Photo: This chapter is a foray into ethical considerations related to ape health in situ and ex situ within the fields of care and conservation. © Sean Viljoen/Lwiro Primates Rehabilitation Center

CHAPTER 5

Ape Health and Ethics

Introduction

Ape care and protection give rise to many moral problems. As with other areas of ethics, it is impossible to enumerate the full range of moral dilemmas that can occur in the context of protecting and caring for apes (see Box 5.1). Nonetheless, exploring these issues in general—and specific quandaries in particular—can provide insight into practical methods for ensuring the health and wellbeing of individuals, communities and populations.

Human interventions regarding apes can take the form of primary, secondary or tertiary prevention of injuries, infectious diseases, physical illnesses, psychological disorders, acute or chronic suffering or death.[1] Nearly all such interventions raise

moral issues, some of them complex. In primary prevention, for example, technological advancements in vaccine development raise ethical questions about the justifiability of human interference to prevent ape illness (see Case Study 5.1). Other ethical challenges may arise when animals are injured in their natural habitats, such as in connection with treatment strategies or secondary prevention (see Case Study 5.2). Further issues may come to the fore in the context of captive care, such as rehabilitation in sanctuaries or tertiary prevention (see Case Study 5.3).

Since apes live in diverse regions around the world, human deliberations about their protection and care often involve collaboration across the borders of disciplines, countries, ecosystems and cultures (see the Apes Overview). As part of these processes, decision-makers may encounter normative perspectives that converge with or diverge from their own.

This chapter is a foray into ethical considerations related to ape health in situ and ex situ within the fields of care and conservation. It begins by exploring general ethical questions that arise in ape conservation; ethical foundations of ape moral standing; and the role of compassionate conservation in addressing tensions between individual and population health outcomes. Next, it examines particular moral dilemmas with a view to proposing general considerations and approaches for resolving key moral dilemmas of ape care and protection. Finally, the chapter highlights ways in which caregivers and other decision-makers can remain morally courageous and resilient in the face of significant challenges (see Box 5.2).

The aim of this chapter is to support ethical decision-making in practice by offering new perspectives, facilitating critical reflection, and furthering capacity for ethical decision-making across organizations and institutions.

Key findings include:

- Moral dilemmas regularly emerge during the course of ape protection and care.
- Approaches such as compassionate conservation address tensions between individual and population health strategies.
- Interventions are ethically sound if they are attempted by qualified personnel (such as field-trained veterinarians) and if anticipated benefits outweigh identified risks as they relate to individual, environmental and social conditions.
- Retaining an on-site veterinarian has ethical implications in that doing so improves emergency response time and increases the probability of success, thus reducing suffering and improving wellbeing.
- The provision of health care to apes presents ethical challenges that require

BOX 5.1

Ethical Considerations Beyond the Scope of this Chapter

To unpack all the ethical considerations relating to disease and zoonosis prevention would fill an entire book. Among the ones that are not explored in this chapter are:

- providing medical care and disease prevention equipment for the protection and treatment of apes in places where they are not available or accessible for human communities, as was the case when researchers, tourists and veterinarians wore masks when tracking the mountain gorillas (*Gorilla beringei beringei*) during the COVID-19 pandemic, and when life jackets were provided for orangutan transport in Indonesian Borneo (Chua *et al.*, 2021);
- taking and storing samples from humans who live alongside wild and captive apes, for example as part of a One Health approach (Tindana *et al.*, 2014; Vaz, Sridhar and Pai, 2016);
- medically intervening in the case of non-life-threatening injuries and diseases or intervening in response to injuries that resulted from group interactions, which could potentially alter the natural dynamics in a social group setting (Gruen, Fultz and Pruetz, 2013);
- imposing Western or external health and hygiene ideals and standards on local communities. The ethics of such approaches have been explored to some degree in the context of mountain gorilla conservation in Rwanda (Scholfield, 2013); and
- administering euthanasia to seriously sick or injured apes in sanctuaries or in the wild, with the aim of reducing suffering or protracted deterioration of health.

balancing the complex and often conflicting values that define wellbeing.

- To foster moral courage and resilience, organizations can provide support for caregivers and others, for example by developing peer networks, fostering positive coping strategies and ensuring institutional responsiveness.

General Ethical Considerations in Ape Care and Conservation

Moral conflicts in ape conservation often occur along two axes: the individual and the collective. Along one axis are individual humans and individual apes. Along the other axis are groups of humans and groups of apes, who are also members of families, communities, populations, societies, species and ecosystems.

In conservation circles, emphasis is often placed on protecting systems, ecosystems and the biosphere, as well as endangered species and their habitats (Vucetich *et al.*, 2018). Some conservation policies implicitly treat individual animals as irrelevant or expendable, while some frame them only in terms of their contribution to the species overall or to other conservation goals. These are examples of the "holism" of environmental ethics at work—the grounding of values in wholes such as species and ecosystems, to the disadvantage of individuals (Varner, 1998). As a result, the interests of specific individuals may be discounted in favor of conservation policies that are intended to preserve species and their habitats. The ensuing moral question is how to consider individual apes in the ethical decision-making process in the context of conservation.

Ethical Considerations Regarding Apes

There are many ways to include animals in ethical decision-making. One way is to consider who or what matters morally, and

Photo: Some conservation policies implicitly treat individual animals as irrelevant or expendable, while some frame them only in terms of their contribution to the species overall or to other conservation goals. Skull of a western lowland gorilla. © Jabruson/naturepl.com

how much (Goodpaster, 1978). From a utilitarian perspective, for instance, sentient beings matter since they have experiential welfare, but any consideration of their interests may be curtailed by an aim to achieve the best possible outcome for all sentient beings in question (Singer, 2011). Approaches that strive for a collective good, like utilitarianism, may therefore disadvantage individuals. In contrast, rights-based approaches protect individuals from being disadvantaged by collective outcomes, for example by arguing for moral rights not to be harmed, killed or held captive, or for moral rights to the safeguarding of social, environmental and other determinants of health and well-being (Cochrane, 2012; Shue, 1996). The interests of sentient beings can also serve as a basis for rights. Interests in continuing to live, enjoying bodily sovereignty and not being made to suffer, for instance, can serve as grounds for recognizing moral rights for individual humans and animals (Cochrane, 2012; Feinberg, 1974; Ferdowsian, 2020).

> “Ape conservationists and health professionals are regularly confronted by the tension between care for the individual and the collective.”

Other ethical perspectives highlight the qualities of the decision-maker and their attunement to, or relationship with, the individual or collective in question. In this context, enquiries may look into what would qualify a person as virtuous with respect to animals and nature; how empathy morally enriches relations between humans and other animals; or which moral obligations arise from relations between humans and animals (Gruen, 2015; Hursthouse, 2011; Palmer, 2010; Yu and Fan, 2007).

Across and within cultures and traditions, many ethical perspectives align with this relational approach. For instance, seeing oneself and the rest of reality as thoroughly relational and even interdependent—a key element of Buddhism as well as other traditions—can spark compassion (Halifax, 2011). Similarly, some African cultural traditions emphasize a relational approach. The Ubuntu philosophy of personhood states, “I am because we are.” Personhood arises from participating in the social life of a community of persons (Eze, 2010). The relational understanding of human beings and their ethical commitments in terms of Ubuntu has also been explored in relation to animals and nature (Etieyibo, 2017). While ethical approaches exhibit moral diversity across and within cultures and traditions, they tend to strive for a particular balance between individuals and the collective of which they are part (Prinz, 2007).

The Individual and the Collective

Ape conservationists and health professionals are regularly confronted by the tension between care for the individual and the collective. As discussed below, compassionate conservation may help to integrate not only the individual and the collective, but also the question of moral consideration and the question of how to relate to others.

