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**A Criminology of Extinction:  
Biodiversity, extreme consumption and the vanity of species resurrection**

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**Abstract**

This article explores an issue pertaining to the commodification of nature and related market processes—reviving extinct species. It begins by offering an overview of the aesthetic, economic, scientific and ethical reasons to preserve biological diversity. The article then considers how and why biological diversity is actually being reduced at an unprecedented rate—the ways in which, and the explanations for why, human acts and omissions are directly and indirectly, separately and synergistically, causing extinctions—quite possibly of species that we do not even know exist. From here, the article draws on the growing body of research on resurrecting species—a process known as *de-extinction*—

to contemplate the questions raised about the permanency of extinction, as well as whether we should revive extinct species and the meaning and criminological implications of doing so.

### **Keywords**

biodiversity/biological diversity; consumption; de-extinction; extinction; hunting/poaching; wildlife (crime, trade, trafficking)

### **Introduction**

Significant international work in recent years has drawn attention to “animal abuse,” “wildlife crime” and, more broadly, harms and crimes affecting non-human species (Bayrachnaya et al., 2018; Beirne, 1995, 1997, 1999, 2009, 2014; Gibbs et al., 2010; Maher and Sollund, 2016; Maher et al., 2016; Moreto, 2018; Nurse, 2013, 2015; Pires and Clarke, 2011; Sollund 2011, 2013a, 2013b, 2015; Wyatt, 2013). In some respects, this work has been pioneering. In other ways, it builds on the past work of others and serves as a reminder of the historical complexity of human-non-human relations. Bryant (1979:412) made an early call for the study of “zoological crime”—a term coined to refer to the violation of “animal related social norms . . . [that] may well be among the most ubiquitous of any social deviancy.” Beirne’s (1995) essay, some sixteen years later, was, in part, a

frustrated reaction to the failure to respond to Bryant's proposal. Although Beirne (1995:5) acknowledged that "the field of crimes against animals does not yet constitute a recognized, let alone a coherent, object of study," he maintained that it would be inaccurate to state that "animals are never present in criminological discourse," and he noted the wide range of materials involving animals as central figures in relation to "*inter alia*, the configuration of rural class relations in 18th-century England, the alleged links between crime and human nature, and the behavioral manifestations of children who are likely to be violent as adults." For example, the American scholar and linguist E.P. Evans (1906/1987) had documented the role nonhuman animals play in human society in *The Criminal Prosecution and Capital Punishment of Animals*, while historians such as E.P. Thompson, Linebaugh and others outlined the importance of wildlife in terms of property law, moral economies, class oppression, and social and environmental transformation (Hay, 1975; Linebaugh, 1976; Thompson, 1975). Game laws and poaching/anti-poaching activities and initiatives reflect centuries of human relationships with nature, as have measures aimed at balancing conservation, culling, hunting for sport, and killing for food. Many sociological studies of deviance and leisure have produced descriptive accounts of the recreational pursuit of wildlife, abuse of animals, and breaking of wildlife protection laws (Eliason, 2003; Nurse, 2013).<sup>1</sup> Hence, although Moreto and colleagues (2015:360) may in general be correct that

law enforcement and criminal justice systems have accorded wildlife offences a “low priority when compared to other crimes (Cook *et al.* 2002),” this is not to suggest they have been ignored completely or have not been regarded as important.

Criminological attention to poaching, trafficking and related animal abuse is now substantial, and encompasses contributions aimed at market reduction and enhancing conservation efforts (e.g., Lee et al., 2014; Schneider, 2008; Shepherd, 2017). While all of this represents a welcome shift, attention to the dynamics of the illegal market for a particular species or the investigation of the scope, extent, and geographical range of the international trade in specific wildlife as live bodies or as harvested “parts and products” has overshadowed—and has perhaps come at the expense of—broader criminological considerations of “biological diversity” (or “biodiversity”) loss, decline and extinction, of which wildlife crime is but one cause (see, e.g., <http://www.cnn.com/interactive/2016/12/specials/vanishing/>).

