# Revealing Plato's 'Shadow Kingdom': Rendering pandemic risk explicit in extinction engagement

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## Introduction

The published extinction accounting framework and the framework for investor engagement on extinction and biodiversity (henceforth extinction engagement framework) implicitly include risk management and anticipation of massive events such as pandemics and Covid19.[1] The focus of both frameworks on enhancing biodiversity, protecting species and wildlife, protecting ecosystems from biodiversity loss and extinction, protecting habitats, implicitly drive business practices that naturally protect humanity from global and local risks arising from the erosion of ecosystems, wildlife and their habitats. The extinction accounting framework and the extinction engagement framework were developed on the foundation of financial risk management and the incorporation of material financial risks linked to biodiversity loss and species extinction into investor chains and organisational governance. They provide a means of integrating species protection and biodiversity enhancement into the heart of accounting, finance and governance and were recommended as a core element of any integrated reporting framework (King with Atkins, 2016). The financial rationale for species protection and extinction prevention, as well as for enhancing biodiversity and protecting habitats, was built upon the interconnectedness of all life on earth and, from an anthropocentric perspective, the reliance of humans on 'natural capital', on flora and fauna, for our survival.[2] We only have to consider estimates of ecosystem services loss to appreciate the direct financial impacts of declining biodiversity. For example, the harrowing report produced by IPBES last year stated that $577 billion in annual global crop output is at risk as a result of pollinator loss (IPBES, 2019).[3] IPBES estimate 1 million species to be currently threatened with extinction. The financial implications from biodiversity loss and habitat degradation are now well-documented but other side-effects of anthropogenic ecological degeneration are only now becoming evident. It is increasingly clear that other high-consequence risks are amassing as a result of anthropogenic loss of species, biodiversity and habitat. Indeed, the Natural Capital Coalition linked these issues with the emergence of new diseases,

"Related to this is the role of biodiversity in the ecosystem's ability to cope with shocks and change, such as new diseases and changes in climate." (Natural Capital Coalition, p.8).

Covid19 reminds us all that upsetting the balance of nature and interfering directly with wild animal species can threaten the very existence of humans on the planet. Human extinction is a practical and terrifying reality.[4] The onset of Covid19 has raised global awareness around wildlife trafficking, the illegal consumption of wild, protected and endangered species and the health risks associated with these. Meat from wild animals forms a critical contribution to food sources and livelihoods in many countries with high levels of poverty and food insecurity but the risks of these traditional ways of life are now becoming obvious to all. There are a plethora of articles online and in the media suggesting that loss of habitat is bringing species closer to humans, increasing risks of disease transmission. 'Wet markets' and illegal trafficking of wildlife are obvious means of disease transmission from non-human species to humans. More articles, with a conspiratorial air, suggest the Covid19 outbreak is Nature's way of 'getting her own back' for damage to ecological systems and the natural world. However, the threats to humanity of depleting habitats,

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[1] The extinction accounting framework has been developed in a number of papers and books, specifically: King with Atkins (2016); Atkins and Maroun (2018); Atkins et al., (2018); Maroun and Atkins (2018); Atkins and Maroun (2020).

[2] Many examples have been cited to demonstrate the material financial implications of losing various species including bees (Atkins and Atkins, 2016), rhinoceros (Atkins et al., 2018), fruit bats (flying foxes) (Atkins and Macpherson, 2019).

[3] IPBES Report, Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, May 2019.

[4] See Gray and Milne (2018; 2019).

driving species to extinction and destroying biodiversity have been all too well documented in the literature in recent decades. We have also witnessed SARS and MERS, so Covid19 is not exactly a surprise.

The cataclysmic impact of one isolated instance of coronavirus transmission from a wild animal (probably a bat/pangolin) to one human on global trade, global economies and the global financial system is only just beginning to be revealed. Such risks have to be made explicit within our accounting frameworks and our investor engagement processes in order to ensure that another strand of coronavirus is never transmitted to humans again. Protection of businesses, the financial markets and people from pandemics needs to be made explicit within accounting, finance and governance frameworks as a critical elements of all systems of internal control and risk management.

The aim of this paper is to make pandemic risk and risk management an *explicit* element of the existing extinction accounting and extinction engagement frameworks so that they may be implemented urgently throughout investor engagement and throughout accounting frameworks in order to prevent a re-occurrence of the current crippling global pandemic. Further, we theorise the emergence of Covid19 through a Becksian lens of Risk Society, and draw on Plato's 'Allegory of the Cave' in order to demonstrate the intangible, hidden and surreptitious nature of pandemic threats on human existence.

sections

## Plato, Beck and Covid19: unveiling the second reality

Plato here

Beck's work drew on Plato's 'Allegory of the Cave' to highlight the invisible nature of ecological risks arising from scientific and industrial development.

Social distancing and illness/death from Covid19 are encapsulated in Beck's prophetic work on risk society,

"What is astonishing ... is that the industrial pollution of the environment and the destruction of nature, with their multifarious effects on the health and social life of people, which only arise in highly developed societies, are characterised by a loss of social thinking. The loss becomes caricature – this absence seems to strike no one ..." (Beck, 1992, p.25).

Although Beck was preoccupied with pollution and its invisible effects on society, we can see from the quotation above that multifarious effects on health and social life allowed for risks unforeseen by Beck, as he was clearly aware that by their very nature ecological high consequence risks arising from industrial activity and its impact on the environment and nature could not be necessarily predicted or foreseen. He also discussed the difficulty in attributing causality to the perpetrators of ecological damage

Beck outlined the globalisation of risks of civilisation and again, his thoughts were prophetic of the current pandemic, and although referring to pollution, he underlined the potential for risks to escape class and geography as they impact everyone and anyone equally, as he stated,

"... poverty is hierarchic, smog is democratic. With the expansion of modernization risks – with the endangering of nature, health, nutrition and so on, - the social differences and limits are relativized" (Beck, 1992,

The impact of this globalization of risks may manifest itself in apathy, as,

"Where there is no escape, people ultimately no longer want to think about it. This eschatological eco-fatalism allows the pendulum of private and political moods to swing in any direction. The risk society shifts from hysteria to indifference and vice versa" (Beck, 1992, p.37).