That the individual matters as part of collectives is further indicated by several initiatives on the moral status of apes. The Great Ape Project, the Nonhuman Rights Project and the Philosophers’ Brief, for example, point out that there are good reasons to think individual apes deserve robust protection, perhaps even a basic set of rights (Andrews *et al.*, 2018; Cavalieri and Singer, 1996; Wise, 2010; Wise, Durham and Banes, 2020). Like human rights, a set of ape rights arguably includes the right to be free of unnecessary harm, coercion and restraint; the right to have their autonomy respected; and rights to pursue their interests individually and through their associations with their families and communities, as well as with other animals (Andrews *et al.*, 2018).

While there are good reasons to acknowledge the individual, fostering collectives is vital in view of the ongoing breakdown of the ecological fabric that supports life (O’Riordan and Lenton, 2013). All apes live

under threats posed by human development and encroachment, including agricultural expansion, infrastructure construction, logging and mining, as well as killing, capture and trade (Arcus Foundation, 2014, 2015, 2018, 2020). Activities such as the clear-cutting of rainforest also destroy the habitats of countless other animal species, rob Indigenous Peoples of their homes and livelihoods, and endanger vital ecosystems that affect the climate (Lovejoy and Nobre, 2019).

In considering how best to safeguard species and the habitats on which they depend, conservationists not only consider the collective, but take into account the interests—or rights—of individuals (Bruskotter *et al.*, 2019; Palmer, 2020). When species conservation goals conflict with the interests of human individuals and collectives, however, they can generate difficult moral dilemmas whose resolution requires careful consideration and respect. Flexibility and creative solutions can advance mutual respect and mutual interests. Compassionate conservation may help to prompt moral deliberation and to navigate the moral complexities inherent in fostering collectives and promoting individual flourishing within and across species.

Compassionate Conservation and Managing Ape Health

Compassionate conservation emerged over the past decade as a novel perspective on moral decision-making in conservation practices (Wallach *et al.*, 2018). The idea was born at the nexus of animal welfare science and conservation biology, where recognition of the wellbeing of individual, free-living animals was seen as integral to sound conservation practice (Baker, 2017; Fraser, 2010).

In more recent conceptualizations, compassionate conservation challenges three assumptions in traditional conservation: collectivism, instrumentalism and nativism (Wallach *et al.*, 2018). A common interpretation of collectivism is that it presumes the primacy of collectives—species, populations and ecosystems—over individuals, rather than seeing individuals as social beings in relation to members of their environment (Baker and Winkler, 2020; Santiago-Ávila and Lynn, 2020). While conservationists are not likely to deny the intrinsic value of individuals, some may base decisions about species preservation exclusively on individuals' instrumental value. The notion of nativism can disadvantage individual animals and their groups for the sake of historical, geographical and attitudinal ideals about the presence of species in a particular ecosystem—ideals that invite ethical reflection on their merit (Wallach *et al.*, 2018).

> "Compassionate conservation is based on four general principles: first, do no harm; individuals matter; inclusivity; and peaceful coexistence."

As discussed below, compassionate conservation is based on four general principles: first, do no harm; individuals matter; inclusivity; and peaceful coexistence (Draper, Baker and Ramp, 2015). Foundational to these four principles is that compassion is a critical moral capacity in ethical decision-making. In other words, for decisions to be ethically robust, they need to be informed by compassion. Why compassion? Compassion, as generally defined, involves a recognition of the suffering of others paired with a motivational response to be helpful in resolving or alleviating the suffering (Singer and Klimecki, 2014). As such, it provides a way to relate to the experience of other sentient beings. While empathy has an important role to play in moral agency, on its own it can introduce bias, such as for those near and dear. Instead, compassion attunes one's perceptions to the suffering of others, regardless of whether they are familiar (Bloom, 2017; Halifax, 2011). Compassion thus serves a highly relevant moral purpose: considering the experience of other sentient beings in as unbiased a way as reasonably possible and thereby providing a basis for an ethics

Photo: When species conservation goals conflict with the interests of human individuals and collectives, they can generate difficult moral dilemmas whose resolution requires careful consideration and respect. Orangutan in an oil palm plantation.
© HUTAN-Kinabatangan Orang-utan Conservation Project

of interspecies interdependence, attuned to the flourishing of both humans and animals as members of their ecological communities (Batavia *et al.*, 2021; Kirby, Steindl and Doty, 2017; Nieuwland, 2020).

Although highlighting compassion cannot solve all moral problems in the field, in part because tragedy is sometimes inescapable, compassionate conservation encourages conservationists to reflect on their goals as well as on their practice before exploring possibilities for a compassionate approach to safeguard and promote the protection of animals and biodiversity (Batavia, Nelson and Wallach, 2020; Wallach *et al.*, 2018). Compassionate conservation is a topic of ongoing intellectual and practical debate, such that employing it and discussing its merits within a specific conservation context can help bring out different points of view and individual moral commitments (Batavia *et al.*, 2021). In that sense, the approach can be used to navigate the moral complexities of including the health and wellbeing of individual apes in the context of conservation. It invites those with an affinity for collectives to explore moral deliberation that highlights individuals as morally valuable participants of

those collectives, while calling on those with sympathy for the individual to bear witness to the complexities of moral decision-making that extend beyond mere individualism.

First, Do No Harm

With respect to ape health, compassionate conservation calls for the application of the "first, do no harm" principle in any given context. In settings where humans are or could be present near apes, for instance, a critical evaluation can establish whether associated risks of disease transmission from humans to apes are too high (Woodford, Butynski and Karesh, 2002). Such critical evaluation may also be applied to the practice of habituation, which may be considered harmful given the level of stress caused over a long period of time when unhabituated apes are confronted by frequent human presence (Williamson and Feistner, 2011).

Individuals Matter

Given the immense and assorted pressures on ape species and populations, the principle of individuals matter is perhaps already engrained in much of ape conservation. The interests of apes, especially great apes, are increasingly recognized in terms of individual moral and legal rights (Andrews *et al.*, 2018; Cavalieri and Singer, 1996). Still, when individual apes cannot reproduce or be reintroduced into their natural habitats, or when the reintroduction of, for example, an orangutan appears contrary to his or her interests, the interest of the individual may be obfuscated in deference to the promotion of species or population sustainability (Palmer, 2020).

Emphasizing the individual in conservation works in at least two ways. First, compassionate conservation aims to promote the flourishing of collectives, such as species and populations, in a way that aligns with individual flourishing. As part of this strategy, seeing populations and their individuals as thoroughly interdependent encourages efforts to protect the social fabric. Second, when individual interests become detached from the collective goals of conservation, compassionate conservation highlights the moral relevance of individuals in their own right (Wallach *et al.*, 2018).

Inclusivity

The principle of inclusivity counters biases towards apes in conservation practices, especially when these biases disadvantage others. This principle is pertinent to ape conservation, given that various cultures ascribe a distinctive status to apes, as compared to other animals (Corbey, 2005). It points towards a recognition of apes as living in multispecies collectives, with other species not merely instrumental to human or ape interests. Compassionate conservation works to undo biases in ethical decision-making. It remedies unfair distribution of resources and brings attention to how certain conservation practices that benefit particular species, such as apes, could potentially marginalize and overlook other species, communities and individuals (Santiago-Ávila and Lynn, 2020; Wallach *et al.*, 2018).

Peaceful Coexistence

The principle of peaceful coexistence primarily aims to mediate human–ape conflict through the exploration of potential changes in the behavior of both humans and apes. Rather than placing more emphasis on the competing interests of humans and apes, it promotes creative inquiry into the possibilities of living peacefully together (Wallach *et al.*, 2018). As part of this inquiry, compassionate conservation underlines the critical importance of human behavioral change

Photo: The ethical and practical question of whether humans should interfere in situ is also commonly raised in response to the detection of injuries in apes. © Suzi Eszterhas/Minden/naturepl.com

(Hockings *et al.*, 2015). Moreover, compassion necessarily attunes all conservation efforts to the needs and involvement of local communities (Santiago-Ávila and Lynn, 2020).

