

2 DEFAUNATION, WILDLIFE EXPLOITATION AND ZOO NOTIC DISEASES

*A green criminological perspective*¹

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INTRODUCTION

Over the past century the human impact on the environment has become increasingly visible. Humans have consumed more natural resources in the past 50 years than in all of previous history (EPA 2009). In his renowned book, *The Future of Life*, Edward Wilson (2002: 23) unflinchingly remarked how maintaining the level of consumption of the United States, for every person on Earth, would require four additional planets. This massive destruction of resources and natural habitats contrasts sharply with the perspective of sustainable development and a long-term future (Vercelli 2017). Against a modest use of nature, the excessive, structural over-exploitation of neoliberal society leads to multifaceted problems – socioeconomic, political and environmental. That more wood is being consumed globally than is currently being grown is a pertinent example of such unsustainable deficit today, with half of the tropical and temperate forests having disappeared (EPA 2009). Such deforestation not only contributes to the annual greenhouse gases released into the atmosphere (FAO 2006) but is also instrumental in the decrease of global biodiversity, as tropical forests contain more than 50% of all living species on earth (Boekhout van Solinge 2010).

In addition to deforestation and habitat degradation, the excessive and unsustainable exploitation of fauna threatens the world (Zimmerman 2003). Today, large trade flows of endangered species have become important to the global economy, with these entering the market as commodities for a wide variety of purposes: animal products are used as medicines, meat and eggs are served as food, while skins and furs are used for leather and clothing products (Van Uhm 2014; 2018). This leads to global defaunation,² with extensive consequences that are not limited to national borders – the complex effects can threaten

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2 Defaunation is the equivalent of 'deforestation'; the term is used to refer to the loss of species and populations as well as local animal loss (Dirzo *et al.*, 2014).

all life on earth (Hooper *et al.* 2012; Dirzo *et al.* 2014; IPBES 2019). A recent example of the dangerous consequences of defaunation is the Covid-19 pandemic, in which the highly contagious zoonosis was transmitted through animals being sold on animal markets. Since December 2019, the Covid-19 outbreak has infected over 60 million people, with more than 1,5 million people having died worldwide (Johns Hopkins CRC, 2020).

Despite the harmful impact of humans on the environment, criminology has been remarkably ignorant of the crimes perpetrated against nature, with studies focusing on green crime being few and far between (Beirne & South 2007; Sollund 2019). Within the past 10 years, however, there has emerged a growing body of green criminologists committed to examining environmental crimes, in large part due to increasing international concerns about the degradation of nature and its effects on ecosystems, plants, humans and non-human animals (White 2011). In this chapter, the criminogenic impact of nature exploitation will be discussed from an ecocentric perspective, by examining the link between anthropogenic defaunation, ecological interaction and the risks of zoonoses. In the analysis, both green criminological and ecological concepts will be used to indicate the precarious state of life on earth, arguing that the over-exploitation of nature has had increasingly visible effects on the socioeconomic, political and ecological dimensions of society, thus raising important questions for criminology in the context of the present Covid-19 pandemic. From this perspective, this chapter can be seen as an attempt to analyse the Covid-19 pandemic from a green criminological perspective.

First, a brief overview of the emergence of green criminology as a broad harm perspective will be afforded, before we move on to discuss the anthropogenic defaunation so prevalent in the socioeconomic and political dynamics of the Anthropocene.³ Ecocentric approaches will then be introduced while interpreting the symbiotic relationship between animals, people and plants in relation to defaunation, and the global spread of zoonoses, such as Covid-19, will be analysed as a dangerous side effect of such forms of natural exploitation. Finally, the chapter will discuss the manageability of these consequences and conclude by demonstrating the relationship between the over-exploitation of nature and the Covid-19 pandemic.

3 The Anthropocene is a proposed geological epoch dating from the commencement of significant human impact on Earth's geology and ecosystems.