In 2016, the World Wildlife Fund for Nature’s *Living Planet Report* (WWF, 2016: 4) noted that for some decades, “scientists have been warning that human actions are pushing life toward a sixth mass extinction” (see also Kolbert, 2014; Mirzoeff, 2014:227 (citing Novoacek 2007)). The data from the Living Planet Index—which offers an indication of the state of global biological diversity, based on trends in the populations of

vertebrate species from around the world—show that between 1970 and 2012, the planet experienced a “58 per cent overall decline in vertebrate population abundance” with populations of vertebrate species falling, on average, “by more than half in little more than 40 years ... an average annual decline of 2 per cent,” with “no sign yet that this rate will decrease.” This decline of other species is one measure of the magnitude of human impact on the planet stemming from the expansion and acceleration of human activity designed to meet the demands of human survival as a growing global population needs more food, requiring more human engineered change to natural habitats (e.g., deforestation) and contributing to more over-fishing and over-hunting (EEA, 2015).

Along with pollution and global warming, these anthropogenically-induced pressures on the planetary ecosystem are now sending warning signals (Brannen, 2017). Some believe that by responding to these signals now, policy changes and technological developments can help provide remedies; others caution that some change is already irreversible and only drastic reorganization of global economic and consumption systems can slow down species decline and extinctions (for a discussion, see, e.g., Ripple et al., 2017).

This article considers human contributions to the rate of loss of biological diversity, beliefs that science and regulation can control the extent and nature of any consequences

(Fukuyama, 2002; Wilson, 1998, 2004), and related efforts to explore the plausibility, viability and implications of reviving extinct species (Wray, 2017). It first provides an overview of the reasons for preserving biological diversity, before turning to an outline of the causes of recent (unprecedented) extinctions. The implications of extinction trends have been explored thoroughly within relevant natural sciences and some areas of the social sciences, but not so far within criminology. This article explores the prospects of species extinction in terms of the merger of conservation and consumerism (e.g., “conservation tourism” (AWF, n.d.; Buckley, 2010)), as well as the bases for denial and deferral of action furnished by faith in the new science of “*de-extinction*.” It concludes by arguing the case for considering “extinction” as a matter of criminological concern, and for why this is not only justifiable but necessary.

### **The Importance of Biological Diversity and the Problem of Extinction**

Article 2 of the Convention on Biological Diversity (known informally as the “Biodiversity Convention” or “CBD”), defines “biological diversity” as “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems” (see <https://www.cbd.int/doc/legal/cbd-en.pdf>). According to Ledec and Goodland (1988:6), in

a still well-cited document, “biological diversity usually refers to three elements: (1) the number of different ecosystems (communities of plants and animals and the environments that sustain them) and their relative frequencies in a country or in the world; (2) the number of species of animals and plants and their relative frequencies; and (3) the genetic variation within each species.” It would seem axiomatic that humans should have an interest in preserving biodiversity without the need for a multilateral treaty but given the scope and rate of modern extinctions of flora and fauna (Ceballos et al., 2015), a brief overview is in order.

Ledec and Goodland (1988:8-9) submit that there exist convincing *aesthetic*, *economic*, *scientific* and *ethical* reasons to preserve biological diversity—all of which rest on the assumption that the extinction of species is “completely irreversible” and that as such, “preserving biological diversity keeps open important options for the future.”

The *aesthetic* justification is that “many wild species of plants and animals are an irreplaceable source of wonder, inspiration, and joy to human beings because of their beauty, intriguing appearance, variety, or fascinating behavior” (Ledec and Goodland, 1988:14; see also Kahn, 2018). Indeed, the U.S. Endangered Species Act of 1973 (16 U.S.C. § 1531 *et seq.*) recognizes explicitly the aesthetic (as well as educational, historical and recreational) value of flora and fauna—even for those who do not interact directly with

such fish, wildlife and plants. In other words, “knowing that wild things thrive in faraway places can provide sufficient reason for preservation” (The Stanford Environmental Law Society, 2001:4).