Primary Prevention: Conservation and Interspecies Health Policy

Attuning conservation efforts to local communities and every individual animal requires unwavering moral resolve. Complicating matters, conservation is confronted with an increase in emerging infectious diseases, which can threaten the health and wellbeing of individual animals and wildlife communities (Capps and Lederman, 2015; Jones *et al.*, 2008). These diseases, and some of the underlying drivers of their increased emergence—such as deforestation and human encroachment—reflect the interdependence of human, animal and ecosystem health (Daszak, Cunningham and Hyatt, 2000; Patz *et al.*, 2004). The One Health initiative has captured the push for an interspecies health policy, providing a framework for conservation to align with public health goals (Nieuwland, 2020; see Chapter 2).

Ebola virus disease has made the international community critically aware of the dangers of emerging infectious disease. It has also sparked debate about human intervention in the wild (Capps and Lederman, 2015). This debate can inform the ethics of intervention: Should humans interfere in the lives of apes who are relatively independent of humans? More recently, the COVID-19 pandemic and its potentially devastating impact on ape health served as a reminder of the critical importance of understanding human and ape health within an interspecies health policy perspective (Gillespie and Leendertz, 2020). Exploring whether it is appropriate to intervene in the lives of apes in the wild is a central aspect of One Health ethics (Edwards *et al.*, 2018; Gruen, 2018; Nieuwland, 2020; see Case Study 5.1).

Secondary Prevention: Responding to Injury

The ethical and practical question of whether humans should interfere in situ is also commonly raised in response to the detection of injuries in apes. While opportunities to vaccinate apes in situ against a disease may be rare, practitioners often find themselves in a position to intervene in cases of human-caused injuries to apes (see Case Study 5.2).

CASE STUDY 5.1

Ebola Virus Disease and Vaccinating Apes[2]

In view of the potential impact of Ebola virus disease on apes in the wild and the ongoing development of vaccines against the disease, some ape health experts have suggested immunizations of African apes in situ, with the aim of diminishing the threat of infection among ape populations (Leendertz *et al.*, 2017; Ryan and Walsh, 2011; Walsh *et al.*, 2017; Warfield *et al.*, 2014; see Chapters 1, 4 and 6). These contributions to the literature have triggered ethical debate and raised a range of distinct ethical concerns. Among these concerns is the question of whether humans should interfere with the lives of apes in their natural habitats (see also Case Study 5.2). This question has elicited a range of responses, from principled objections to any human meddling in the ecological systems of which apes are a part, to arguments for intervention. The ethical question of whether humans should intervene in situ is limited in part by various empirical questions related to the possibility and consequences of interventions. While these concerns may suffice to steer clear of any intervention, they do not eliminate the need to consider various ethical and empirical questions (Nieuwland, 2020).

Questions also emerge with reference to settings where there are no principled objections to vaccinating apes in situ. In the case of Ebola virus disease, one justification for pursuing vaccination is that the disease is generally considered a major risk to the survival of ape populations in Africa, yet other considerations could also prove relevant. For instance, individual apes arguably have an interest in being protected against Ebola virus disease (Capps and Lederman, 2016; Nieuwland, 2020; Ryan and Walsh, 2011). Moreover, vaccinating apes in situ has been suggested as a One Health approach for protecting ape populations while simultaneously decreasing the risk of disease spillover into human communities, reflecting a concern for public health in wildlife interventions (Capps and Lederman, 2015; Edwards *et al.*, 2018; see Chapter 2).

Ethical Considerations Regarding Vaccine Development

Other concerns relate to the development of a vaccine against the Ebola virus and particularly whether the allocated effort and resources are fair and reasonable in the light of other moral demands. Is it justifiable, for instance, to spend significant resources on a potentially unachievable goal of protecting apes against Ebola virus disease (or another threat to their health) in situ while the health needs of neighboring human communities remain unmet due to a lack of funds? Apes may be better protected against disease if resources are spent on the prevention of hunting, other forms of habitat encroachment, and ecosystem fragmentation and destruction (Addison and Malone, 2018; Gruen, 2018). Alternatively, humans should arguably allocate resources to vaccine development for apes precisely because of large-scale anthropogenic intrusion into ecological systems on which apes rely for their health, well-being and survival (Osofsky, 2016).

In addition to concerns about resources that flow into pharmaceutical development, distinct scientific questions relate to the development of an Ebola vaccine. Whether health knowledge can be readily transferred from animal experiments to human biology is unclear; the same applies to transference between animal species, such as gorillas and chimpanzees (Addison and Malone, 2018; Gruen, 2018; Nieuwland, 2020). While chimpanzees have historically stood in as models of human biology due to observable similarities between the two species, Jones and Greek (2014) demonstrate that complex, systemic differences between and within species consistently prove to be biologically meaningful. Separately, changes to the individual due to environmental conditions—especially if such conditions affect multiple generations—can hinder the transfer of knowledge related to different cases from a single species, such as captive apes and their conspecifics in situ (Gruen, 2018). Another concern relates to differences across Ebola virus species, which could limit the cross-species immunizing potential of a vaccine (Feldmann and Geisbert, 2011; Leendertz *et al.*, 2017). Furthermore, the knowledge base regarding Ebola vaccines in apes is limited, as only two vaccine trial studies have been undertaken, both on captive great apes (Gruen, 2018; Walsh *et al.*, 2017; Warfield *et al.*, 2014).

Since vaccine development has until now been inextricably tied to the use of animals in research, moral questions have been raised about the justification of the harms involved (Nieuwland, 2020). Do the presumed benefits really outweigh the harms inherent to such research (Barnhill, Joffe and Miller, 2016; DeGrazia, 2016; Ferdowsian and Fuentes, 2014; Ferdowsian *et al.*, 2020)? Is it morally acceptable to harm apes in captivity for the benefit of their conspecifics elsewhere (Capps and Lederman, 2015; Nieuwland, 2020; Wendler, 2014)? Moreover, if the use of apes in medical research were to be deemed unacceptable because of the suffering and restriction of freedom it would involve, then additional moral problems would emerge with respect to the use of monkeys or, more broadly, any sentient animals. Once the human–animal distinction and, subsequently, the species barrier lose (much of) their moral relevance in justifying harms to animals, any invasive research that imposes harm on sentient beings to benefit other sentient beings may become morally problematic (DeGrazia, 2016).

Vaccine Implementation

Vaccination is seldom used to protect ape health in situ, because of both practical challenges and ethical concerns. In large part, the practical challenges depend on how the vaccine is to be administered, which is determined based on whether apes are habituated to human presence. One notable case in which habituated apes were vaccinated occurred in 1966, when Jane Goodall detected severely ill chimpanzees and immunized these apes to protect them against infection with poliovirus, using bananas as bait (Goodall, 2000). In 1989–1990, the Gorilla Doctors observed an outbreak of respiratory disease, to which they responded by vaccinating

Photo: Is it justifiable to spend significant resources on a potentially unachievable goal of protecting apes against Ebola virus disease (or another threat to their health) in situ while the health needs of neighboring human communities remain unmet due to a lack of funds? © Pete Oxford/Minden/naturepl.com

60 mountain gorillas (*Gorilla beringei beringei*) to protect them against what they presumed was measles, although the diagnosis remained unconfirmed (Cranfield and Minnis, 2007).

