human and animal health and disease.

Key words: Emerging infectious disease, One Health, risk perception, wildlife conservation, wildlife disease.

INTRODUCTION

Wildlife conservation faces many threats. Direct threats include habitat degradation and depletion, overexploitation, and, increasingly, impacts of wildlife diseases on population viability (Daszak et al. 2000). Added to these direct threats, increasing occurrences of negative human-wildlife interactions, including wildlife disease, can become indirect threats when they generate media attention and have socially amplified risks (Ho et al. 2007), which have the potential to decrease the social acceptability of human coexistence with wildlife (Decker et al. 2010). This is a vitally important consideration for wildlife conservation because, without social acceptance of wildlife, social support for conservation will decrease (Decker et al. 2010, 2011, 2012a).

The general model of wildlife management is the practice of manipulating wildlife populations, habitats, humans, and their interactions (Giles 1978). This

concept of wildlife management has been adopted, adapted, and elaborated by others (e.g., Decker et al. 2012a), but the basic idea is little changed over the last 35 yr. Starting from this wildlife management model, we define wildlife conservation as:

avoiding threats to wildlife populations, species, and habitats, and where necessary, restoring wildlife populations, habitats, and the ecologic processes necessary to sustain wildlife, as well as influencing people (individuals, communities, and institutions) such that human behavior does not degrade wildlife, habitats, or ecologic processes, and instead supports the philosophy, ethic, and practice of conservation.

While the bulk of wildlife conservation scholarship has focused on biologic and ecologic issues (including effects of wildlife disease in conservation; Daszak et al. 2000; Deem et al. 2001), we emphasize a

human-dimensions or social-science consideration in our definition and argue its importance in the wildlife and veterinary professions' approach to One Health (i.e., the interdisciplinary integration of human, animal, and environmental health due to the recognition that these three are linked). Wildlife conservation is a philosophy of managing wildlife populations and their environment in a manner that does not despoil, exhaust, or extinguish species or their habitats. Furthermore, wildlife conservation is not just an unrelated set of policies, practices, and supporting science, but it is a coherent ethic of resource use, allocation, and protection. Widespread societal belief in and adherence to this conservation ethic enable conservation (i.e., the practice of conservation continues to be supported as long as society agrees with the philosophy and ethic of conservation). Wildlife conservation is therefore a societal value (or set of values) in a normative belief system (philosophy and ethics), and associated actions are collectively the practice of wildlife conservation. We view support for conservation not as a given, but as a product of societal experiences and beliefs, where experienced or perceived positive impacts of wildlife exceed negative impacts of wildlife. This suggests that significant diminishment in the belief that wildlife has value and net public benefit could cause erosion in the societal backing for wildlife conservation (Decker et al. 2010). Thus, sustaining societal support for wildlife conservation hinges on enduring positive net benefits for society from wildlife. Absent that positive net outcome, wildlife conservation would be in jeopardy.

Applying this logic to One Health, it is reasonable to assume that wildlife-associated disease may reduce society's perceptions of wildlife's benefits and increase negative perceptions of wildlife. One Health links animal, environmental, and human health outcomes, both conceptually and in practice. One Health is intended and has great potential to benefit

the health of all species. It is a movement capable of mobilizing multiple sectors and combining resources to most efficiently tackle issues that affect the health of multiple species or resources. However, this focus on the interconnectedness of different species could have unintended negative consequences in a naïve or risk-averse audience if care is not taken to consider and address the lack of context or knowledge the general public may have regarding zoonotic disease. Emerging infectious diseases (EIDs) associated with wildlife can exacerbate negative public perceptions of wildlife and erode public support for conservation and value of wildlife due to the fear of human health consequences (Decker et al. 2011). This is a potentially serious situation for wildlife conservation that requires conscientious effort and urgency to avoid an undesirable outcome.

While the human dimensions of wildlife disease management are challenging in general, zoonotic diseases make the social aspects of wildlife conservation much more complex and important (Peterson et al. 2006). Because wildlife-associated health and safety hazards present risks to more citizens than perhaps ever before, the balance between positive and negative wildlife-associated impacts may be gradually moving toward the negative in many places (Butler et al. 2003). As pointed out already, we see this as a possible reduction in societal tolerance of wildlife. The relative contribution of wildlife-associated disease to this emergent conservation threat is currently unknown, but there are indications that this phenomenon should be taken seriously by wildlife conservationists, including significant decreases in community tolerance for wildlife such as coyotes or white-tailed deer due to perceived disease concerns (Decker et al. 2010). In the absence of effective disease management and risk communication interventions, wildlife-associated disease risk perception may negatively affect public tolerance of wildlife and

significantly diminish the value society places on wildlife conservation. One Health messages may have an effect on perceptions of wildlife and EIDs, but in what direction will they shift the balance? Communicating One Health as the interconnectedness of human and animal health, particularly as related to diseases, could tip the balance either way.