GREEN CRIMINOLOGY: ENVIRONMENTAL PROBLEMS BECOME SOCIAL PROBLEMS

Green criminology is a relatively young but rapidly growing field within criminology. The primary concerns of green criminologists are twofold: on the one hand, the focus is on approaching green crimes from traditional and legal definitions of crime, such as infringements against (environmental) legislation (administrative, civil and criminal), and on the other, the focus lies on (not yet) criminalized forms of environmental harm. In the latter, the concept of 'harm' encompasses a diversity of behaviours and negligence associated with nature exploitation, climate change, pollution and abuses of the rights of animals, plants and ecosystems as direct and indirect victims. Green criminology, thus, employs a broad concept of harm and is not limited to criminalized (or regulated) activities, dealing also with the harmful, intended and unintended behaviours that are not restricted by law and regulations (White 2011). Definitions of crime are after all socially constructed and dependent on time and place, as power relations and social inequalities in society always play an important role in defining crime (Sellin 1938; Quinney 1970; Hulsman 1986). It is, therefore, imperative to study activities that are harmful to the environment, like the exploitation of natural resources, even if they have yet to be criminalized (South 1998; Stretesky *et al.* 2013, Zaitch *et al.* 2014; Van Uhm 2020).

The over-exploitation of nature has become essential for keeping the global economy running in the 21st century (e.g. Lynch & Stretesky 2014). Economic interests by powerful actors, whether states, corporations or landowners, have long hampered the effective criminalization of environmental harms (Ruggiero & South 2013; Stretesky *et al.* 2013). An important reason for this is that governments generally work closely with the industry to preserve and protect the social and economic structures underlying the exploitation of nature (Beck 1992; Hajer & Schwarz 1996; Zaitch *et al.* 2014; Siegel, Spapens, & Van Uhm 2020). In this sense, most environmental crimes and harms can be considered crimes of the powerful (Pierce 1976; Ruggiero & South 2010, 2013; Zaitch & Gutiérrez Gómez 2015). According to Zygmunt Bauman (2001), such exploitation has become the norm, a "precept of reason" that normalizes over-exploitation, driven by the consumer society with few standards and much temptation. In particular, the rampant economic growth of the Global North is responsible for this incessant harm to the natural environment, particularly in the Global South (Duffy 2010; Goyes 2019; Zabyelina & Van Uhm 2020). In our increasingly globalized world, the destruction and consumption of nature is now entrenched within socioeconomic and political dynamics, with evident ecological decline resulting from anthropocentric lifestyle patterns (Brisman & South 2014).

Even though attention towards the crimes and harms against nature is growing, criminology is still one of the disciplines that is embedded in exemptionalist thinking: the belief that

the relationship between humans and nature is unimportant, because humans are both distinct and exempt from natural forces (White 1967). Several green criminologists have, however, emphasized that society, with all its subsystems of economy, politics, culture, family, and so on, should no longer be seen as autonomous from nature (South 1998; White 2008; Sollund 2019; Van Uhm 2020). In his article ‘Biology and Social Theory in the Environmental Debate’, Benton (1994) already emphasized that the dualistic thinking about nature and society as separate and independent kingdoms is obsolete. Environmental problems are not only problems affecting our environment; they have become fundamental social problems in their origins and consequences: access to land and water, food scarcity, hostile living conditions and many other issues are experienced in the social, cultural or political realms (Harari 2011). In essence, green criminology emphasizes the need to consider the dialectical relationship between humans and the natural environment when studying environmental crimes and harms, and to further integrate such considerations into the scientific practice of criminology (Benton 1998; White 2008, 2011).