Evaluations of vaccines developed or in development for protection against Ebola virus disease consider a host of factors that determine their applicability for use in situ (Leendertz *et al.*, 2017; Nieuwland, 2020). For instance, while a single injection of a vector-based vaccine such as cAd3-EBO-Z or rVSV-EBOV proves sufficient to protect an individual ape, virus-like particle-based vaccines instead require multiple injections to protect individual apes, making them much less realistic for use in situ (De Santis *et al.*, 2016; Henao-Restrepo *et al.*, 2015; Leendertz *et al.*, 2017; Warfield *et al.*, 2014). The cytomegalovirus-based vaccine developed specifically for great apes in situ disseminates throughout a population when an individual is vaccinated (Marzi *et al.*, 2016). For each of these vaccines—but especially the cytomegalovirus-based vaccine, given that it self-disperses—it is ethically crucial to ensure that the effects in both apes and non-target species are not disadvantageous (Gruen, 2018; Leendertz *et al.*, 2017; Osofsky, 2016).

Do No Harm

Precaution appears warranted in addressing the unforeseen and unforeseeable consequences of introducing genetically engineered vaccines within ape populations (Gruen, 2018). The many scientific and ethical concerns that pertain to the safety of introducing vaccinations into wild populations seem to outweigh any prospects of expeditious implementation. These concerns also support the application of the principle central to both medicine and compassionate conservation—*first, do no harm*—in any consideration of implementing vaccines in situ.

Still, certain situations may call for a carefully coordinated reactive vaccination strategy with (habituated) apes, as did the abovementioned disease outbreaks witnessed by Goodall and the Gorilla Doctors (Leendertz *et al.*, 2017). Coordination is key since Ebola outbreaks occur randomly, which makes it practically impossible to assess the risk to any single population with any degree of accuracy. Complicating matters, outbreaks leave little to no time for planning a medical response. Practitioners who are tasked with managing ape health thus prepare situational assessments and develop protocols for potential medical intervention in advance (Leendertz *et al.*, 2017; see Chapter 6). To ensure robust ethical decision-making in the face of future disease outbreaks requires that such preparations include investment in ethical oversight and best practices to guide veterinarians and others charged with protecting ape health (Gilardi *et al.*, 2015; Gruen, 2018; Gruen, Fultz and Pruetz, 2013; Osofsky, 2016).

CASE STUDY 5.2

Addressing Ape Health in Natural Habitats[3]

Uganda's Rationale for Health Interventions in Situ

In 2009, at Uganda's great ape health workshop, a collective of invited national and international researchers, veterinarians and wildlife experts, agreed to intervene in response to all human-caused injuries to great apes and other primates in the country. This landmark decision was made in part because approximately one-third of Uganda's chimpanzees were estimated to have snare injuries (Plumptre et al., 2010).

While chimpanzees and other primates are not necessarily the intended targets of Ugandan hunters, many snares are set in forests and gardens, increasing the risk to chimpanzees almost everywhere. Snares can cause prolonged suffering and, when left untreated, snare injuries can result in permanent disfigurement or death (Hartel *et al.*, 2020). For survivors, severe snare wounds impose long-term damage through their effects on behavior, social status and reproductive success.[4] Interventions provide an opportunity to alleviate human-induced suffering, mitigate permanent injury and preserve behavioral and social integrity (Gruen, Fultz and Pruetz, 2013; Hartel *et al.*, 2020; Hyeroba, Apell and Otali, 2011).

Conditions Necessary for Snare Removal Interventions

Snare removal interventions are logistically challenging and accompanied by inherent risks, such as those related to dart deployment, drug administration, potential falls and responses by the target or their conspecifics. These risks are factored into any decision-making process. Standardized protocols can help to evaluate each situation and to determine the probability of success.

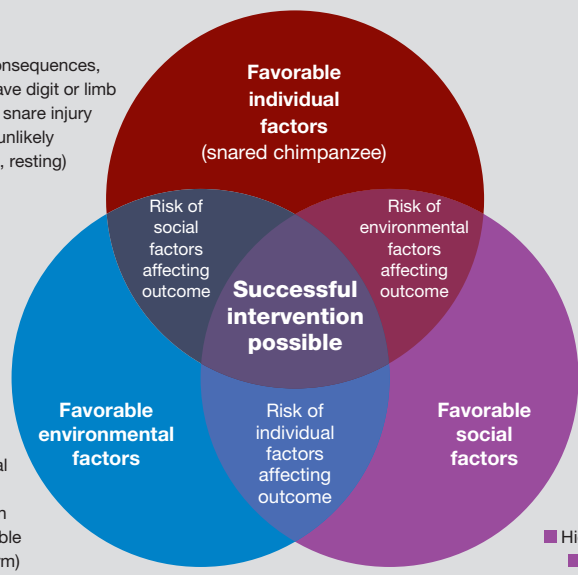
In deciding whether to intervene, practitioners and other stakeholders focus on one main question: Do the potential benefits of intervention outweigh the inherent risks? Qualified personnel—including veterinarians, field teams, project managers and directors, and wildlife authorities—are best placed to make that assessment. Similarly, interventions are best carried out by the most qualified experts, such as highly trained wildlife veterinarians who have the requisite equipment (including dart guns, controlled drugs and medical supplies) and are accompanied and advised by field assistants, rangers or guides who have intimate knowledge of the target apes, their conspecifics and the forest (Gruen, Fultz and Pruetz, 2013).

Figure 5.1 outlines the individual, environmental and social prerequisites for an intervention attempt. If all criteria are met,

FIGURE 5.1

Requirements for Successful Snare Removal Intervention

- Well habituated to humans
- Not a dependent infant
- Severe injury with permanent consequences, such that intervention likely to save digit or limb
- Already handicapped from prior snare injury
- Adverse reaction to anesthesia unlikely
- Calm when darting (for example, resting)



- Enough daylight hours for darting, removal and recovery
- Target at safe darting height (for example, low fall risk)
- Target within dart gun's proximal range with high accuracy
- Shot unobstructed by vegetation
- Safe area for dart contact is visible (for example, target's thigh or arm)

- Party is small and conspecifics are likely to avoid or ignore
- High-ranking conspecifics are absent
- Mother is absent or likely to avoid

Notes: This figure shows that individual, environmental and social factors must all be favorable for a snare removal intervention to be successful. If only two of these three sets of conditions can be met, the absence of the third risks undermining the outcome of the intervention. In deciding whether an experienced veterinarian should plan and perform a snare removal intervention, qualified personnel evaluate the presence of all three sets of conditions. Deciding to proceed with a possible intervention is not the same thing as choosing to go ahead with dart deployment. These options require separate assessments; the diagram includes conditions relating to both. Since 2006, intervention attempts have not been possible in 27% of snare cases in Uganda due to challenging individual, environmental and social factors.

Source: Based on Hartel et al. (2020)

the probability of success is expected to outweigh potential risks and an intervention may be attempted. If it is not possible to meet all the criteria, then the risks may exceed the potential for success, which suggests that the intervention should be pursued with extreme caution, postponed until all conditions can be met or abandoned entirely.

Chimpanzee Snare Injury and Intervention

Since 1987, the Kibale Chimpanzee Project (KCP) team has routinely observed a habituated chimpanzee community of 40–58 individuals in the Kanyawara area of Kibale National Park, Uganda (see Figure 5.2; Emery Thompson *et al.*, 2020). In 1997, in collaboration with the Uganda Wildlife Authority, KCP established its conservation arm, the Kibale Snare Removal Program, in response to the high rate of chimpanzee snare injuries: 45% of the living and deceased individuals had been snared,[5] and the majority of them (88%) had suffered permanent injury (Hartel *et al.*, 2020). While the program has helped to reduce the probability of a chimpanzee being snared, it has not eliminated the threat, such that interventions are still needed. Since 2006, KCP has conducted seven veterinary-supervised snare removal interventions, which have resulted in a reduction in the likelihood of permanent injuries and injury severity (Hartel *et al.*, 2020).