CONTEXT

During the latter half of the 20th century, negative concerns associated with wildlife expanded from historical worries about economic impacts on agriculture and forest regeneration to include motor-vehicle collisions involving larger animals and human safety threats from encounters with large carnivores. The interest of wildlife professionals and the public in the economic, safety, and health impacts of human-wildlife interactions has grown during the last two decades as more people have become aware of and experienced negative consequences of wildlife presence. These negative consequences include damage to property by habituated wildlife in human-dominated landscapes, threats to pets and livestock, and wildlife-associated zoonoses (Conover 2001). Wildlife-associated disease has been a long-time and persistent concern in many developing countries, but aside from rabies and a few other “legacy” diseases, wildlife-associated disease had not been widely perceived as a major human or wildlife risk in other parts of the world.

However, wildlife-associated disease awareness, beyond effects on wildlife species of interest to the public, has grown in the wake of evidence that 75% of all EIDs are zoonotic, most originate in wildlife, and EID incidence has continued to increase since 1940 (Jones et al. 2008). The advent of Lyme disease, West Nile virus encephalitis, chronic wasting disease, and the possibility of zoonotic avian influenzas, among others, has heightened awareness and changed the attitudes and

wildlife disease risk perceptions of health professionals and wildlife managers. Wildlife-associated disease is rapidly rising as a public health concern and is affecting more communities and individuals than perhaps at any time. However, the general public may still have limited awareness or concern about wildlife diseases (Hanisch-Kirkbride et al. 2013). This may be beneficial in providing time required for necessary research to proactively develop effective risk messaging.

The human-dimensions implications of wildlife disease (i.e., not simply human or wildlife health) have rarely been a focus of research, and calls to understand these implications have been few and only recently voiced (Decker et al. 2010). Milton Friend’s (2012) informative article, “Transformation through time: How wildlife disease became a focus of conservation,” outlines the history of wildlife disease interest and response by the wildlife profession, but it does not indicate that public perceptions of wildlife disease should be a concern for effects on support for conservation.

The potential impacts of wildlife disease are concerning for a variety of reasons, including our focus—erosive effects on support for wildlife conservation. Conservation is largely a grass-roots movement, in that accumulated local community support drives overall conservation support. Opposition to wildlife presence also can emanate as a powerful, community-level force (e.g., controversy over wolves and brown bears), and the importance of this should not be overlooked as negative human-wildlife interactions accumulate. As the human population continues to grow, the loss of natural habitat expands, and wildlife populations continue their recovery, the frequency of human-wildlife interactions has and will continue to increase (Madden 2004). Natural hazards of all types have potential to diminish or subdue enthusiasm for human interaction with the outdoors, but we can expect those where risk perceptions are strong and

negative to be especially problematic. Risk in the wildlife context refers to the possibility that a wildlife event or interaction leads to negative outcomes for people or something people value (Slovic 1987; Klinke and Renn 2002), such as pets or particular wildlife species. Wildlife-associated disease has all the traits of a hazard where risk perceptions can be magnified above actual risk and be socially amplified (i.e., elevated to a level where dread of wildlife disease can exceed human support for the benefits provided by wildlife presence). These risk traits include: novelty, potential for high-consequence outcomes (i.e., severe illness or death), lack of individual and societal ability to control the threats, and others (Slovic 1987). These same traits also stimulate media reporting, which can contribute to either the amplification or attenuation of public risk perceptions (Heberlein and Stedman 2009).

Perhaps if the rise in wildlife-associated EIDs were occurring in a different time, the concern about effects on conservation would be less than it is today. However, we live in an increasingly risk-averse society (Beck 1992) during a time of high uncertainty about habitat and climate change effects (Shaw et al. 2012). Thus, it is especially important for the wildlife conservation community to make conscious efforts to sustain wildlife conservation support in any situation that may increase individual and community perceptions of risks from coexistence with wildlife. Urban, suburban, and exurban populations are increasingly encountering wildlife in their neighborhoods (Kretser et al. 2008). These populations are largely inexperienced with wildlife and may be more likely to overestimate risks, either due to lack of knowledge, situation novelty, or perceived threats to children or pets. The lack of other experience with wildlife can translate into lack of a priori wildlife support, making negative interactions or perceived disease risks the foundation from which opinions form. Further, unlike

negative human-wildlife interactions reported in far-off or wild places, wildlife-associated disease may bring a perceived hazard to the communities and doorsteps of millions of citizens.