"In Plato's 'Allegory of the Cave', the visible world becomes a mere shadow, a reflection of a reality that by nature escapes our possible knowledge" (Beck, 1992, p.73).

"What becomes the subject of controversy as to its degree of reality is instead what everyday consciousness does not see, and cannot perceive: radioactivity, pollutants and threats in the future" (Beck, 1992, p.73).

We suggest that the threat of a global pandemic, discussed in recent years, has been perceived as something intangible and unmanageable and also therefore given inadequate attention by businesses, financial markets and the accounting function. Further, the links between biodiversity loss and destruction of habitat and endangered species with pandemics have been ignored. We suggest that this effectively invisible threat must be made explicit and rendered visible within current accounting and finance frameworks.

"Threats from civilisation are bringing about a kind of new 'shadow kingdom', comparable to the realm of the gods and demons in antiquity, which is hidden behind the visible world and threatens human life on this Earth..... Dangerous, hostile substances lie concealed behind the harmless façades. Everything must be viewed with a double gaze, and can only be correctly understood and judged through this doubling. The world of the visible must be investigated, relativized and evaluated with respect to a second reality, only existent in thought and yet concealed in the world. The standards for evaluation lie only in the second, not in the visible world" (Beck, 1992, p.72).

In the next section we demonstrate how extinction accounting and engagement are attempting to reveal the reality of these risks by making the second reality visible through their frameworks and calls for emancipatory public and private reporting. It is now time to enhance human consciousness of high consequence risks such as pandemics and make them visible and explicit throughout society and the economic systems around the world.

" the step to cultural risk consciousness is everyday thought and imagination removed from its moorings in the world of the visible" (Beck, 1992, p.73).

## Investor engagement on biodiversity and extinction

Institutional investors have, in recent years, escalated their engagement with investee companies on issues relating to biodiversity. Responsible investors, since the turn of the century have developed increasingly formalised structures of engagement and dialogue around social and environmental issues, with a two-way relationship evolving (Solomon and Solomon, 2006). Although engagement in this area has been interpreted as imbued with impression management

and myth creation (Solomon and Darby, 2005, Solomon et al., 2013) there has been some evidence that responsible investor engagement on climate change and other social and environmental factors are an important element in risk management for investors (Solomon et al., 2011) and that it can change investor and investee behaviour, as well as impact investment decisions (Solomon et al., 2013). Of particular relevance is the finding that there is a two-way relationship between public social and environmental reporting and private social and environmental reporting (i.e. one-on-one investor/investee meetings, known also as engagement and dialogue) whereby the public reporting feeds into investor/investee meetings, informing investor questions, and consequently the engagement/private reporting process feeds back into the public reporting through investees taking investor questions from the meetings and incorporating it into their reports (Solomon and Solomon, 2006). In the specific area of engagement and dialogue on biodiversity and natural capital there is very little research, which is a reflection of the newness of this area of practice within the investment industry. However, some practitioner writings have identified the development of engagement practice in this area on bees and pollinators (Herron, 2016; Thamotheram and Stewart, 2016) and on marine stewardship and fish/seafood species (Herron, 2019). Given the increasingly obvious connections between biodiversity loss, habitat loss, species extinction threats and the Covid19 pandemic, it is, we believe, imperative that responsible investors incorporate elements from these areas into engagement to enhance financial resilience and contribute to preventing further pandemics. Further, there is likely to be a growing demand from the responsible investment community for public reporting by their investees on biodiversity, habitat, species extinction and other factors relating to potential pandemics. Investor engagement on biodiversity will fuel the production of such reporting by investees. We now explore the literature relating to accounting for extinction and biodiversity.

The past year has witnessed a wide range of initiatives launched by the financial community to explore embedding biodiversity and natural capital into the financial system more deeply. Investec Bank hosted an event, "Natural Capital, Species Extinction & Sustainable Financial Markets" on 29th May 2019 at which the Species Protection Action Plan for the Financial Markets was officially launched (Atkins and Macpherson, 2019).[5] This event involved speakers and panels from the investment industry, banking, accounting and conservation and led to other initiatives, as outlined here. In September 2019, an investor briefing entitled, ´The State of the Apes´, was published by ShareAction[6] outlining steps investors should be taking to assist in conservation and biodiversity protection. [7]Further, ShareAction conducted a ranking of 75 of the world´s leading asset managers´approaches to responsible investment, which included a ranking on biodiversity activism, producing a report entitled, "Point of No Returns" (ShareAction, 2020). The report sets out by stating that,

"The urgency of the action necessitated by the severity of the crises in the natural and human world means small incremental steps from a business-as-usual approach will not be adequate. Asset managers, and other institutional investors, need to prioritise taking a holistic approach to addressing systemic risks while also accounting for the positive and negative impacts their investments have on society and the environment. At root, this will require a conceptual shift from taking into account ESG factors because they pose financially material risks to portfolios,

[5] See the write-up of the event at: https://www.investec.com/en_gb/focus/investing/to-bee-or-not-to-bee-species-extinction.html

[6] ShareAction is a non-profit aimed at building a global investment sector which is responsible for its impacts on people and planet.

[7] https://shareaction.org/wp-content/uploads/2019/09/State-of-the-Apes-investor-briefing-compressed.pdf

towards consideration of the real-world impact of investments on the environment and society" (ShareAction, 2020, p.5).

They also highlight biodiversity as one of the most important and relevant ESG factors that need addressing in the face of climate and nature-related risks and conclude that responsible investors are 'sub-standard' in their efforts to address risks in this area,

"Our research has found that, generally, asset managers have yet to develop a sophisticated approach to the issue of biodiversity loss, despite the fact that, like climate change, it poses a systemic threat to the economy and wider society. Not a single assessed asset manager has a comprehensive investment policy on biodiversity, while only a few integrate biodiversity into policies for high-risk sectors" (ShareAction, 2020, p.20).

Further, they found that only two asset managers in their study offer a product that can be characterised as biodiversity-specific, confirm that biodiversity remains on the periphery of investor attention.

In December 2019, the Climate Disclosure Standards Board (CDSB) initiated an open public consultation and call for evidence on advancing nature-related financial disclosures and use of CDSB Framework. They are hosting a webinar at the end of April 2020 to discuss the results of the consultation and the future of natural capital accounting.[8] The CBSD states that its existing reporting frameworks for climate-related disclosures can be adapted to provide a tried and tested framework for natural capital reporting.[9] In 2020 a Biodiversity Protocol for corporate reporting on biodiversity and natural capital will be published which provides detailed stages and a framework for reporting in this area (Biodiversity Protocol, 2020).