In January 2020, in collaboration with the Jane Goodall Institute and the Uganda Wildlife Authority, KCP established the Chimpanzee Health, Intervention, and Monitoring Program (CHIMP), which takes a One Health approach (ASP, n.d.; see also Chapters 2 and 4). CHIMP is led by a wildlife veterinarian who lives onsite at Kanyawara but is available for interventions throughout Kibale and elsewhere. Since elapsed time is the biggest enemy of a snare injury, CHIMP has been instrumental in reducing the emergency response time, which can increase the chance of a successful intervention and reduce the likelihood of permanent injury.

The discussion below considers three cases of snare injuries with and without intervention prior to CHIMP's establishment, as well as one successful intervention following CHIMP's establishment.

No Intervention

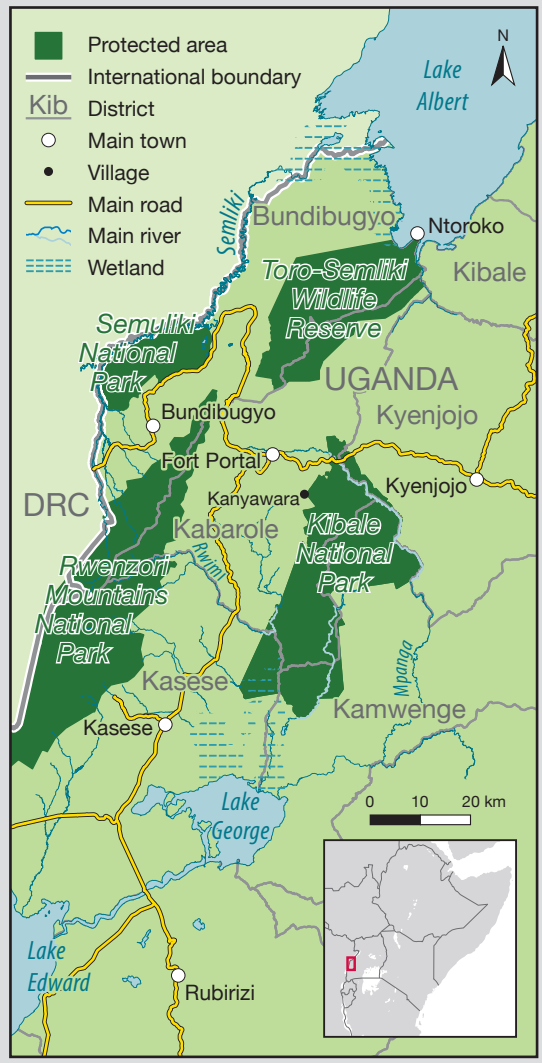
Sometimes interventions are not possible because the snare has already resulted in permanent damage by the time qualified veterinarians become aware of the injury. Such was the case with Max, a male chimpanzee who was snared twice as a juvenile (see photo below). Max's mother, Mususu, was a somewhat peripheral female who would spend weeks in the northern sector of the Kanyawara home range without being seen by researchers.

When Mususu appeared in June 2004, after not having been sighted for 21 weeks, six-year-old Max had a snare around his right ankle. About ten days later, Max was observed carrying his foot, which was still attached to his leg by some connective tissue. As he struggled to travel and climb trees on his own, Max often screamed or whimpered for help from his mother. He was seen again two days later without his foot; only a bloody stump remained.

Three years later, in March 2007, Max was snared around his left ankle. As was the case with the first snare, this injury led to the loss of his foot before the team had the chance to intervene. In July of the same year, Mususu was seen without Max, and the team assumed he had died. Surprisingly, after

FIGURE 5.2

Kibale National Park and Surrounds



Sources: Protected areas—UNEP-WCMC (2021c, 2021i); country boundaries—GADM (n.d.); other base map detail—OpenStreetMap (n.d., © OpenStreetMap contributors, published under Creative Commons Attribution License CC BY; for more information see http://creativecommons.org)

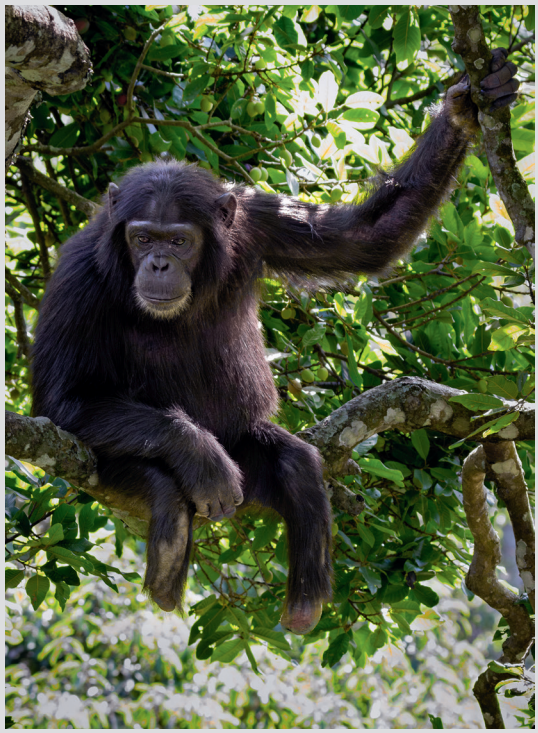


Photo: Max, who was snared twice as a juvenile. © Ronan Donovan

a three-month absence, Max returned. He moved slowly on his stumps, which sometimes still bled.

Even without feet, Max, now an adult, is able to walk and climb trees. He has struggled socially and reproductively, however. He remains the lowest-ranking adult male, is often the target of aggression and has yet to sire any offspring. If not for these permanent snare injuries, his social life would probably have been very different (Cohen, 2010).

Unsuccessful Intervention

When protocols are not well-defined or followed, risk levels increase and interventions can result in adverse outcomes. An example involves Mandela, an eight-year-old orphaned male chimpanzee. In April 2007, KCP field assistants saw Mandela with a snare around the toes of his left foot. An external veterinary team was notified and responded within three days. Unfortunately, the veterinarian darted Mandela although adult male conspecifics were nearby. As a result, Mandela fled to the other males for support and reassurance.

As Mandela's anesthesia took effect, he fell unconscious, and the adult males prevented the veterinarian from approaching by acting aggressively towards him. When the anesthesia wore off, Mandela awoke to find the snare still around his toes. The adult males departed and Mandela, still groggy, followed them (D. Hyeroba, personal communication, 2007; Hartel *et al.*, 2020). The KCP team never saw him again.

Since male chimpanzees remain in their natal group for life, Mandela was presumed dead after his conspecifics were seen without him for several months. While the KCP team cannot be certain of what caused his death—the snare injury, the anesthesia, an infection or something else—his remains the only instance of death following a snare removal intervention at Kanyawara. This incident occurred prior to the 2009 Uganda great ape health workshop, after which standardized protocols became part of every intervention.

Successful Interventions

Under ideal conditions, an intervention alleviates pain and suffering, mitigates an injury's severity and reduces the probability of permanent damage, as illustrated by Special, a 12-year-old orphaned female. On July 28, 2012, the research team encountered Special after not having sighted her in a week. Seeing a snare cutting deeply into her right wrist, they immediately contacted an external veterinary team. As field conditions were favorable, darting was carried out successfully the very next day. The veterinarian removed the snare wire (which had already cut to the bone), cleaned and sutured the wound, and administered an antibiotic to fight infection.