THE EFFECTS OF ANTHROPOGENIC DEFAUNATION

A well-known form of harmful green crime is the increase in anthropogenic defaunation. After the five mass extinctions on Earth caused by meteorite impacts, volcanic activities and large-scale climate change, several scientists predict that we are currently at the beginning of the sixth mass extinction (e.g. Leakey & Lewin 1995; May, Lawton & Stork 1995; Pimm *et al.* 1995; Butchart *et al.* 2010; Barnosky *et al.* 2011; Dirzo *et al.* 2014; Kolbert 2015). At least 680 vertebrate species have died out by human activity since the 16th century,⁴ and currently as many as 0.5 to 1 million species are threatened with extinction (IPBES 2019). For example, 26-37% of mammals, 17% of birds, 38% of chameleons, 31% of sharks and rays, 33% of reef-forming corals and 41-56% of amphibians experience threat levels (Hoffmann *et al.* 2010; Dirzo *et al.* 2014).⁵ In contrast to the previous waves of extinction, humans appear to be the central cause of the sixth mass extinction in the current scenario (Myers 1990; Barnosky *et al.* 2011). In addition to the mass killing of species, introduction of invasive species and the fragmentation of natural habitats, the changing global climate and spread of pathogens may also prove disastrous for the biodiversity on Earth (Van Uhm 2016). Wilson (2002: xxiv) has noted that “[w]e have been too self-absorbed to foresee the long-term consequences of our actions”.

4 Incidentally, the rate of decline in invertebrates, such as insects and worms, would be at least as severe as in vertebrates. According to Dirzo *et al.*, (2014), the number of invertebrates has decreased by 45% in the past 40 years.

5 However, insufficient data makes it impossible to estimate the percentage for the groups of reptiles and molluscs (IUCN 2014).

The lawyer Polly Higgins argued 10 years ago that the anthropogenic attack on the planet has had a comprehensive impact on many daily life activities. She speaks about “ecocide”:

the extensive destruction, damage to or loss of ecosystem(s) of a given territory, whether by human agency or by other causes, to such an extent that peaceful enjoyment by the inhabitants of that territory has been severely diminished.
(Higgins 2010: 63)

We would find ourselves in an ecological crisis causing serious disturbances, not something separate from us, but at the core of our existence (Crook, Short & South 2018). Higgins emphasizes that the world must change every time humanity reaches a tipping point; after the abolition of slavery, the banning of the apartheid system and the criminalization of genocide, it should be time for the next phase – to consider ecocide as an international crime (Higgins 2010). In his article ‘Criminology and the Anthropocene’, criminologist Clifford Shearing (2015) also argued that the perspective of criminology should change to take into account the ecological implications in the Anthropocene.⁶ Today, people should no longer be regarded as human actors operating exclusively in a social area of human-to-human interaction, but rather as an integral part of the Earth; the separation of the social and natural worlds is an illusion. We can see humans as biophysical ‘actants’ who have significantly transformed the Earth through their activities (Latour 2005).

Since the consequences of anthropogenic defaunation are not always clearly visible or are deliberately shielded by governments, legal companies or criminal entrepreneurs, it is important to illustrate the effect of defaunation on the basis of the complexity of ecological symbiosis between organisms.⁷ An immediate example is how animals and plant species maintain ecosystem services by keeping the water clean or by absorbing carbon monoxide. A decrease in biodiversity cannot only have an impact on a population, but can also influence the operation of ecosystem functions and, thus, the well-being of plants, people and other animals (Dirzo *et al.* 2014). Such symbiotic relationships make the consequences of anthropogenic defaunation difficult to predict. That the impact of poaching, for example,

6 Although the Holocene is known as a relatively stable climatic period during which humanity could develop, the Anthropocene that follows the Holocene is characterized by a period in which the Earth and atmosphere are severely impacted by human activities (Hamilton 2013).

7 As described in the ecological literature, an ecosystem consists of abiotic components, such as air, water, soil, atoms and molecules, and biotic components, such as plants, animals, bacteria and fungi. Although animals depend on plants for food or medicine, plants also depend on animals for reproduction (Wilson 1993; Tudge 2005; Roosmalen 2008). For example, monkeys and birds are important distributors of seeds. Toucans, for example, disperse the seeds of the endangered *Virola* trees, and a reduction in toucans will have an effect on their spread (Kays *et al.*, 2011). Even with abiotic seed dispersal, animals often play important roles in ecology as seed eaters.