The *economic* justification for preserving biodiversity rests in the belief that many species of wild plants and animals can be conceptualized as “undeveloped resources . . . [with] significant economic potential that is currently undiscovered, undervalued, or underutilized” (Ledec and Goodland, 1988:9). This *resource* oriented view is, of course, familiar: biodiversity underpins agriculture, fishing, forestry and modern food security, as well as necessary products and secondary services (medical, pharmaceutical, tourism). Furthermore, as Kahn (2018) notes, “ecosystem services” represent an economic argument for preserving biodiversity: we benefit “because it saves us money (mangroves prevent coastal erosion that we would otherwise have to handle with an expensive engineering project) or because it contains something of value to us, either now or in the future,” such as, pharmaceutical drugs derived from plants, or the way in which we have relied on horseshoe crabs to ensure the safety of virtually every drug and medical device in use today (see Krisfalusi-Gannon, 2018; Zhang 2018).

The *scientific* case for preserving biodiversity rests on recognition of unique biochemical, physiological, and population characteristics of non-human species and the

benefits to humans that follow from increasing our understanding of basic life processes (Ledec and Goodland, 1988:13-14; The Stanford Environmental Law Society, 2001:3-4). These benefits exist independent of any potential (or eventual) economic payoff.

Operating from an *ethical* or *moral* perspective, some contend that humans should refrain from engaging in unsustainable practices that “could lead to the loss of species from peoples’ daily lives, customs and conceptual world, thus leaving a culturally and emotionally poorer world for their children” (Herbig, 2010:125). Preservation of biological diversity and protection of the environment for future generations *of humans* is a common refrain in environmentalism (see, e.g., Brisman and South, 2015a, 2018a). In a slightly different vein, another ethical or moral justification for biodiversity preservation begins with the recognition that humans are the one species with the ability to annihilate all other species (intentionally, recklessly, negligently or accidentally) and thus humans should not only exercise *restraint* with respect to this awesome power, but have a *duty* of stewardship—an *obligation* not to engage in acts or omissions of ecocide that have significant consequences for bio-diversity. The human capacity to create systems of production, operating locally but with global impacts, should demand that humans exercise a serious degree of responsibility to, as White (2013:12) puts it, “ensure that such production methods do not exceed the ecospheric limits of the planet (White 2007).” Other

ethical and moral justifications for preserving biodiversity—ones far less anthropocentric in orientation—rest on the conviction that “animals have intrinsic value and that, as such, they should not be conceptualized or treated as economic resources” (Goyes and Sollund, 2016: 95).

The aforementioned *aesthetic*, *economic*, *scientific* and *ethical* reasons for ensuring continued biological diversity on Earth reflect a number of different—and sometimes competing—ecophilosophies (see Halsey and White, 1998; White, 2013). The justification that might resonate the most with criminologists, however, is one based on *risk* in relation to the consequences of extinction (Brisman, 2017). Without biodiversity, the stability, strength and inter-dependence of eco-systems are weakened and crucial processes of, for example, photosynthesis, water retention and soil nutrition, are threatened (Tilman, 1999). The fundamental risk, therefore, is that the pace of species extinction gathers momentum to the point of endangering the existence of *all life*. Similar to cases of denial (Cohen, 2001; see also Brisman and South, 2015a, b; Natali, 2010; Wyatt and Brisman, 2017), strategic ignorance (McGoey, 2012) or omission (van Erp and Huisman, 2013), here humans are unwilling to fully comprehend or appreciate what biodiversity loss may mean for the ecosphere and that we may be “imperiling our own tenure on this planet” (Dawson, 2016:10).

Despite the *aesthetic, economic, scientific* and *ethical* justifications for preserving biological diversity—as well as the *risks* to human and nonhuman life and the planet as a whole for not doing so—biological diversity is actually being *reduced at an unprecedented rate*. Admittedly, *extinction*—the ultimate demise of a species—is actually a routine occurrence in evolutionary terms (Angelici, 2016; Sodhi et al., 2009), but over tens of thousands of years, the process of evolution and the nature of extinction events have been shaped by the impact of human activities. This significant and adverse influence has been pronounced, such that human-induced extinctions now far exceed natural ones (Hogan et al., 2010). From the Pleistocene period of exotic animals and mega fauna to today, humanity, as Dawson (2016:8) contends,

essentially ate its way down the food chain when wiping out biodiversity. Africa, our ancestral home, is virtually alone in harboring some remnants of the Pleistocene biodiversity. . . . [W]e are witnessing the final destruction of the world's remaining megafauna . . . .