Overall, it is fair to say that at the moment there seems to be a proliferation of competing reporting frameworks. We hope in this paper to offer a simple extension to the existing extinction accounting and engagement frameworks, which already incorporate biodiversity, habitats, ecosystems and species extinction, to integrate protection against pandemics.
The UK government has also been driving efforts to conserve biodiversity through their recent initiative, a £220 million fund to save endangered animals from extinction as part of a call for urgent action to tackle the drivers and impacts of climate change.[10] This has been in tandem with the Government´s request for a review to be led by Professor Sir Partha Dasgupta to assess the economic benefits of biodiversity globally, assess the economic costs and risks of biodiversity loss and identify a range of actions that can simultaneously enhance biodiversity and deliver economic prosperity. The Review will report ahead of the 15th meeting of the Conference of the Parties to the Convention on Biological Diversity - an international biodiversity summit taking place in Kunming, China in October 2020.[11]
Investor and governmental initiatives are leading to an increased demand for corporate (and other organisational) reporting in these areas.
The increasing evidence linking biodiversity/habitat loss and species extinction to Covid19 presents an urgent call for action by the investment community.

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[8] Details at: https://www.cdsb.net/events/1028/consultation-results-advancing-nature-related-financial-disclosures-and-use-cdsb

[9] It is notable that CDSB attended and spoke at the Investec event in May 2019 and at that time, in response to the discussions on extinction accounting and engagement, and the newly launched Species Protection Action Plan for the Financial Markets, raised the idea of using the existing CDSB climate framework for natural capital.

[10] https://www.gov.uk/government/news/pm-launches-new-action-plan-to-save-the-natural-world

[11] See more details at https://www.gov.uk/government/collections/the-economics-of-biodiversity-the-dasgupta-review

"Almost 40 years since its foundation, UKSIF continues to represent a force for 'good' in society and in the financial markets. In the midst of the current global Covid19 pandemic, their website includes a quotation from Simon Howard, the Chief Executive of UKSIF" (Solomon 2020, chapter 10),

*"This is the first crisis when responsible investment has been hard-wired into the financial system, and we need to make sure this is the first time our issues are central to the response. The sector is very well positioned to achieve this, sustainability is now integrated into the strategies and activities of leading financial services firms and our issues are supported by the public in increasing numbers. Those in power were recognising that we needed to be listened to in the good times, we must now insist we are heard in the bad. There has been a lot of talk about green infrastructure and the new economy; about fairness and the need for a just transition. Now, with change forced on us, is the time to make sure we play our part in delivering. By doing that we help our society, the planet and our members' ability to serve both."(Follow this link: https://uksif.org/events/covid-19-sustainable-finance/)*

## Extinction Accounting and Accounting for Biodiversity

Interest in accounting for and reporting on biodiversity has increased significantly. A special issue on biodiversity published in *Accounting, Auditing and Accountability Journal* in 2013 focused on 'problematising' the accounting for biodiversity at a philosophical, theoretical and technical level (Jones and Solomon, 2013). The limitations of existing accounting techniques for recording changes in biodiversity are discussed including the under-valuation of biodiversity impact (Cuckston, 2013; Freeman and Groom, 2013) and subordination of environmental imperatives to financial and economic ones (Tregidga, 2013). The challenge of defining the scope of biodiversity reporting and applying recommendations provided by the Global Reporting Initiative (GRI, 2007; 2016) are considered in two case studies focused on Sweden (Rimmel and Jonäll, 2013) and Denmark (van Liempd and Busch, 2013). There is also an example illustrating how reporting on species and habitats, classified according to protection status and risk (see Jones, 1996; 2003) could be operationalised in the context of a developing economy (Siddiqui, 2013).

Two inter-related streams of research dedicated to the advancement of biodiversity accounting have subsequently emerged. Concerned about using organisations as the 'unit of account', Russel and associates (2017) outline a more ecologically informed schematic. We are reminded that efforts to monetise nature (see, for example, United Nations, 2019) serve only to entrench the very anthropocentric notions which have contributed to environmental degradation (see also Milne, 1996; Gray, 2010; Milne and Gray, 2013). 'Nature-signalling numbers' are required to describe and record changes in the 'inventories' of biodiversity and communicate deep ecological conceptualisations of value (Feger and Mermet, 2017; Sullivan and Hannis, 2017). These can be integrated with detailed narratives on habitats under protection delineated according to the type, variety and status of flora and fauna (Jones, 1996; Cuckston, 2017). The biodiversity accounts should include year-on-year measures of the ecological health of habitats (classified according to vulnerability and populations of species) to provide a quantitative and longitudinal basis for environmental accountability (Cuckston, 2017).

Importantly, reporting is not confined to a single organisation. Taking advantages of developments in data analytics and information processing, a type of biodiversity accounting at the national and supra-national level envisioned during the 1990s (Gray 1990; Milne, 1996) becomes possible (Feger and Mermet, 2017). Historical records, personal narratives and testimonials can provide context to support disclosures dealing with biodiversity at the aggregated level and ensure that otherwise marginalised perspectives are incorporated as part of the

ecological accounting (Lanka et al., 2017). Consistent with the research on the role of nature diaries (see Gallhofer and Haslam, 1996; Solomon and Thomson, 2009) and counter-accounts (Thomson et al., 2015; Laine and Vinnari, 2017) in fostering an awareness of the importance of biodiversity conservation and activism, a space-time instantiation of ecologically-cantered accounting:

'...acts as a network-making practice that produces an accounting entity that can be acted upon at a distance from a centre of calculation, and how this contributes towards making biodiversity conservation thinkable and possible' (Cuckston, 2017, p. 1556).

The second stream of research draws on the 'calculable infrastructure' of accounting (Mennicken and Miller, 2012) and its potential to construct new fields of organisational visibility (Hopwood, 1987) to advance a normative framework dealing specifically with the loss of species (Atkins and Maroun, 2018). 'Extinction accounting' does not preclude the type of ecological record-keeping advanced by Russel and others but attempts to strike a balance between theoretical elegance and practical implementation.