can be much greater than initially expected is illustrated by the process of ‘trophic cascades’ (e.g. Paine 1980; Power 1990). A trophic cascade⁸ is an ecological phenomenon with reciprocal changes in predator and prey balance caused by the removal or addition of apex predators,⁹ leading to dramatic changes in the structure of the ecosystem. In a further example, decreases in the number of cougars could lead to an increase in the density of mule deer and, subsequently, to more browsing intensity and a decrease in bank plants and the subsequent thinning and eroding of stream and riverbanks. Bank erosion can then lead to a reduction in both terrestrial and aquatic species, and can also result in infrastructure limitations for the local human population (Ripple & Beschta 2006).¹⁰

In short, ecological insights not only evidence the strong symbiosis between species in ecosystems, but also the way in which they can become unbalanced or even collapse due to excessive exploitation of the natural environment. Sometimes, an ecosystem becomes unbalanced and reaches a tipping point in which the system is no longer able to sustain itself and instead begins to slowly – or rapidly – disintegrate. Alongside the degradation of ecosystem services this can have other harmful effects on humans (Myers *et al.* 2007; Lindsey *et al.* 2012). Local indigenous people may experience food and mobility restrictions due to erosion indirectly caused by defaunation, such as the disappearance of food resources, sources of income and transportation routes. Furthermore, the plundering of wildlife species can result in systemic criminogenic effects, including high prices on the black market and the involvement of powerful (illegal) entrepreneurs, but can also lead to violent conflicts over natural ‘resources’ in the countries of origin or destination (Zaitch *et al.* 2014; Van Uhm 2020). Caviar is one such example, where the trade in the eggs of the endangered sturgeon has resulted in various conflicts between local poachers, government officials, companies and the Russian mafia (Van Uhm & Siegel 2016).

8 The concept of a trophic cascade originated from fieldwork and experiments by ecologists who have observed the role of predators in marine ecosystems.

9 In practice, many trophic cascades have been initiated by people poaching on apex predators, such as tigers, jaguars and great white sharks (Terborgh *et al.*, 2001; Terborgh & Estes 2013).

10 Species’ survival rate also depends on the correlation between population size and density, and the average individual condition of a population or species. In other words, small (isolated) populations are more vulnerable due to the smaller chance that reproductive partners can find each other, and in combination with their limited genetic variety. This Allee effect (Courchamp *et al.*, 2006) causes small populations to die out faster than expected, and anthropogenic elements, such as the high market value of a species, can expedite the process (Courchamp *et al.*, 2006; Hall, Milner-Gulland & Courchamp 2008). Scarcity often affects the value of animal products on the black market with a consequential effect on demand, with the increase in price and demand for rhinoceros’ horn being a salient example (Van Uhm 2019). Combined with a small population, gene pool and range, the chances of survival for the Javan rhinoceros, one of the world’s most endangered mammals with a population of less than 50 animals, are very small (Brook *et al.*, 2014).

Outside of the aforementioned environmental and social effects, the harms of anthropogenic defaunation can also be seen to manifest in the increased global risk of zoonotic diseases. It is with this in mind that this chapter will now turn to the recent case of Covid-19 as an unfortunate but illustrative example of such negative anthropogenic consequences.

THE BOOMERANG EFFECT: THE GLOBAL SPREAD OF ZOO NOTIC DISEASES

The harmful effects of anthropogenic defaunation are visible in structural inequalities, power relations and asymmetries, mainly between the Global North and the Global South (Passas 2000).¹¹ The rainforests of the latter region, for example, are inhabited by millions of people who depend on the natural resources that are disappearing due to the over-exploitation and unsustainable trade practices of the Global North (Boekhout van Solinge 2010; Goyes 2019). Such over-exploitation results in a decline in the economic, social and cultural value of many areas, often by way of land or water grabbing, loss of ancestral or communal property rights and forced migration. Damaged ecosystems lose both their social and cultural value as habitats, as well as their economic value as their natural resources are unsustainably drained (Van Uhm 2020). Both deforestation and defaunation in the Global South are most often the result of ‘extractivist’ models of capital accumulation by states, corporations, landowners or criminal entrepreneurs – or coalitions among these powerful actors – through activities like fishing, mining, agrobusiness, wildlife or megaprojects like the construction of hydropower dams, which often result in violent accumulation by dispossession, land and water grabbing and the privatization of public and communal territories (Harvey 2003; Zaitch *et al.* 2014; Zaitch & Gutiérrez Gómez 2015). In addition to the impact of anthropogenic defaunation in the South, countries in the North are also affected.