The intervention undoubtedly saved Special's hand, and the intervention was so successful that she used her hand to grasp branches while climbing only three months later (see Figure 5.3). Today, Special has full functionality of her snared hand, and all that remains of her injury is a faint scar (see Figure 5.3). Special remained in her natal community and gave birth to her first offspring when she was 14 years old; she is a caring mother (KCP, n.d.).[6]

Following the establishment of CHIMP and the hiring of a permanent onsite wildlife veterinarian in January 2020, a 12-year-old natal female named Wenka was seen by field assistants with a snare around her left wrist. The veterinarian mobilized an emergency response that same day, immediately began to follow Wenka to assess her snare injury, and formulated an action plan. Five days later, the veterinary team successfully darted Wenka and removed the snare, in an action that ultimately saved her hand. Four years prior, in 2016, Wenka had lost all of her fingers on the same hand to a snare injury, leaving her with only her thumb and palm intact. Despite this permanent injury, she had adapted well. Losing her entire hand would have called for a much tougher adjustment (N. Bukamba, personal communication, 2020).[7]

Having an onsite veterinarian has greatly expedited the team's emergency response. The team expects to improve the probability of success as the chimpanzees become habituated to the veterinarian, who visits the chimpanzees regularly to monitor their health. In Wenka's case, the darting intervention was delayed a few days because the CHIMP veterinarian was still in training; it took time for an experienced veterinarian to arrive with the necessary intervention drugs (N. Bukamba, personal communication, 2020). Nowadays, however, two fully trained CHIMP veterinarians are able to initiate a snare removal intervention independently, which should further reduce the risk of permanent injury.

FIGURE 5.3

Special's Recovery from a Snare Injury Following Human Intervention

Special two months after intervention (left and middle) and gripping a branch three months after intervention (right).

CASE STUDY 5.3

Provision of Health Care in Sanctuary Settings[8]

Negra, a chimpanzee who is now living in the Chimpanzee Sanctuary Northwest in the US state of Washington, was captured as an infant in Africa in the early 1970s (Ferdowsian *et al.*, 2011; see photo below). For the next 35 years, she was confined in cages in various biomedical research facilities across the United States for use in experimental surgery and vaccine development. Throughout that time, she was routinely anesthetized by dart, often for the purpose of experimental intervention but also for routine procedures such as physical exams and teeth cleanings. Incomplete records indicate that she experienced at least 60 anesthetic events, although the exact number is probably several times higher.[9]

Today Negra is one of several thousand chimpanzees living in sanctuaries across five continents. Despite their many differences, all sanctuaries share a common goal in that they strive, above all else, to provide for the health and wellbeing of their residents. Beneath this seemingly straightforward objective lies a considerable moral dilemma, however. Owing to their size, strength and volatility, adult chimpanzees like Negra cannot simply be walked into a veterinary clinic for an annual exam, nor can they be restrained like a fractious dog or cat. Instead, most medical interventions for chimpanzees require anesthesia, whose use can potentially lead to significant negative psychological and medical consequences. How then do caregivers weigh the benefits of frequent routine exams against the medical risks and the trauma of anesthesia?

Maintaining quality of life for captive animals requires a broad and balanced approach. Historically, efforts to conceptualize animal welfare have focused on three overlapping categories: maintaining physical health; minimizing negative affective states, such as pain and distress, while allowing for normal pleasures; and allowing captive animals to experience life in as natural a way as possible. When considered together, these three criteria can serve as a roadmap to optimal welfare. When pursued on their own, however, these categories sometimes lead to conflicting outcomes (Fraser, 2009). For example, too much emphasis on promoting pleasure, as in the provision of unhealthy kinds or quantities of food, may result in heart disease or diabetes, while a singular focus on what is "natural" may preclude vaccination and thus lead to preventable illness and suffering. Similarly, the consequences of efforts to maintain the physical health of the chimpanzees in sanctuary care through frequent routine examination may have undesirable consequences when measured against other criteria.

In an ideal world, veterinarians and others responsible for managing captive chimpanzee populations would have sufficient health data on which to base their decisions without the need for anesthesia. With the greater institutional adoption of positive reinforcement training in the United States, this approach is becoming increasingly possible. By employing the principles of operant conditioning, whereby trainers provide food and other rewards for actions that increasingly approximate desired medical behaviors, sanctuary personnel can teach captive chimpanzees to become active participants in their own health care. With relatively little training, chimpanzees learn to sit on a scale to be weighed or to present parts of their body for visual inspection or auscultation. With greater investment of time and resources, urine collection and basic echocardiography become possible. The greater the discomfort or physical restriction required to achieve such behaviors, however, the less likely widespread compliance becomes, for example with respect to blood pressure monitoring or venipuncture.

In practice, thorough medical examinations still require chimpanzees to be fully anesthetized. The benefits of such exams are obvious. Dental prophylaxis, deep palpation, chest X-rays and other procedures that are difficult if not impossible to achieve through positive reinforcement training or across a safety barrier are powerful tools in the prevention and early diagnosis of disease. Still, the drawbacks demand serious consideration.

While recovery can be eased with the use of reversible anesthetics, the effects of which can be rapidly diminished via administration of a reversal agent, such drugs may not be available or affordable for all institutions. Not all chimpanzees are good candidates for these classes of anesthetics, be it due to old age, obesity, cardiac disease or other health conditions. Other anesthetics are safer but more likely to result in difficult recoveries, which may involve stress, confusion and unease, even when combined with adjuncts meant to attenuate such effects.

Most anesthetics must be administered via intramuscular injection. Positive reinforcement training can play a crucial role by giving chimpanzees the choice to willingly present an arm or leg for the needle. In practice, however, not all chimpanzees can be sufficiently trained, either due to their history, behavioral predisposition, or a lack of available time and resources. When transmucosal administration and hand injections are not an option, anesthesia must be administered remotely by dart—a traumatic and potentially dangerous route of administration (Cunningham, Unwin and Setchell, 2015; see Chapter 4).

Beyond the risks and trauma of anesthetic administration, there is the risk of complications from the anesthesia itself. Humans and companion animals set to undergo anesthesia, such as those scheduled for surgery, are often given a pre-anesthetic blood test to evaluate their ability to tolerate the procedure. Such a test is not possible for chimpanzees if the