Unfortunately, the benefits of biodiversity and natural habitats in reducing zoonotic disease risk (Schmidt and Ostfeld 2001; Myers et al. 2013) are less well publicized or conceptualized by the public; while Lyme disease and West Nile virus have arrived in the neighborhoods and local news station of many Americans, awareness of biodiversity's protective health benefits has rarely spread beyond scientific circles and lacks the tangible, personal outcome that a local illness can bring. Furthermore, as biodiversity and habitat loss continue, so do the increases in EIDs and human health threats resulting from ecosystem degradation (Myers et al. 2013).

WHAT NEEDS TO BE DONE?

The wildlife conservation community needs to address communication about wildlife-associated disease with serious intent and partner with the broader health communities to reduce unnecessarily extreme risk perceptions and promote benefits of nature and wildlife. The human and domestic animal health fields are obvious partners, but wildlife professionals are not typically included in conversations between these groups (Decker et al. 2011). Decker et al. (2011) recently identified four main sets of actors in the wildlife-associated disease communication system—human health professionals, wildlife veterinarians, wildlife biologists/managers, and wildlife management stakeholders. They argue that wildlife veterinarians can play a key role in facilitating communication among the domestic animal, human health, and wildlife conservation communities. They also assert that wildlife veterinarians can be effective media spokespersons for wildlife conservation as a way to reach the public with

balanced One Health messages. However, domestic animal veterinarians have the networks, and a much broader workforce and distribution to have a significant impact on promoting balanced One Health messages.

Riley and Decker (in press) reviewed a recent case study of wildlife-disease risk perception that found that people react to a wildlife-associated disease based in part on their sense of self-efficacy and societal efficacy. These traits develop at a local level. They reflect how confident a person feels in his or her surroundings, including confidence in the institutions that support a sense of security in the face of a threat. An agency's capacity and competency to detect, respond to, and communicate about a wildlife-associated disease contribute significantly to a sense of societal efficacy—the public's sense that government and its partners can competently manage a disease. Siemer et al. (2012) report on a national study of agency competencies that experts think are needed to manage wildlife disease. Key factors among them are coordination and collaboration. One Health promotes both of these, and communication is fundamental to achieving these goals.

Unbiased communication about wildlife-associated disease by wildlife professionals to avoid amplification of risk or diminished social efficacy is more difficult than it may seem. It takes discipline and vigilance to avoid reinforcing negative and frightening images of wildlife-associated diseases among the public. Although stakeholders are concerned about disease effects on wildlife as well as humans (Hanisch-Kirkbride et al. 2013), our professional institutions are often biased toward the power of overstatement, to the point that we have become conditioned to sensationalize communications to generate attention (often in the media) and rewards (financial and other institutional support) garnered. Grant writing provides an excellent example. The most competitive grant proposals are often

those that claim to address the most pressing need; this need is often expressed in extreme terms (overstated or emotionally presented) to emphasize the urgency of the work proposed. This can be extremely effective for proposals directed at a small review panel, but the language of proposals is often repeated in subsequent presentations, papers, and reports picked up by the media. The stronger or more sensational the language, the more likely it may be shared with large numbers of viewers, listeners, or readers of mass media. This kind of indirect, collateral effect of our professional communication often occurs with little individual accountability, yet it is a real responsibility and carries potential for important consequences.

How can One Health contribute to wildlife conservation while wildlife-associated EIDs continue to increase?

One Health is a concept that brings the natural world and wildlife into the spotlight and, it is hoped, positive attention for wildlife's well-being in its own right and biodiversity preservation for both human health and conservation purposes. One Health could bring various disciplines together to more efficiently and effectively improve the health of multiple species. However, how wildlife is framed in One Health communication will make a huge difference in how wildlife—as victim or as perpetrator of disease—will be viewed by the public.

Those embracing One Health need to consider how the message is communicated (Decker et al. 2011, 2012b). Some scholars and practitioners in the wildlife health fields believe that the One Health concept holds promise for generating broader professional and public attention needed for wildlife health, to give wildlife a voice in the comprehensive “health” conversation. This belief has merit for wildlife conservation, if the potential unintended negative consequences are carefully considered and addressed (Wild et al. in press). One Health is an

integrative idea—which makes it inherently complex and requires calculated public communications. It also makes explicit the idea that wildlife health, and conversely, wildlife-associated disease, can affect people and companion animals that people hold dear.

Wild et al. (in press) and others (Decker et al. 2010, 2011, 2012b) caution that the use of fear messages, commonly used to motivate human health and safety behavior, needs to be replaced with a more positive approach, if One Health is to improve both human and wildlife health. If handled poorly, the fundamental One Health message with respect to wildlife has potential to activate fear and low tolerance of health risks to self, significant others, and pets. The potential for public backlash against what is perceived as unhealthy or diseased wildlife is real and needs to be dealt with through carefully crafted messages.