In the short-term a complete reorganisation of the capital market and supporting accounting systems is infeasible. What is needed is a method of accounting for biodiversity which can be implemented immediately and applied widely by the very organisations contributing to biodiversity loss. In this context, Atkins and colleagues (2015; 2016; 2018; 2019) develop a schematic inspired by the emancipatory accounting movement (see Gallhofer et al., 2013; 2015; 2017) and informed by the prior biodiversity reporting research (see Jones and Solomon, 2013) and existing business discourse (see IIRC, 2013; GRI, 2016). Their position is support by Gallhofer and Haslam (2017, p. 6) who point out that:

"More generally, there is a move away ... from the position that emancipatory accounting – if still a radically progressive notion – necessarily reduces to an accounting that is an instrument of revolutionary or grand radical transformation consistent with the position suggested in the Marx-inspired line of thought pursued by Tinker".

An extinction account provides important context. As suggested by the seminal biodiversity reporting literature (Jones, 1996) and advocates of ecological record-keeping (Russell et al., 2017) it includes details on species, habitats and ecosystems under an organisation's control and affected directly or indirectly by its operations (see also GRI, 2007; GRI, 2016). Narratives, scientific measures, graphs, tables and images are used to describe the status and value of biodiversity from both a deep ecological *and* an anthropocentric perspective (Atkins et al., 2018; Maroun and Atkins, 2018). To promote action, organisations are encouraged to incorporate biodiversity as part of their risk assessment, strategic developments and operational reviews. The accounting infrastructure must be upgraded to collect data on the economic, environmental and social 'capitals' or resources which are required for effectively implementing anti-extinction measures.

Information produced by the accounting system informs internal decision-making and the details reported to stakeholders in an organisation's environmental, sustainability or integrated report (Atkins and Maroun, 2018). In the spirit of continuous improvement, key performance indicators must be developed to track policies, plans and actions designed to prevent or reverse biodiversity loss. Formal assessments of planned versus actual performance must be performed. Favourable and unfavourable variances should be explained to stakeholders and used to refine the steps taken to combat extinction. Internal controls and assurance providers can assist with

ensuring the integrity of the assessment and reporting process (Atkins and Maroun, 2018; Maroun and Atkins, 2018). Those charged with governance play an integral role in monitoring environmental proactivity and providing long-term strategic direction (King and Atkins, 2016). The primary 'elements' of the extinction accounting framework are illustrated in Figure 1 (insert from original ark paper).

Rimmel and Jonäll (2013), van Liempd and Busch (2013), Mansoor and Maroun (2016) and Adler et al. (2018) find relatively low levels of reporting by organisations on how biodiversity and the risk of extinction are being addressed. The possibility that biodiversity, ecological or extinction accounting is adopted symbolically to manage impressions cannot be precluded (consider Gray, 2010; Tregidga et al., 2014; Boiral, 2016; Maroun et al., 2018). This is especially true when related disclosures and do not enable environmental accountability in either the private or public sector (Rimmel and Jonäll, 2013; van Liempd and Busch, 2013; Schneider et al., 2014). At the same time, the need to balance environmental imperatives with economic fundamentals can undermine the emancipatory potential of the broader extinction accounting project and cannot be overlooked (Gray and Milne, 2018; Weir, 2018).

While there are certainly limitations to any form of environmental accounting, there are also reasons for optimism. A recent study by Hassan et al. (2020a)[12] finds that biodiversity- and extinction-related disclosures have been increasing and that organisations are becoming more aware of the need for urgent action to protect flora and fauna. Similarly, studies on local authorities reveal, at least, some efforts to explain the importance of biodiversity from both an instrumental and deep ecological perspective (Samkin et al., 2014; Gaia and Jones, 2017). Efforts to advance extinction accounting as an integral part of existing corporate governance frameworks are underway (King and Atkins, 2016). Extinction accounting is also gaining traction with the investment community. Added to this are several examples of efforts to draw attention to the plight of different species and encourage social and environmental activism to prevent their extinction (see, for example, Jonäll and Rimmel, 2016; Atkins et al., 2018; Jonäll and Sabelfeld, 2019; Lanka, 2019; Nicolov, 2019; Sibanda and Mulama, 2019; Solomon and Clappison, 2019; Zhao and Atkins, 2019). Extinction accounting is not a complete solution to the 'biological annihilation' described by the scientific community (Ceballos et al., 2017) but it is an important step in mobilising accountants to help save the planet.

## Exploring the Linkages between Covid19, business risk, extinction and biodiversity A summary of recent articles in the press and online media

Biodiversity loss is becoming a big driver in the emergence of some of the current viruses. "Large-scale deforestation, habitat degradation and fragmentation, agriculture intensification, our food system, trade in species and plants, anthropogenic climate change – all these are drivers of biodiversity loss and also drivers of new diseases. Two thirds of emerging infections and diseases now come from wildlife." (BBC, 2020).

We read an extensive sample of articles published on Covid-19 since WHO announced it is a pandemic. We classified these articles into six classifications to be able to present it in a away to be suitable for our paper. (1) the link between abusing nature and covid-19; (2) the link between Wildlife markets and covid-19; (3) Positive impact of covid-19 lockdown on animals; (4) Negative

[12] The authors developed a 53-item disclosure index which was classified into five themes to evaluate 'extinction accounting' by some of the world's largest listed companies: (1) company reports on current and previous actions (CPA); (2) prevent activities happening from the future (PAF); (3) reporting on activities contributing to extinction/biodiversity loss (ELOSS); (4) report of following guidelines (FG) and (5) report on company fines (FIN).

impact of covid-19 lockdown on animals; (5) Other impacts of Covid-19 lockdown and the way forward; (6) Suggestions to prevent future pandemic viruses to happen.