Dawson's analysis of human impact merits further discussion here. In short, while the *rate of natural extinction* of species has “usually been slightly less than the *rate of formation* of new species through evolutionary processes (Myers 1979)” (Ledec and Goodland, 1988: 7 (emphasis added)), it is the activity of *humans* that has caused an *acceleration* of extinction, with the possibility that now, “[m]ore species of the Earth's

flora and fauna may disappear in the next several decades than were lost in the mass extinction that wiped out whole taxonomic groups of animals, including the dinosaurs, 65 million years ago (Wolf 1987).”

Although humans are not the first species to have brought about the extinction of another species, the scale of their impact is without precedent, over millennia threatening *numerous groups* of other organisms (Stenøien and Andersen, 2018). The tragedy and shame of this is that humanity is “the first [species] to be aware of the implications of [its] actions and to be capable of controlling them” (Ledec and Goodland, 1998: 9) and yet remains unwilling to act in response to dire forecasts and warnings (Agnew, 2012; Ripple et al., 2017). It is beyond shameful, but perverse and criminal, to transform the process and environmental consequences of impending extinction of species into an economic opportunity to create a profitable market based on rarity and scarcity—a phenomenon to which we now turn.

### **Uncontrollable human urges? Conquest, collection, consumption**

The financial and cultural value of scarce “things” has been noted widely (see, e.g., van Uhm, 2018). In the past—and today—conditions of near-extinction have stimulated unregulated and criminal markets for the rare or exotic (Schneider, 2012; Sellar, 2017).

Courchamp and colleagues (2006: 0001) note that the “human predisposition to place exaggerated value on rarity fuels disproportionate exploitation of rare species, rendering them even rarer and thus more desirable, ultimately leading them into an extinction vortex.” In some cases—and in addition to rarity and desirability—it is a quality of “charisma” that may make a species particularly popular as an icon of nature and as images (real or artistically-/computer-generated) in cultural products (film and television, toys, clothing, and so on). Yet, as Courchamp and colleagues (2018) suggest, it is precisely such popularity and the widely received presentations of “virtual” populations as apparently thriving, that may be helping to create the perception that these species are not at risk of extinction and need no conservation interventions.

Uncontrolled hunting or poaching—as well as the capture of rare animals as pets and the (illegal and legal) trade in animal body parts—are obvious threats to some species’ survival (for examples, see Gettleman, 2017; Nordland, 2018; Nuwer, 2017, 2018a, 2018b; Rivett-Carnac, 2017; Werblow, 2018; Zimmer, 2013). Various other human activities have also indirectly contributed to species decline, including pollution and atmospheric change (Giller, 2018; Pacifici et al., 2017), as well as deliberate and inadvertent allochthonous species introduction, which can become serious competitors or predators for autochthonous species (Keller and Perrings, 2011). In the well-known case of the California condor

(*Gymnogyps californianus*), DDT contributed to eggshell thinning and lower reproductive success (see, e.g., Kiff et al., 1979). Other impacts follow from habitation alteration caused by agricultural intensification, deforestation and industrial development (Maxwell et al., 2016; Zimmer, 2013:33), as well as war and civil unrest (Brisman and South, 2018b; Daskin and Pringle, 2018; Nuwer, 2018b). Such causes and changes may bring about loss of species independently of, or in concert with, one or more other factors, such as competition for space and food. In many such cases, non-human species are then identified or labeled as the source of threats to livestock or crops and are subsequently persecuted—often at a magnitude disproportional to the actual damage they cause—contributing to further negative impacts upon the equilibrium of eco-systems (Sodhi et al., 2009; see also Brisman et al., 2015).

Essentially, human acts and omissions are directly and indirectly, separately and synergistically, causing extinctions. It is perhaps unsurprising then that one human response is directed not at efforts to *prevent* extinction but to enable the process of *resurrection* or *de-extinction* of species (Dawson, 2016; Zimmer, 2013). In the next section we consider some of the issues and implications that follow.