The veterinary and wildlife professions could engage in One Health strategically to help the risk-averse public better understand the “whys” and “hows” of emerging zoonotic disease, including the beneficial aspects of a healthy ecosystem and wildlife. In the highly competitive media environment, using an interdisciplinary One Health approach to couple various health professions’ efforts could greatly improve appropriate media coverage. One Health addresses two issues important for wildlife-associated disease risk perceptions—self-efficacy and societal efficacy. Human, companion animal, wildlife, and livestock health communities each address specific and different audiences and can empower individuals and improve societal efficacy by acting as a trusted source of health-related information. A joint, interdisciplinary effort to replace fear messages with factual and holistic information about disease, the protective benefits of biodiversity, and the ways to minimize risk associated with wildlife-associated disease could maintain or improve societal support for wildlife

conservation. Biodiversity, including wildlife populations, has countless benefits to human health and well-being beyond its inherent value (Millennium Ecosystem Assessment 2005). Including positive messages on ecosystem benefits of wildlife in messages about public health risks from wildlife would provide a broader perspective on the ways in which humans are impacted by the species addressed.

Research needs

Wildlife conservation should be integrated into One Health communications and considerations as soon as possible, but it must be done with full recognition that more social science of wildlife conservation is needed. Human dimensions research is needed to inform One Health message development and delivery to targeted segments of the public. Furthermore, stakeholder engagement processes can improve both public understanding of wildlife health risks and agencies’ understanding of public concerns. The multidirectional flow of information created by public engagement can lead to informed input in wildlife disease management. In the absence of such research and engagement activities, caution should be taken by all fields of the One Health community not to turn the public away from valuing wildlife presence (i.e., effectively devaluing wildlife conservation) due to generated fear of wildlife as zoonotic disease reservoirs (Decker et al. 2010, 2011, 2012a, b). The potential for this very real side effect makes it even more important to break down the normal, cross-disciplinary communication barriers. Jack (2012) encouraged communication across jurisdictional and disciplinary boundaries and among the respective professional communities that have not historically regularly interacted (i.e., human health professionals, livestock and companion animal veterinarians, wildlife veterinarians, and environmental and wildlife scientists).

Moreover, in the absence of specific human dimensions research on the topic,

One Health professionals from all disciplines should follow general communications guidance on achieving the credibility and trust necessary to effectively inform laypeople about wildlife-associated disease. This is especially challenging given the scientific uncertainty often present in wildlife-associated disease. Consistency in balanced, informative messages about wildlife disease, especially in early stages after detection, is important to help people understand the situation. Communication coordination is needed to ensure consistency and effectiveness.

Although some human dimensions research on wildlife-associated disease has occurred over the last 10 yr (e.g., Hanisch-Kirkbride et al. 2013), much more is needed to help managers better understand who is affected by wildlife disease, the nature and severity of stakeholders' perceived risks, and impacts experienced because of wildlife disease. Improving managers' understanding of wildlife users (hunters, trappers, viewers, photographers), and others who come in contact with wildlife of their own volition, is of interest. However, as wildlife and humans increasingly coexist in urban, suburban, and exurban environments, members of the public with no special interest in wildlife as objects of recreation or study are interacting more frequently with wildlife. The wildlife disease beliefs and attitudes of these people are perhaps in greatest need of further exploration.

CONCLUSION

The One Health movement is intended to improve the health of multiple species and the environment, and it has great potential and promise in this regard. If One Health is handled well with respect to wildlife, it could be an important positive conservation force. Natural resources and biodiversity have countless benefits for human health and reducing infectious disease spread (Millennium Ecosystem Assessment 2005; Chivian and Bernstein

2008). If handled poorly, the incorporation of wildlife in One Health could backfire for conservation, increase public apprehension about wildlife living in proximity to humans or their pets, and cause diminished conservation support. The wildlife profession needs to develop, test, and evaluate wildlife-associated disease messages that increase the public's knowledge and improve individuals' perceptions of self-efficacy and societal efficacy for mitigating disease risks without eroding wildlife support or value. Risk perception research indicates that wildlife-associated disease tolerance can be enhanced if individuals are confident they can avoid or reduce exposure (self-efficacy) and that societal institutions (e.g., wildlife agencies, health departments, medical profession, etc.) are managing disease and are capable of aiding people and pets if disease affects them (Evensen and Clarke 2012).

These balanced, One Health messages must resonate with wildlife, human, and domestic animal health professions. This is perhaps best achieved by collaboration of these allied health fields in message development and communication design efforts. Preparation of a position statement about One Health communication may be a logical step toward avoiding the potential down side of the One Health initiative for wildlife conservation. This should be undertaken without delay, given the rate of habitat destruction and new EIDs anticipated.

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