### *The link between abusing nature and Covid-19 crisis*

A number of researchers including Vidal (2020) thinks that human destruction of biodiversity creates the conditions for new viruses and diseases such as Covid-19. Human activities such as road building, mining, hunting and logging, that triggered the Ebola epidemics in the 1990s and that is unleashing new terrors today. In addition, Quammen also explained that humans disrupt ecosystems when cutting the trees, killing animals or caging and sending them to markets. As a result, viruses have lost their hosts and are looking for new hosts that ultimately transfer to human beings (2013; 2020). An example of that is about 60 greylag geese were shot and killed at the national training centre for England football teams from 2018 to 2019 to "preserve safety" because they were defecating on the pitches (Busby, 2020). In addition, Jones et al., (2008) explained how species in degraded habitats are likely to carry more viruses that can infect humans as destroying landscapes, and the species left are the ones humans get the diseases from. Therefore, shrinking natural habitats and changing behaviour add to the risk of diseases spilling over from animals to humans (Hassan *et al.*, 2020b). In addition, Murtha (2020) added that When habitat and biodiversity disappear and the buffer between humans and the natural world weakens, pathogens "spill over" to human populations, causing pandemics, such as Covid-19. Humans are creating the conditions for the spread of diseases by reducing the natural barriers between host animals – in which the virus is naturally circulating – and themselves. As a result, when human wear down biodiversity, it is likely see a spread of the species most likely to transmit *new* diseases to human, but there is also good evidence that those same species are the best hosts for existing diseases (Jones et al., 2008). In addition, as a result of the destruction of forests into fragmented patches is increasing, the likelihood that viruses and other pathogens will jump from wild animals to humans will increase (Bloomfield et al., 2020). The authors pointed out that covid-19 has taught us that once a pandemic starts it is very hard to control. They argued that many people see the animals infecting humans but actually, humans go to the animals and intrude on their habitats. Sanicas (2018) explained the above by illustrating the cases of Bats. Bats are the mammals that have forelimbs adapted as wings; as such, they are the only mammals that are naturally capable of sustained flight. Bats are also the perfect hosts for lots of disease-causing viruses (Sancias, 2018). Humans have started creeping into areas where bats naturally live, especially in the tropics, which has led to an increased risk of contact with these animals. As people continue to move into jungles on the planet, they will see more and more outbreaks of many viruses (Sanicas, 2018). Bats also carry more human pathogens than other animals because they prefer to live close to one another (like humans spreading respiratory viruses like the flu during winter), giving plenty of opportunities for pathogens to spread between the bats. Cohen (2020) as Observer columnist mentioned that a disregard for creature welfare is often central to disease and it spreads because of humanity's abuse of animals. Johnson et al., (2020) also suggested that the rate of new infections could be rising as humans cram into every corner of the planet. They also added that the loss of habitat and the exploitation of wildlife through hunting and trade increased the risk of infections. Pope Frances, the head of the Catholic Church in Rome said in his speech, "*I don't know if these are the revenge of nature, but they are certainly nature's responses*". He also suggested that the global pandemic might be one of nature's responses to the man-made climate crisis (Davidson, 2020). In addition, Weston (2020), the vast illegal wildlife trade and humanity's excessive intrusion into nature is to blame for the coronavirus pandemic, according to a leading US scientist who says "this is not nature's revenge, we did it to ourselves". Finally, another potential nature disaster as Harvey (2020) pointed out is that the olive

oil industry set to lose billions unless drastic action is taken to combat bacterium that has killed millions of olives trees.

There are currently suggestions emerging that link climate change with the Covid19 outbreak, as,

"Weather patterns have also started to be more volatile with severe storms, cyclones and hurricanes and more unpredictable and unusual weather around the globe. Although the scientific evidence has not yet been produced, increases in diseases and pandemics such as Coronavirus, that is rampaging around the world, is likely to be due to human activities and the impact the human race is having on the environment" (Solomon, 2020, chapter 9).

### *The link between Wildlife markets and Covid-19*

Disease ecologists argue that viruses and other pathogens are also likely to move from animals to humans in the many informal markets that have sprung up to provide fresh meat to fast-growing urban populations around the world. Animals slaughtered cut up and sold on the spot (Vidal, 2020). The "wet market" (one that sells fresh produce and meat) in Wuhan, thought by the Chinese government to be the starting point of the current Covid-19 pandemic, was known to sell numerous wild animals, including live wolf pups, salamanders, crocodiles, scorpions, rats, squirrels, foxes, civets and turtles. Greenfield (2020), mentioned that the United Nations' Biodiversity Chief has called for a global ban on (06.04.2020) wildlife markets (such as the one in Wuhan, China) to prevent future pandemics. She said countries should move to prevent future pandemics by banning "wet markets" that sell live and dead animals for human consumption. However, we should also remember that we have communities, particularly from low-income rural areas, particularly in Africa, which are dependent on wild animals to sustain the livelihoods of millions of people. She added, unless we get alternatives for these communities, there might be a danger of opening up illegal trade in wild animals, which currently is already leading us to the brink of extinction for some species. As a result, Shenzhen has become the first Chinese city to ban the sale and consumption of dog and cat meat and the new law will come into force on 1st May 2020 (BBC, 2020). In addition, according to Thomas Lovejoy, who coined the term "biological diversity" in 1980 and is often referred to as the godfather of biodiversity. "This pandemic is the consequence of our persistent and excessive intrusion in nature and the vast illegal wildlife trade, and in particular, the wildlife markets, the wet markets, of south Asia and bush meat markets of Africa... It's pretty obvious, it was just a matter of time before something like this was going to happen," (Weston, 2020).