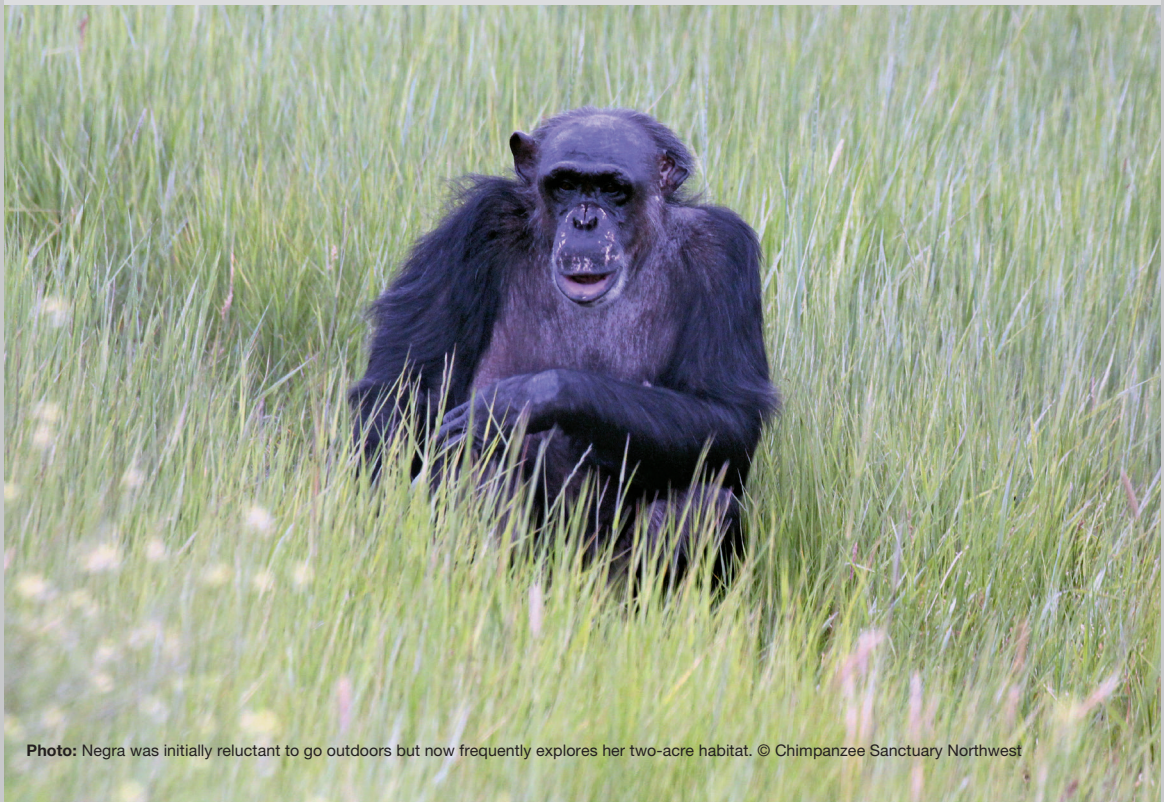


Photo: Negra was initially reluctant to go outdoors but now frequently explores her two-acre habitat. © Chimpanzee Sanctuary Northwest

blood draw itself requires anesthesia. In the case of apes who are undergoing their first documented physical exam or for those with undiagnosed, subclinical illness, this lack of information can be dangerous and, in rare cases, deadly.

Perhaps most importantly, anesthesia is a threat to the already diminished autonomy of the individuals in captive care. For chimpanzees like Negra, sanctuary is a place to recover from the trauma of laboratory life. After three and a half decades in research, Negra arrived at the sanctuary exhibiting many of the clinical signs of post-traumatic stress disorder and depression (Ferdowsian *et al.*, 2011). She was socially withdrawn, reluctant to try new things and prone to fearful outbursts when touched. And while she has made great strides in sanctuary, progress has been slow and hard won. It has been measured in small steps ventured farther outdoors, in brief social interactions with her group mates and in tenuous moments of trust in her caregivers. As her caregivers attempt to protect her health, they run the risk of damaging it further.

The issue is not whether anesthesia is ever warranted; anesthesia is commonly indicated for emergent illness and acute trauma on the grounds of limiting short-term pain and distress alone. Similarly, preventive care and the detection of preclinical or subclinical illness each have significant potential to outweigh any short-term negative consequences of anesthesia. Rather, caregivers are forced to wrestle with the question of how often it is warranted, and to what end. Put simply, is the acquisition of health data through routine exams under anesthesia always in the best interest of sanctuary residents?

The sheer range of protocols evident across accredited institutions—from those that perform annual exams on all residents to those that do not conduct exams in the absence of a specific clinical concern—signals a lack of consensus on the issue and a need for further consideration and dialogue.

Choosing when to conduct a routine exam under anesthesia or deciding for whom such exams are not warranted requires caregivers to think beyond their desire to prevent all illness and disease towards a more holistic idea of welfare. It challenges a team to acknowledge the risks of both inaction and action and place them in a context that considers not only physical health, but also broader components of wellbeing, such as agency and autonomy. Most importantly, it demands that caregivers imagine the world from the perspective of those in their care. In human medicine, patients who lack medical competency—that is, those who cannot understand why they require medical intervention—as well as those who are unable to provide informed consent, have designated proxies. These proxies are able to make informed judgments based on shared biological and cultural experience (Ferdowsian *et al.*, 2020). When caregivers serve as proxies for chimpanzee residents, they are tasked with making difficult decisions from the chimpanzees' perspectives but risk unwittingly substituting their own. These decisions, therefore, call for a chimpanzee-centered ethical framework that encourages caregivers to balance the complex and often conflicting values that define wellbeing.

Tertiary Prevention: Respect for Autonomy and Care for Wellbeing in Sanctuaries

Veterinary medicine can be invaluable in the care of apes in natural and captive settings. Nonetheless, veterinarians who specialize in wildlife or work in sanctuaries, other professionals and staff all face vexing dilemmas when it comes to managing ape health, as the very interventions that are designed to improve the health of animals can also effectively restrict or harm them. In reviewing potential courses of action, decision-makers inevitably seek to achieve a balance between the benefits of intervention and an animal's freedom from interference.

One of the key values to consider in determining whether to engage in a medical intervention is wellbeing—a concept that may be open to different interpretations. A good understanding of wellbeing can help in the assessment of whether an intervention appears to be in the interest of an individual ape (see Case Study 5.3).

Moral Agency and Moral Courage in Ape Care and Conservation

Reflections on the ethics of caring for the health of apes can quickly become overly theoretical and detached from the reality of moral dilemmas. Policy-makers, funders

and other stakeholders need to be careful not to overlook the professionals who face these dilemmas on a daily basis. Many professionals who seek to provide care for apes are changed positively by their experiences. Nonetheless, threats to their moral resilience and moral courage remain, underlining the need to identify successful preventive techniques, coping mechanisms and approaches to resolve these challenges.

What is required of professionals working in care and conservation for them to navigate the sometimes-vexing moral problems that arise in their fields? And how can institutions and organizations support professionals to realize the principles enshrined in their mission statements? Using the lens of compassion, organizations and supporters can do a lot to help professionals build moral courage to solve complex problems and to help them build resilience to address the next set of challenges (see Box 5.2).

Conclusion

When practitioners, policy-makers, funders and other decision-makers take the health of apes seriously in care and conservation, they are often pulled in different directions. On the one hand, decision-makers are invited to consider threats to the health of, for example, an individual gibbon. On the other hand, decision-makers are also quickly swept the other way, upstream and outwards to untangle the innumerable ways in which the health of an individual ape is inextricably connected to their conspecifics, to animals of other species living in shared habitat and to the many other living beings who populate the earth. Ideally, the various conservation approaches would consider the health of both individuals and groups of apes, within their own ecological context.

A One Health approach provides a way of integrating human and ape health within a shared ecology. Crossing species bounda-

BOX 5.2

Building Resilience and Moral Courage

Professionals who work with apes in risky in-situ settings or in sanctuaries can be vulnerable to burnout, vicarious traumatization and moral distress, particularly in morally complex situations. As a result, caretakers and other professionals need to develop skills to preserve their own health and wellbeing and to maintain an authentic practice of moral decision-making. Development of these competencies can benefit from individual and institutional efforts.

Burnout, Vicarious Traumatization and Moral Distress

Whereas burnout is a cumulative process associated with increased occupational stress, energy depletion, emotional exhaustion, withdrawal from work and reduced professional efficacy, it is typically unrelated to trauma and therefore distinguishable from vicarious traumatization (WHO, 2019).

In 1995, psychologists Laurie Ann Pearlman and Karen Saakvitne first used the term "vicarious traumatization" to document signs of secondary (indirect) traumatic stress in trauma therapists (Pearlman and Saakvitne, 1995). Vicarious traumatization—which is sometimes referred to as compassion fatigue—involves mental and emotional changes in caretakers and other individuals who witness and empathize with others' suffering (Figley, 1995). Changes can include alterations in a professional's world view, sense of self, psychological needs, cognitive processes and sensory experiences (Pearlman and Saakvitne, 1995). Symptoms often mirror post-traumatic stress, which can manifest as reexperienced trauma, avoidant behaviors, negative cognitions or mood, or hyperarousal. Harmful coping mechanisms may include denial, detachment or self-numbing behaviors such as substance abuse (Dunkley and Whelan, 2006). Affected professionals may also experience reductions in their ability to exercise cognitive flexibility, thereby complicating the process of ethical problem solving and sound moral judgment (Bryant, 2006).