### **Reviving Extinct Species**

For thousands of years, the Pyrenean ibex or *bucardo* (*Capra pyrenaica pyrenaica*)—a kind of wild goat—clambered along the mountains between France and Spain. With the advent of hunting with guns, by early 2000, the bucardo was extinct. Three years later, however, a team of French and Spanish scientists, using cells from the world’s last Pyrenean ibex delivered a 4.5-pound clone (Carlin et al., 2014:9). The clone died within ten minutes, but in her short lifespan—the first living birth of an extinct animal—she raised the hopes of some that cloning could help reverse the trend of species dying out due to human activities. What had heretofore been fantasy (think *Jurassic Park*) had edged into the world of scientific possibility. Admittedly, resurrecting dinosaurs is still out of reach. As Zimmer (2013:33) explains, “[i]n reality the only species we can hope to revive now are those that died within the past few tens of thousands of years and left behind remains that harbor intact cells or, at the very least, enough ancient DNA to reconstruct the creature’s genome.” Thus, natural rates of decay will preclude our ability to retrieve the full genome of the *Tyrannosaurus rex*, which disappeared roughly 65 million years ago. But the species that we may be able to revive are those that vanished during—and, as noted above, *because* of—humanity’s ascension to world domination.

*Whether* we can resurrect extinct species—and *how* we might do so or *which* methods we might use—remain important scientific questions for wildlife biologists and

geneticists. *Should* we do so—or *why* we might bring back extinct species—are ethical questions that have relevance for criminology. In order to understand why this may be the case, it is necessary to consider some of the arguments for and against de-extinction.

Some contend that humans have a *moral obligation* to resurrect species that we drove to extinction. Defending themselves against claims that reviving a species that no longer exists demonstrates “humanity’s lack of humility” (Carlin et al., 2014:6) and is akin to “playing God,” proponents of de-extinction contend that “we played God when we exterminated these animals” (Zimmer, 2013:33 (quoting Professor Michael Archer, a paleontologist at the University of New South Wales)).

Other supporters of de-extinction point to the *concrete benefits* of reviving extinct species, such as those animals that performed key services to their ecosystems. For example, the Siberia of 12,000 years ago was a landscape of grassy steppe, rather than moss-dominated tundra. Mammoths and other large herbivores maintained the grassland by breaking up the soil and fertilizing it with their manure. When these large grazing animals disappeared, moss took over, transforming the grassland into less productive tundra (Zimmer, 2013:33)—leading to efforts to revive these proboscideans. Similarly, efforts to bring back the auroch—an ancient breed of land herbivore, a keystone herbivore vital for European biodiversity prior to its extinction in 1627, and an ancestor of all cattle (through a

process known as “breeding back” or “back-breeding”—a form of artificial selection involving the deliberate selective breeding of domestic nonhuman animals in an effort to produce a breed with a phenotype that resembles its “wild” ancestor)—have been undertaken in an effort to “rewild” parts of Europe (Graham, 2017; Monks, 2017).

Some opponents of de-extinction object on the grounds that cloned animals are at risk of mortality because of genetic defects and thus such processes and procedures may be cruel or painful. For example, the scientists involved in the revival of the Pyrenean ibex made numerous attempts prior to the fetus that survived to term and the newborn burcardo clone struggled to breathe before dying (Zimmer, 2013:33). This, of course, raises a series of additional issues. As Carlin and colleagues (2014:17) emphasize, “the ultimate objective of de-extinction efforts is not to produce laboratory curiosities, but to restore lost species to independent existence in nature. No de-extinction proponent has yet admitted a desire to produce mammoths solely for zoos or Carolina parakeets solely as pets. Rather, the aim of these efforts is to create, release, and reestablish self-sustaining breeding populations in the wild.” If a species became extinct hundreds or thousands of years ago, much of its original habitat may have been destroyed by human activity and development, its food supply may have disappeared, and its former habitat—what is left of it, if any—may have new occupants. The re-introduction of a species will, in turn, have consequences for this

changed environment and these may not be easy to predict. The disappearance of a species from an ecosystem usually leads to negative alterations in the food chain of which it is a part, and there is no guarantee that reintroducing a formerly extinct species would not disrupt the integrity of a present ecosystem: an existing food chain would not simply “make room” for a species that had disappeared and returned. In such a situation, without an environment to put re-created species back into, the whole exercise might create a new class of endangered species—or worse—a new list of *extinct* species—due to the incompatibility of the re-created/reintroduced ones with the current ecosystem(s).