*Positive Impact of Covid-19 lockdown on animals*

Human around the world are practicing social distancing and staying indoors as much as possible. Businesses are on lockdown and people cannot gather as usual. Even though the pandemic is incredibly serious and dangerous, it is become clear that animals and nature are reaping some benefits from all this. While humans remain on lockdown, animals just continue enjoying the world in a way that we never allow them to. One of the consequences of human being lockdown is that land and sea handed back to nature. This would spark a recovery of wildlife, turning everything from motorway edges to railway embankments into a 'Nature Recovery Network' (Cuff, 2020). He added, wouldn't it be lovely if every town or city had a genuinely green greenbelt around it where people could go and get a daily dose of nature? It is very fair to reinforce bringing good, functioning, abundant, healthy wildlife populations and functioning ecosystems close to where tens of millions of people live. Everybody needs a slice of nature near his or her home to have a daily dose of nature. Pavid and Knapp (2020) explain that reducing biodiversity loss by returning land, sea to nature can improve people's wellbeing and mental health. Dalton (2020) also mentioned that the lockdown is helping nature and biodiversity rediscover their natural spaces as the world's second-largest mammal took advantage of the absence of human bustle and noise around major city to make a "very rare" appearance. Two fin whales spotted near Marseille, southern France, which, like almost all of Europe, is in lockdown during the coronavirus crisis. "The absence of human activity means the whales are far more serene, calm, and confident about rediscovering their playground that they abandon when there is maritime transport activity. "It is clear that the lockdown of humans is helping nature and biodiversity rediscover their natural spaces." Additionally, Korten (2020) support the above by saying that the pandemic has left many unable to leave harbour, creating a window for fishing grounds to recover from years of overfishing. The spread of COVID-19 has forced such a stop upon the world. The question now is what effects, if any, a slowdown will have on fish populations. A slowdown that lasts a couple of months would not have much long-lasting impact. However, if demand for fish dropped because of a wider recession, operations could take longer to restart. A slowdown of at least a year would allow most fish to go through their spawning cycle—and that may be enough for some species to flourish. In the short time commercial fishing has slowed down because of COVID-19, fish behaviour has begun to change. In China, because of the decrease in fishing boats, smaller fish are appearing on the ocean surface and predators are becoming more active. Vega (2020) also noticed that Sea turtles are some of the endangered species seriously threatened by human activities. Almost all species of sea turtles classified as endangered. They often slaughtered for their eggs, meat, skin, and shells. They are also victims of habitat destruction and plastic pollution. Fishing gear left in the ocean also causes turtles to die of entanglement. In addition, to make matters worse, humans can just be flat out cruel to them. For instance, a few months ago, many baby sea turtles burned to death. Another sea turtle abused by people who thought they could harass her and climb on top of her. Also researchers in Florida say that coronavirus restrictions keeping humans and harmful waste off beaches are having a beneficial effect on the numbers of endangered leatherback sea turtles in the state (Luscombe, 2020). **Moreover,** some wild animals and birds are changing their behaviour in response to altered human activity during the Covid-19 crisis. For examples, foxes are taking advantage of the absence of people in public parks and urban open spaces to appear in larger numbers and move around in daylight. Seagulls, on the other hand, that hang around in raucous gangs in Dublin city centre have decided to get out of town (O'Keeffe, 2020). Another positive point that worth mentioning is that other countries like UK took initiatives. For example British Airways has flown, accompanied by a specially trained crew, to help bring dozens of pet pooches (36 dogs and 14 cats) over to the British Isles so that they could enjoy a new life. This

to give these animals a second chance (Smithers, 2020). Additionally, some countries like Madrid in Spain banned involving wild animals such as tigers, elephants, lions, and other animals from participating in wild-animal circuses and this comes into force this month (Saskia, 2020).

### *Negative impact of Covid-19 lockdown on animals*

It is fair to say that national lockdowns, border closures, emergency visa restrictions, quarantines and other measures put in place to stop the spread of the coronavirus have severely affected animals' tourism industry (Roth, 2020). It is worth mentioning that since South Africa announced a national lockdown, at least nine rhinos have been poached "and those are just the ones we know about." In Botswana, at least six rhinos have poached since the country closed its borders to stop the spread of Covid-19 and others have killed by military. The lockdown strategies leading some experts to fear that threatened and endangered animals may become additional casualties of the pandemic. As poachers are going to tourists area that they did not use to go before the lockdown restrictions.

In most of Africa's countries, tourism-related sources, such as park entry fees and trophy hunting permits contributes hugely to income and national economies. Without that revenue, many parks, private reserves and community conservancies may not be able to pay employees. It is very important to note that since the coronavirus arrived, with zero income and an increase in expenses trying to fight off the poachers and protect the reserve. Specialists are sharing their fears by saying it is expected not only poaching of rhinoceros and elephant and other iconic animals, but it is also expected more as there are going to be many people without income to turn on the natural world and we cannot blame them, these are hungry people (Roth, 2020). In addition, Hilton (2020) mentioned that thousands of elephants face starvation in Thailand because the coronavirus crisis has slashed revenue from tourism. This because an almost total absence of visitors means that many caretakers are struggling to afford food for Thailand's elephants. It is a challenge to keep the animals fed and healthy at the best of times but now it is the dry season, which makes the situation even more extreme as there is not enough forest left to feed them. Happy elephants are usually swinging their tails, flapping their ears, or even giving themselves dust baths to keep cool. Nevertheless, elephants get depressed when they are hungry, and none of that happy behaviour would be on display. Perrie (2020) also noted that Zoos around the world have been forced to close because of the coronavirus pandemic. People think the animals might enjoy a bit of peace and quiet for a little bit, however staff at one zoo say they're getting lonely and some animals still turning up to their 'meet the public' appointments, Sadly though, no one is there to see them. People provide a great real-life stimulation for the animals, some of our very social animals, such as kea, are thinking something odd is up." As a result, zoo staff have been working hard to keep the animals engaged. This leads us to conclude, "*Both humans and animals cannot live without each other*".

Another negative impact of lockdown that is very heart breaking is if the lockdown continues, some animals might soon have to be fed to others (BBC, 2020). In UK, wildlife Trusts warn of effects from neglected reserves and species loss, to fly-tipping and illegal shooting (Davis, 2020). While lockdown has allowed some a greater appreciation of spring and the fun of seeing goats, sheep and deer foraying into urban landscapes, Covid-19 is causing chaos with UK biodiversity. This is because vital conservation projects are put on hold. They mentioned that a combination of furloughed staff, depleted funds through the closure of visitor centres, and cancellation of fundraisers, and the difficulty of working within social distancing guidelines, had profound implications for UK biodiversity. Wildlife trust announced that "Restoring nature in the UK – one of the most nature depleted countries in the world – has become harder than ever during the pandemic," said the Wildlife Trusts. "At the same time, people are seeking solace in nature." "The Wildlife Trusts can be a vital part of our nation's recovery from the current health crisis.

Nature brings health benefits and offers solutions to the other great emergency facing humanity – climate change – so it must be protected and allowed to recover."