A striking example is the dangerous side effect of defaunation in relation to the outbreaks of zoonoses. Many emerging diseases are zoonotic in origin, meaning that the disease originated in an animal and crossed the ‘species barrier’ to infect humans. About 60% of all known human infectious diseases and about 75% of emerging infectious diseases that have affected people over the past three decades have come from animals (WHO 2014: 1). It is the increased human contact with wildlife due to habitat fragmentation and wildlife trade that poses a significant risk of pathogen exchange (Wolfe *et al.* 1998; Zommers & Macdonald 2006). In 2003, the outbreak of severe acute respiratory syndrome (SARS) coronavirus, a life-threatening form of an atypical pneumonia traceable to the carnivores

11 An example of the distribution of inequalities is the exploitation of wild animals that takes place in relatively poor countries of origin, while rich countries mainly benefit from this (Roe *et al.*, 2002).

and bats trade, showed that zoonoses can have global effects. Joint teams of epidemiologists from China and the World Health Organization (WHO) discovered that some of the first SARS patients in Guangdong Province, China, worked selling or preparing wild animals for human consumption (Bell, Robertson & Hunter 2004; Lau *et al.* 2005). Within a few weeks, SARS had spread from China's Guangdong province to 37 countries around the world. The first cases of SARS outside of China were reported on 26 February 2003, and by 31 May, the number was already 8,359 potentially infected, with a death rate of 14% outside China. Approximately 10,000 individuals were infected worldwide with SARS; 1,000 of them were fatal (Smith 2006). After the SARS outbreak, 838,500 wild animals were seized in the markets in Guangzhou (Karesh *et al.* 2005).¹²

A few months later it was found that both the legal and illegal bird trade also played an important role in the worldwide spread of zoonoses. The highly pathogenic avian influenza (HPAI bird flu) H5N1 outbreak caused flu-like symptoms, including drowsiness, watery eyes and swollen throats, which proved fatal in acute cases. Hundreds of people, millions of poultry and an unknown number of wild birds and mammals were infected, including endangered species (Brooks-Moizer *et al.* 2008). H5N1 originated in Asian countries, but the virus also spread due to animal trade in Europe (Zommers & Macdonald 2006). An immediate example being the illegal import of two infected eagles from Thailand to Brussels (Yee, Carpenter & Cardona 2009). The H5N1 subtype of avian influenza virus was also transmitted through wildlife fairs and exhibitions, and during transportation where the increasing interaction between humans and animals facilitated its spread (Zommers & Macdonald 2006).

Another striking example of the dangerous consequences of zoonotic diseases is the spread of the Ebola virus in Africa, which was first discovered in 1976. Since then, several Ebola outbreaks in Africa have been traced to infected primates or bats. In the early 2000s, Ebola outbreaks in Gabon and the Democratic Republic of the Congo (DRC) were traced to infected monkey meat. Monkey meat is considered a delicacy in some African countries and is traded on animal markets (Leroy *et al.* 2004). The Ebola outbreak in West Africa in 2014 (mainly in Sierra Leone, Liberia and Guinea) emphasized once again the cross-border nature of zoonoses. Despite the claims that flights from these areas were highly controlled, people in both Europe and the United States were infected. Like SARS and H5N1, the Ebola virus spread in a short time and proved difficult to control (EFSA 2014). The WHO estimated that from 28,646 Ebola patients, 11,323 people died, although it is very likely that the actual numbers were higher (WHO 2015). A recent outbreak in

12 Civets, badgers, deer, wild boars, hedgehogs, foxes, squirrels, bamboo rats, gerbils, snakes, pangolins and endangered leopard cats were sold on the market (Karesh *et al.*, 2005).