Other opponents express concern that “the ability to revive dead species may undercut conservation efforts for still-living species that are endangered or threatened, detracting from the perceived need to protect them if they are reliably replaceable” (Carlin et al., 2014:6). As Professor John Wiens, an evolutionary biologist, remarks, “There is clearly a terrible urgency to saving threatened species and habitats. As far as I can see, there is little urgency for bringing back extinct ones. Why invest millions of dollars in bringing a handful of species back from the dead, when there are millions still waiting to be discovered, described and protected?” (quoted in Zimmer, 2013:40). Or, as Paul Ferraro, Bloomberg Distinguished Professor of Water and Environmental Economics at Johns Hopkins University, puts it, “[t]he fact is that when you spend resources on one species,

you by definition are not spending them on another” (quoted in Kahn, 2018). While advocates of de-extinction reply that the technologies of cloning and genomic engineering for reviving species could be helpful for *preserving* endangered ones—especially those that do not breed easily in captivity—there remains the untouched matter regarding why certain species have become endangered in the first place. In other words, do de-extinction projects serve as a “distraction”—reducing the impetus to address the root causes and underlying problems endangering a species—or do they constitute a form of “salvation” (Zimmer, 2013:41)?

This brings us back to the question raised above regarding *why* we might attempt to revive extinct species. From a scientific perspective, it is obvious that studying living species is likely to be more illuminating than studying those that are extinct. The commercial attraction lies with the willingness of consumers (collectors, pet-owners) to pay high prices for resurrected species, with price sensitivity regulated if the technology is also controlled, creating availability but maintaining scarcity. Other questions to confront include whether we would revive extinct species solely for the purpose of oppressing or “enslaving” them (to use Sollund’s (2017) language)? For consumption as food by humans (Carlin et al., 2014:44-45n.163)? As game on ranches for wealthy trophy hunters to engage

in “canned hunting” or “captive hunting” (Fernandez, 2017)? What might de-extinction mean, then, given our current ecocidal practices of consumerism and consumption?

*Rarity, vanity and consumption*

When we think about our relationship with nature in current conditions, it is interesting to note how much modern consumerism depends on the environment not just for necessities but for what is made desirable or essential in other ways, through the influences of fashionability and marketing—what Katz (1998: 52) calls “greenateering.” Collectors who might just as well pursue hobbies of acquiring antiques, art or stamps, are already customers in a huge international market for exotic wildlife (Slater, 2014:118; see also Werblow, 2018). Such individuals may claim—and indeed feel—that their activity is an expression of a desire to reconnect with the natural world, and that ownership—especially of endangered species—is not a form of exploitation but an act of “conservation” and an important way of keeping such animals alive on Earth.<sup>2</sup> Corporate environmentalism has also, as Katz (1998: 50-51) argues, opened up new markets, buying and selling “nature”—“whether ecotourism outfits, or shops such as The Nature Company, The Body Shop, or the recently opened Evolution in downtown Manhattan, which sell *inter alia* bones, fossils, natural elixirs, and dead bugs” (internal citations omitted). At present, in a case of hubris and myopia, buying the cosmetic and clothing products of nature, or owning the exotic and

rare, can be believed to be a reaffirmation of a benign relationship between humans and nature. But these activities do not really help with the revering or preservation of nature, nor do they really help to *protect* or *conserve* wild animal species: humanity still faces an “age of extinction” (Roman and Li, 2018), an “epoch of epic defaunation” (Dawson, 2016:8). Instead, they contribute to a culture of consumption (Brisman and South, 2013, 2014) with regard to nature rather than extending empathy or engaging in conservation. The possibility then arises that de-extinction opens up, not a set of benefits to nature through, for example, the re-introduction of extinct animals that once populated the North American and Eurasian tundra and boreal forests (Wray, 2017), but new *markets* based on a consumer embrace of faux conservation and the narcissism and vanity of human belief that science can reverse the mistakes of the past. Extinction—the death of species—is not to be feared.