### *Other impacts of Covid-19 lockdown and a way forward*

There is no doubt that we are living in an unprecedented health experience. No one will not know the impact of this pandemic for months, maybe even years, but in the short term we can look for some glimmers of light in the darkness. For example, the lockdowns are hitting the fossil fuel industry, with fewer drivers on the roads and planes in the air, the price of oil has slumped almost two-thirds since last year, car sales fell down and accompanied by reduction on motorway traffics (Watts, 2020). Additionally, there is an evidence that countries around the world have reported significant drops in air pollution since implementing coronavirus restrictions (Tallberg, 2020). Many countries have experienced a temporary falls in carbon & Nitrogen dioxide and immediate reductions in air pollution levels in response to government lockdowns to tackle the virus outbreak. For example, research suggests a 25% drop in energy usage in China that could see huge decline in its carbon emissions by the end of the year. In Italy, the vision of Venice's canals running clear puts into perspective how quickly a reduction in human activity can positively improve air quality. In New York, carbon monoxide emissions down 50% on this time last year. Delhi is one of many capitals enjoying improved air quality since restrictions were introduced due to the coronavirus (Ellis-Petersen, et al., 2020). According to Lawrie et al., (2020) life in the UK has been utterly transformed since lockdown restrictions. Overall transport use across road, rail and the Tube in London - fell by 60% between early February and the beginning of April. Footfall at Birmingham New Street station had fallen by 86% at the start of April and similar trend occurred in both London and Manchester. Khoo, (2020) illustrated that this drop in air pollution shows that less traffic can quickly lead to cleaner air. William Bloss, a professor of atmospheric science at the University of Birmingham, said "*As we all make changes to our lives and stay at home to protect the NHS and save lives, it's important that we also understand how these changes will affect air quality and its impact on public health in the UK*". Also Watts, (2020) demonstrated that the reduction in air pollution greatly improve air quality and reducing the risks of asthma, heart attacks and lung disease.

We should be careful about the conclusions that can be made from the above discussion. These positive environmental effects are the result of a significant government intervention that has essentially shut down all economic activity in response to a major public health emergency. However, we have to be very cautious interpreting these results as these measures have achieved in the expense of the life and wellbeing of people and as a result of some people have lost their jobs. Therefore, this can be a sustainable solution. Nevertheless, this make us wonder, "*Can we possibly balance economic and social wellbeing whilst having a meaningful impact upon pollution levels in our cities*?". We do believe that the lesson learned from COVID-19 and the lockdown measures is that we must reconsider certain aspects of our lives that we deem necessary and the long-term impact that our actions have on air quality.

It is very important to mention here that, while it is too early to prove a direct correlation between current high air pollution levels and incidence of COVID-19, high pollution levels might also increase the risk of contracting COVID-19 in the first place (Kumar et al., 2020). As a result, counties with higher pollution levels are the ones that have higher numbers of hospitalizations, higher numbers of deaths (Watts, 2020). Carrington, D. (2020) mentioned that almost 80% of deaths across four countries were in most polluted regions. It is believed that air pollution is responsible for 5.5 million premature deaths worldwide (Wu et al., 2020). There are two published academic papers on this topic. Conticini et al. (2020) this paper analyzes the possible link between pollution and the development of acute respiratory distress syndrome and eventually death in North Italy. The study provided an evidence that people living in high levels of pollutant area are more prone to develop chronic respiratory conditions and chronic inflammatory stimulus, even in young and healthy subjects. As a result, they conclude that the

high level of pollution in Northern Italy should be considered an additional co-factor of the high level of lethality recorded in that area. In UK, Travaglio et al., 2020 reported that thousands of cases of COVID-19 are reported in England and over 10,000 patients have died. Whilst there has been progress in managing this disease, it is not clear which factors, besides age, affect the severity and mortality of COVID-19. The authors found that the levels of some markers of poor air quality, nitrogen oxides and ozone, are associated with COVID-19 lethality in different English regions. We conclude that the levels of some air pollutants are linked to COVID-19 cases and illness. In addition, Hamwey, (2020) noted that not all the environmental consequences of the crisis have been positive. Volumes of unrecyclable waste have risen; severe cuts in agricultural and fishery export levels have led to the generation of large quantities of organic waste; maintenance and monitoring of natural ecosystems have been temporarily halted; and tourism activity to natural areas has ceased. Local waste problems have emerged as many municipalities have suspended their recycling activities over fears of virus propagation in recycling centres. Food retailers have resumed using plastic bags at checkout points citing health concerns over consumers' reuse of paper bags. In addition, due to stay-at-home policies, many consumers have increased their consumption of take-away food delivered with single-use packaging. All these developments have created acute challenges for the waste management industry at a time when they are operating with limited capacity due to the coronavirus crisis. With the emergence of import restrictions in export markets and sharp declines in the availability of cargo transportation services, the coronavirus crisis has led to increased volumes of un-shippable agricultural and fishery commodities. As exports of agricultural and fisheries products have declined, production levels have plummeted, causing unemployment levels in both sectors to grow substantially (Hamwey, 2020).

The way forward

We believe that the coronavirus pandemic has made it clearer than ever that human and planetary (nature) health are intimately interconnected and we have to emerge from this crisis with a completely different attitude on how we tackle air quality issues and how we protect lung health. Therefore, we would expect that UN leaders, scientists, activists, governments, political, business leaders, academics and all interested parties to have practical solutions in place. They might think of some legislative changes that allow to track and reduce pollution levels for the long-term. There is an urgent for a public debate so that recovery can focus on green jobs and clean energy, building efficiency, natural infrastructure, etc.,. Ultimately, the most important environmental impact is likely to be on public perceptions. The pandemic has demonstrated the deadly consequences of ignoring expert warnings, of political delay, and of sacrificing human health and natural landscapes for the economy.

We acknowledge that taking control of emissions is difficult at the best of times, but technology can be used to help companies track their emissions levels and act on air quality, on a scale that works for them – it is not just a job for the world's largest space agencies. Especially, during COVID-19 lockdown many people are learning to teleconferencing from home that the government can switch infrastructure investments from buildings roads to widening internet bandwidth (Watts, 2020). Therefore, there is a need for a systematic change in energy infrastructure otherwise emissions will roll back later. It is very encouraging to see some countries moving forward. For example, Milan is to introduce one of Europe's most ambitious schemes reallocating street space from cars to cycling and walking, in response to the coronavirus crisis (Laker, 2020). The city has announced that 35km (22 miles) of streets will be transformed over the summer, with a rapid, experimental citywide expansion of cycling and walking space to protect residents as Covid-19 restrictions are lifted (Laker, 2020). In practice, the excellent quality open source data such as that provided by the European Space Agency showing Italy and by NASA showing China, allowed us to monitor the impacts of lockdown measures and track air pollution in real-time.