Typically, vicarious traumatization occurs insidiously over time. However, it can occur due to a single exposure, such as in response to witnessing a severe injury or being part of a failed intervention. Individual risk factors for vicarious traumatization in professionals include a personal history of neglect or abuse, increased exposure to trauma, too little recovery time, insufficient professional experience and a lack of supervision (Tabor, 2011). Protocols may reduce the risk for vicarious traumatization (see Case Study 5.2).

Vicarious traumatization may also worsen moral distress. Andrew Jameton introduced the concept of moral distress in 1984 to describe the distress nurses face when they identify a morally defensible action but are constrained from carrying it out. Since then, the definition has been expanded to include professionals other than nurses and morally challenging situations that cause distress without feelings of constraint, including moral uncertainty (Fourie, 2017; Jameton, 1984). Moral distress may be aggravated by structural factors such as time constraints and poor teamwork or oversight, and it may also adversely affect worker morale, retention and ethical decision-making (Pauly, Varcoe and Storch, 2012). For instance, when conservationists are confronted with crises—such as political turmoil or natural hazards—the volume of need may increase, especially if support or recovery time is insufficient.

Promoting Resilience and Moral Courage in Institutions

Professionals who work with apes in their natural settings and in sanctuaries can experience vicarious resilience, which has also been called compassion satisfaction. Rather than being traumatized by work, professionals who experience vicarious resilience can become inspired and empowered by the coping capacities and resilience of the individuals and populations they serve (Hernández, Gangsei and Engstrom, 2007). For example, sanctuary care and health interventions performed in situ may invoke a sense of satisfaction among caregivers and other professionals.

Through the development of clear ethical protocols and open ethical discussion of complex dilemmas, professionals can aim to intervene appropriately and raise questions about morally dubious interventions (see Case Studies 5.1, 5.2 and 5.3). They can therefore exercise greater moral courage, which reflects a commitment to stand up for and act on fundamental ethical principles, despite potential adversity such as threats to interpersonal or professional relationships, financial hardship or retaliation.

Establishing a supportive organizational culture is essential to the prevention of vicarious traumatization and moral distress and to the promotion of resilience and moral courage among team members (Bell, Kulkarni and Dalton, 2003). Institutions can help professionals avoid vicarious traumatization by clarifying the roles of various professionals, developing peer networks, encouraging professionals to develop positive coping strategies and offering support.

Finally, organizations can create a compassionate culture that inspires resilience and moral courage by also promoting humility, professionalism, anti-retaliation policies, diversity of thought grounded in evidence and consistent ethical principles, and institutional responsiveness and reform (Aultman, 2008; Murray, 2010; Sekerka and Bagozzi, 2007).

Case studies, role modeling, simulation and practice can be used to help professionals develop ethical reasoning, reflection and communication skills so that they can deepen their understanding and articulation of existing and emerging moral quandaries (Murray, 2010). Promotion of self-awareness and the power to recognize and articulate when ethical principles have been violated can also nurture moral courage (Aultman, 2008). Professionals can be empowered to inquire into related facts and determine potential areas of action. By promoting tools and techniques important to the development of resilience and moral courage, institutions can set the stage for robust moral decision-making within and across organizations.

ries presents a range of scientific and moral challenges, including questions about the ethical distribution of benefits and risks to individuals and populations. Creative and effective solutions require collaboration across disciplines and geographical boundaries, as well as open and respectful discussion about divergent perspectives and values (Nieuwland, 2020; Verweij and Bovenkerk, 2016). Decisions about human and animal health require scientific, moral and political integration, towards a genuine interspecies health policy (Nieuwland, 2020).

In addition to the complexity of viewing human and ape health as interdependent, professionals working to safeguard ape health also contend with diverse emergent medical technologies, including disease monitoring, medication, vaccination and diagnostics. Whether and how they implement such technologies raises questions about scientific uncertainty, potential adverse consequences and the best interests of individual apes, in the light of the vulnerability of apes and ape populations in the 21st century.

The chimpanzees Negra and Special demonstrate how, despite the complexity of moral dilemmas in managing ape health, caregivers and other professionals are still confronted with concrete and context-specific moral problems (see Case Studies 5.2 and 5.3). Professionals are highly motivated to promote the health and wellbeing of apes, and they often know individuals by name, making decisions more difficult and personal. Such a personal, affective bond plays an important role in on-the-ground decision-making (Palmer, 2020).

Moral decisions impact the lives of apes involved, as well as those who make such decisions (see Box 5.2). Fostering moral courage therefore becomes a crucial aspect of managing ape health in conservation and care settings. Supporting moral decision-making, for instance by making use of the framework of compassionate conservation, requires that professionals anticipate moral issues that inevitably arise in the course of caring for apes. Successful efforts require an exchange of moral perspectives among colleagues, as well as the establishment of institutions that can exercise efficient ethical oversight and bolster the preparedness and mobility of organizations and individuals to intervene if such interventions are deemed to be ethically warranted.

Acknowledgments

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Box 5.1: Katy Scholfield and Alison White, editors[18]

Box 5.2: Hope Ferdowsian

Case Study 5.1: Derived from Nieuwland (2020)

Case Study 5.2: Emily Otali and Jessica Hartel

Case Study 5.3: J.B. Mulcahy and Diana Goodrich

Endnotes

1 **Primary prevention**: Intervention before a disease, injury or disorder occurs. **Secondary prevention**: Screening to identify and reduce the impact of diseases, injuries or disorders in their early stages. **Tertiary prevention**: Management of the impact of an ongoing illness or injury that has lasting effects.

2 Case Study 5.1 is derived from Nieuwland (2020).

3 Unless otherwise indicated, Case Study 5.2 presents information based on the authors' 30 years of combined experience researching and working on chimpanzee behavior and conservation in Uganda at a long-term field site and with other stakeholders in the region.

4 Cibot *et al.* (2016); Hashimoto (1999); Munn (2006); Newton-Fisher (2003); Stokes and Byrne (2006); Yersin *et al.* (2017).

5 This metric is higher than the one-third stated above because it includes long-term data (not just data on currently living individuals).

6 Internal veterinary reports from the veterinarian, Dr. D. Hyeroba, and the research team, seen by the authors.

7 Internal documents provided by Dr. N. Bukamba and KCP field assistants, seen by the authors.

8 Unless otherwise indicated, the information provided in Case Study 5.3 is based on the authors' experience working at Chimpanzee Sanctuary Northwest, including eight years as co-directors.

9 Chimpanzee Sanctuary Northwest maintains Negra's historical records, but there are no records prior to 1982 and many gaps after that.

10 Wageningen University & Research (www.wur.nl/en.htm) and the Faculty of Veterinary Medicine, Utrecht University.

11 Phoenix Zones Initiative (www.phoenixzonesinitiative.org) and Department of Internal Medicine, University of New Mexico School of Medicine (https://hsc.unm.edu/medicine/departments/internal-medicine).

12 University of Auckland (www.auckland.ac.nz).

13 The Kasiisi Project (www.kasiisiproject.org) and the Kibale Chimpanzee Project (https://kibalechimpanzees.wordpress.com).

14 University of North Georgia (https://ung.edu), Metropolitan Community College – Kansas City (www.mcckc.edu/), Heartland Conservation Alliance (www.heartlandconservationalliance.org/) and the Kibale Chimpanzee Project (https://kibalechimpanzees.wordpress.com).

15 Chimpanzee Sanctuary Northwest (https://chimpsnw.org).

16 Chimpanzee Sanctuary Northwest (https://chimpsnw.org).

17 Upstate Medical University (www.upstate.edu/bioethics).

18 Both: Arcus Foundation (www.arcusfoundation.org).