*What would de-extinction bring back?*

Arguably, resurrection would not bring back original species but modified or facsimile—and in that sense *new*—versions of the originals (Carlin et al, 2014:16).<sup>3</sup> From a criminological perspective, if we reached the point where de-extinction could be accomplished with relative ease and minimal cost, would we cease to have the problems of—or even *categories* of—“poaching” and “wildlife crime”? For example, “poaching” is

presently a crime because of the private ownership of animals, birds, or fish. De-extinction might mean that poaching for motives of food or collection—reasons that are proffered today—would become uncommon, but the desire to protect the genetic technologies involved and the patenting of the facsimiles could introduce new bases for criminalization and new concerns for criminology. In a different vein, the terminology of “wildlife crime” would no longer make sense when applied to species that have no living connection with the “wild.” Indeed, the “wild” could be changed fundamentally, re-engineered to be a “tamed,” manipulated and de-natured environment. Profit, politics, scientific ambition and ability might encourage the extermination of entire species that inconveniently inhabit some desirable geographical area or possess some sought-after property, facilitated by the promise of being able to bring back a “facsimile” of them if required.

The justifications for preserving biodiversity (*aesthetic, economic, scientific and ethical*), outlined earlier, and the benefits to humans (education, relaxation and pleasure, practical use) are many and multi-faceted. Such justifications and benefits increase when one looks beyond humanity to the importance of biodiversity. Protecting a species—to say nothing of *bringing back* a species—requires more than just preservation (or de-extinction) of *that one* species. It necessitates safeguarding (or, in the case of an extinct species, ensuring) the availability and appropriateness of habitat and food supply.<sup>4</sup> Such

recognition of the interconnectedness of species is often absent, as when proponents of de-extinction endorse creating, for example, passenger pigeons from ban-tailed pigeons or ivory-billed woodpeckers from pileated woodpeckers simply because they would be “a fascinating addition to the world” (Carlin et al., 2014:13). As Hank Greely, a bioethicist at Stanford, has stated, ““What intrigues me is just that it’s really cool. A saber-toothed cat? It would be neat to see one of those”” (quoted in Zimmer, 2013:41). Unfortunately, an approach to protecting and preserving biodiversity and to bringing back extinct species because some animals are “cool” or “neat” (aside from being crass and perverse) bears a strong resemblance to short-lived “commitment” to fetishistic fads—one likely to contribute to the ephemerality of many species and the transience of humans.

## **Conclusion**

A few years ago, at a conference panel on wildlife trafficking, one audience member posed the following question to the two panelists, who had each presented a paper on the illegal wildlife trade: “How do you decide which species to choose to study?” The presenters responded with rather similar answers.

The first presenter expressed a personal dedication to parrots because she had, at one point in time, kept parrots as pets, prior to realizing that this was essentially a form of

“slavery,” in her words. She was careful to add, however, that in designing her research, she did not privilege one species over others, for to do so would constitute *speciesism*—human devaluation and prejudicial treatment of nonhuman species, as well as human perception of nonhuman animals as less worthy of concern, compassion, or justice (see, e.g., Beirne, 1995, 1997, 1999, 2009, 2014; Cazaux, 1999; Sollund 2011). There is a high demand for parrots and many species of them are heavily trafficked (see Goyes and Sollund, 2016; Guzman, 2003; Pires and Clarke, 2011), she added, and they kept appearing in her data. Thus, it was the study of the wildlife trade *as a whole*, rather than a special affinity for a specific species that led her to focus on parrots.

The second presenter also offered a data-driven response. She explained that her intention had been to study enforcement responses to the illegal trade in wildlife without concentrating on any species in particular; attention to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the multilateral treaty, was her guiding framework. When conducting interviews with customs officials, police and wildlife authorities in Uganda, however, she observed that her respondents kept referring to the ivory trade even when she posed questions about trade in wildlife more generally. Because her respondents had more experiences seizing ivory, the second presenter focused on elephants. Like the first presenter, the second presenter “followed [her] data,” which,

she acknowledged, meant neglecting other species, which have been the subject of both legal and illegal trade in Uganda.