DRC was declared a global health emergency by the WHO in 2019. This was the second largest Ebola outbreak on record and resulted in more than 2,000 deaths in east DRC. The outbreak was officially declared to be over on 25 June 2020, but recently a new Ebola outbreak has been detected in northwest DRC, which shows that the threat continues.

The most recent example of the dangerous effect of zoonoses is the ongoing Covid-19 pandemic. Although there is not yet complete clarity about the origin and trajectory of the new coronavirus SARS-2, most researchers argue that it passed from bats. Coronaviruses have been circulating in bats for decades, long before the SARS-2 virus started infecting people, with the recent strain of Covid-19 most likely evolving in intermediate horseshoe bats (Boni *et al.* 2020). As published in *Nature* on February 2020, the virus might have passed to humans via the pangolin, a threatened wild mammal used in China for traditional medicines, during its sale at a wildlife market (Boni *et al.* 2020; Lam *et al.* 2020). Although the meat of pangolins is often considered a rich source of protein for local populations in many African and Asian countries, this protected wild animal is now considered an export product due to its high price in the Chinese black market (Heinrich *et al.* 2017; Van Uhm 2019). In China, the meat of pangolins is regarded as a delicacy and their scales are used for many types of health issues in traditional Chinese medicines, such as for remedying ailments around menstruation and cancers (Van Uhm 2019). As shown by the latest World Wildlife Crime Report 2020, the pangolin is considered one of the most illegally traded animals in the world (UNODC 2020), mainly traded from Africa and Asia to animal markets in Southeast Asia and particularly China. Even though it is possible that pangolins or another species may have acted as an intermediate host, facilitating transmission to humans, current evidence is consistent with the idea that the SARS-2 virus originally evolved in bats (Boni *et al.* 2020). In wildlife markets across Asia, both pangolins and bats are traded in large numbers. Early identified Covid-19 cases were linked to the city of Wuhan, where many people infected reported having visited or worked in the Wuhan Animal Market (WHO 2020). This resulted first in Wuhan becoming a world symbol of 'wrong wildlife' markets, subsequently prompting China, after a few months, to ban wildlife markets and consumption.

Thus, while humans destroy and overexploit the environment, and disproportionately trade and consume wild animals, they increase the chances that viruses carried by wild animals will evolve and become human viruses. The consequences appear not limited by national borders, but instead show the overarching, global risks of anthropogenic defaunation (Bell *et al.* 2004). The billions of direct and indirect contacts between animals and humans, combined with the growing volume of world trade and the increasing transport options with temporary storage facilities and commercial network nodes, have significantly increased the risk of life-threatening diseases in the near future (Karesh *et al.* 2005; Burgos

& Burgos 2007; Mensink 2007). In this sense, the devastating health, social and economic effects of the current Covid-19 pandemic, still to be felt for many years by billions of people on a global scale, can also be regarded as the consequential effects of the growing, unregulated trade in wildlife.

MANAGING THE DUST FROM A DEMOLISHED WAREHOUSE

The consequences of the over-exploitation of Earth's natural resources are becoming increasingly visible: species are becoming extinct, ecosystem functions are declining and zoonotic diseases are permeating all layers of society. As Quammen (2012) remarked in his renowned and visionary book, *Spillover: Animal Infections and the Next Human Pandemic*, "When the trees fall and the native animals are slaughtered, the native germs fly like dust from a demolished warehouse". With 7.7 billion people on Earth, parasitic microbes, such as viruses, are far more likely to find human hosts as anthropogenic defaunation continues unfettered. Where once a journey from the jungle to the city used to take days, it might take today mere hours for a virus to piggyback the vast global transport infrastructure and communication networks: "*Ebola travelled by car, corona by plane*".¹³

The complexity of the described impact of anthropogenic defaunation shows that the exact scale of effects and risks is difficult to estimate. While such risks were viewed in the past as dangers beyond human control – fate, divine punishments, malicious acts of ethnic minorities – today there is a strong emphasis on control and manageability of diseases (Beck 1986, 2006). At the same time, the consequences of environmental degradation – global pollution, deforestation and climate change, alongside anthropogenic defaunation – are clearly becoming less manageable (White 2012). Green criminologists Brisman and South (2014) argue that the modern world poses new risks that previous generations did not encounter. Such worldwide environmental risks have become major problems for global society, far beyond being unpleasant, manageable side effects of modern market societies (White 2011; Shearing 2015).