Both presenters' answers reflected a *biocentric* ecophilosophical orientation—a belief that all species have intrinsic value and equivalent moral worth (see Halsey and White, 1998). Criminology on the whole, however, tends to be anthropocentric in its approach and orientation, “emphasiz[ing] the biological, mental and moral superiority of *humans* over all other living and non-living entities,” and viewing non-human nature “*instrumentally*—as something to be appropriated, processed, consumed and disposed of in a manner which best suits the immediate interests of human beings” (Halsey and White, 1998:349 (emphases in original). This myopic, self-absorbed dismissal or denial of the deterioration and despoliation of the planet will eventually confront us with the ultimate challenge—how to avoid our own extinction (Stephens, 2018).

In their essay on “Criminology, War and Environmental Despoliation,” O’Sullivan and Walters (2016:79) offer the following observation:

Over 30 years ago, Harding (1983: 81) challenged the criminological community to move beyond their traditional fields of study and to branch into issues of global concern. Harding called for us to leave ‘mini-criminology’ behind and to tackle the question of: ‘What can criminology and criminologists do to decrease the chances of the extinction of mankind and the destruction of the planet?’ This challenge is even more pertinent today.

All but the most ardent misanthropic bio-centrists would argue that humanity is worth saving. This article has attempted to suggest that the question of how to decrease the chance of the extinction of mankind without causing the extinction of numerous nonhuman animal species and the destruction of the planet is *the* issue of the future. As the 2016 *Living Planet Report* concludes, “Given our current trajectory toward the unacceptable conditions that are predicted for the Anthropocene, there is a clear challenge for humanity to learn how to operate within the environmental limits of our planet and to maintain or restore resilience of ecosystems” (WWF, 2016: 5). Froestad and colleagues argue that we need to identify a “safe and just space for humanity” (see also Raworth, 2012: 7), but humans are part of a complex ecosystem of interdependence with other species. The principle of equilibrium is vital and humans bear responsibility for extinctions, but the development and use of technologies of de-extinction require scrutiny and caution (Brisman and South, 2017, 2018c; Natali, 2015). If we are to avoid extinction there must be safety, justice and space—not just for us, but for all species.

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<sup>1</sup> While there are problems with the word “wildlife” (see Sollund, 2015), for the purposes of this article, we employ the definition offered by Lemieux (2014), who considers “wildlife” to include all forms of non-domesticated animals and plants.

<sup>2</sup> Indeed, those who breed and subsequently hunt exotic animals claim that they are “help[ing] ensure species’ survival” (Fernandez, 2017:A14). As Fernandez (2017:A14) reports, “[e]xotic-game ranches see themselves not as an enemy of wildlife conservation but as an ally, arguing that they contribute a percentage of their profits to conservation efforts. . . . Beyond the financial contributions, hunting ranches and their supporters say the blending of commerce and conservation helps save species from extinction.” Unsurprisingly, animal-protection groups view such “management of rare and endangered species—breeding some, preventing some from being hunted, while allowing the killing of others” as “repulsive” and “hypocritical” (Fernandez, 2017:A14).

<sup>3</sup> Some scientists acknowledge they are not attempting to create exact copies of extinct animals. For example, George McDonald Church, Professor of Genetics at Harvard Medical School, has inserted DNA from a mammoth into the DNA of an Asian elephant (a close living relative) in the hopes of producing a “mammophant” (Mai, 2017:5). As Mai (2017:5) reports, “Church hopes his efforts will restore an extinct species. His ultimate goal is to release herds of mammophants into the Arctic. His plans would also help save the endangered Asian elephant. Giving it the traits needed to survive in the Arctic would give the species another chance because it would be isolated from human populations.”

<sup>4</sup> A similar issue arises when trying to reintroduce to the wild endangered animals that have been bred in captivity—i.e., ensuring that they do not fall victim to the same factors that drove them toward extinction in the first place (see Kahn, 2018). As Kahn (2018) explains, the goal is to avoid a species becoming “conservation-reliant”—a situation whereby “an endangered animal becomes a literal ward of the state: preserved only in breeding facilities or in tiny, meticulously maintained ‘wild’ habitats.”

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