Despite efforts by governments and science, the manageability of environmental problems is very limited. The negative effects of rampant capital accumulation in consumer societies, coupled with few moral standards and much temptation, continue to haunt us (Bauman 2001; Lynch & Stretesky 2014). These risks of over-exploitation and unsustainable trade are often invisible and diffuse, and the existing regulatory and control structures are insufficient to manage these new risks (Roef 2003; White 2011). Moreover, the risks and

13 'Het is niet de schuld van de vleermuis', *De Groene Amsterdammer*, 8 April 2020.

consequences of the current ecological crisis often pose irreversible threats to the life of plants, people and other animals (Brisman & South 2014). In contrast to previous threats, the new risks are not linked to location, time or social class, but are comprehensive and not insured or compensable (Boutellier 2008). A good example of this is the SARS-2 virus, which in no time could spread to all continents to become a pandemic. However, green criminologists have also shown many forms of selective victimization and uneven distribution of environmental harms and risks: powerful countries or individuals with ample access to health services and medical treatments are obviously better protected from these zoonotic diseases.

Nevertheless, the new risks are not region, land or border bound, and the effects and duration of complex environmental harms like climate change or zoonotic diseases are difficult to estimate (Douglas & Wildavsky 1982; Giddens 1990; Beck 2006; Gibbs *et al.* 2010; Brisman & South 2014). Economic ‘success formulas’ of current affluent or ‘growing’ countries – whether Norway, India or China – might be (partly) the causes of major socioeconomic and ecological risks regarding the environment (Huls 2009; Harari 2011). Zoonotic diseases should be seen as environmental harms that are increasingly difficult to manage and contain within the context of globalized capitalism, a context that sees nature as a resource to overexploit in the name of economic growth. In other words, modern societies are facing new global environmental problems, both as causes and consequences of the large-scale over-exploitation, commodification and destruction of the natural environment (Harari 2011; Brisman & South 2014).

CONCLUSION

The destruction of nature has become embedded within social, political and economic global dynamics, with ecological decline – in this case defaunation – resulting from anthropocentric lifestyle patterns and capital accumulation based on the over-exploitation of nature. With global habitat degradation, massive production and consumption and the expansion of legal and illegal markets involving more human–animal interaction on a global scale, environmental problems are increasingly becoming major social problems with comprehensive and uncontrollable consequences for humanity and the Earth. Nature and biodiversity are indispensable for our food, water and medicines, but also as a source of safety and social cohesion. Defaunation, often conducted, promoted or allowed by powerful actors, is embedded in the asymmetries between the Global North and the Global South. Increasing wildlife trade, but also other forms of animal exploitation and commodification, have become complex and global problems with more visible risks and harmful effects.

One of the effects of anthropogenic defaunation, such as by poaching and trading animals in wildlife markets, or in the mass production of animals for consumption, is the increasing risk of spreading zoonotic diseases. With human population increasing and animals and their habitats being threatened and hunted, viruses long circulating in wild or domesticated animals, like coronaviruses, are more likely to spread to human hosts.

The Covid-19 pandemic should be seen as an important warning sign and a good example of the new risks that the over-exploitation of nature entails in our globalized world. The social, political and economic effects of such environmental harm, only possible to estimate in some years from now, should be recognized next to, and together with, the effects of other global environmental problems such as global pollution, deforestation and climate change. From such a perspective, criminologists are better equipped to examine, in detail, who will be the (future) victims and perpetrators of such outbreaks, who are the (powerful) actors that contribute to the ecological crisis and what are the political, economic and/or social interests that are playing a pivotal role in the decision-making processes. And in light of the recent Covid-19 pandemic, criminologists can further look to ask, what needs to change in society in order to limit or even prevent the harmful consequences of defaunation and zoonotic diseases?

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