This sort of tracking has to continue once restrictions are lifted and include specific remediation in order to prevent a spike in polluted activity. Ultimately, humanity could emerge from this horror into a healthier cleaner world hoping for this to continue and it is the government's role to make this happen. To close, nature is sending us a message that if we neglect the planet, we put our own wellbeing at risk.

*Suggestions to prevent future pandemic viruses to happen*

Vidal, (2020) mentioned that we are in an era now of chronic emergency as diseases are more likely to travel further and faster than before, which means we must be faster in our responses. It needs investments, change in human behaviour, and it means we must listen to people at community levels. The solutions should start with education and awareness. We must make people aware things are different now. The bottom line is to be prepared. We cannot predict where the next pandemic will come from, so we need mitigation plans to take into account the worst possible scenarios. The only certain thing is that the next one will certainly come if our behaviour towards the environment will not change (Hassan et al., 2020a). Roberts et al., (2020) argued that we should nurse the planet back to health by its very abuser humans. They mentioned that the Anthropocene era must now harmonise with nature, immediately. Our planet has 'symptoms' that need to be treated – pollution, plastics, deforestation, habitat destruction and extinction. In unity, we must now nurse our planet to health. In this vein, Wittemyer (2020) mentioned that the COVID-19 pandemic has forced governments to impose severe restrictions immediately, such as social distancing, lockdown strategies, etc. that will have massive economic costs. However, discussion about changing behaviours that contribute to the emergence of these diseases has not announced yet. As a result, we present what scientists have suggested as solutions. For example, Einhorn, (2020) mentioned that one way to decrease the likelihood of having recurrent pandemics is to decrease the potential for people to come into contact with wild animals. Sanicas, (2018) suggested that there is a need to study the interactions between bats, humans and domestic animals and identify factors that are making bats met humans and domestic animals, and try to do something about it. Johnson et al., (2020) also suggested that we should not use animals for food and we should review our own diets. They also added that antibiotics are losing their effectiveness at an alarming and they compared the health crisis with global warming. Cohen (2020) as Observer Columnist suggested that United Nations, World Health Organization (WHO), governments, interested bodies etc., should agree to abandon meat or at least cut dawn the consumption. Cohen (2020) added that meat eating does contribute disproportionately to the production of greenhouse gasses. He also went a step further by suggesting to ban the use of antibiotics in farming and treat meat, cow milk and cheese as we treat tobacco and alcohol and hit them with punitive taxes and make the illegal trade in wild animals as a great crime as the illegal trade in weapons. On individual level, people should think to be vegan because from his point of view if individuals change, the dominants culture makes demands for society to change. In addition, Pope Frances, the head of the Catholic Church in Rome, in his speech on 10th April (2020) raised a question "*whether the global pandemic might lead to ecological conversion, where people lead more environmentally conscious lives with the understanding that the natural world is part of God's creation?*" Davidson, (2020). He also added that the nature would never forgive human on the destruction on biodiversity they caused. He said this is the time to take the decisive step, to move from using and misusing nature to contemplating it. He also added, "This is the moment to see poor people are adding to the society and those in need should be treated as "rescued animals." The United Nations' Biodiversity Chief also mentioned, "*Preserving intact ecosystems and biodiversity will help us reduce the prevalence of some of these diseases. So the way we farm, the way we use the soils, the way we protect coastal ecosystems and the way we treat our forests will either wreck the future*

*or help us live longer. The message we are getting is if we don't take care of nature, it will not take care of us"* Greenfield (2020). Prof Kathy Willis from Oxford University told BBC News: "We love looking at trees – we get all these positive emotions, smells and sounds". However, Harrabin (2020) mentioned that it is not a matter of planting many trees as mass tree planting in the UK could harm the environment if not planned properly. This because badly planned trees would increase greenhouse gas emissions. Carpeting upland pastures with trees would reduce the UK's ability to produce meat, which may lead to increasing imports from places that produce beef by felling rainforests. It is very encouraging to see the business sector start to take initiatives to repair the biodiversity. For example, Microsoft's new commitment is to master a plan to create a "planetary computer" for assessing, monitoring and managing natural ecosystems data more timely. The initiative builds on Microsoft's 2.5-year-old Artificial Intelligence for Earth program, which has supported grants for more than 500 environmental data projects in 81 countries (Clancy, 2020). It is worth mentioning that Google and Amazon have invested in cloud resources and artificial intelligence platforms working toward similar missions, but not on the grand scale that Microsoft seeks to achieve.

### *Covid19 and Business Continuity*

A global pandemic presents an unprecedented risk for businesses and other organisations worldwide. Corporate governance and mechanisms of internal control and risk management are one critical function that prepares businesses for the onset of such catastrophes,

"All companies worldwide now need to prioritise risks relating to climate change, such as how they are managing the risk of negative impacts on their business from extreme weather events, flooding and storms. Similarly, business continuity plans are an important part of corporate risk management and internal control, as companies need to establish clear plans and procedures for dealing with major external events, such as the Coronavirus pandemic, in order to be able to continue business as far as possible. The Coronavirus pandemic is an extreme but also apt illustration of how businesses that have established systems whereby staff can work at home remotely in such a crisis are more likely to weather the storm induced by social distancing measures and new legislation than those that were unprepared" (Solomon, 2020, p.126).

## Introducing explicit elements into the extinction accounting and extinction engagement frameworks to account for preventing global pandemics

The latest version of the extinction accounting framework (Atkins and Maroun, 2020) and the extinction engagement framework (Atkins and Maroun, 2018) are used below to demonstrate how the risk of global pandemics such as Covid19 can be addressed through an emancipatory reporting framework. They incorporate the following elements that link biodiversity and extinction throughout organisation's value chain and that can be monitored and controlled by every organisation:

Financial risk of transmission of viruses such as coronavirus from wild animal species to humans (collapse of global financial markets)
Protect against financial risk attached to organisations that do not take care to prohibit wildlife trafficking (certain airlines, airports, governments) – engage with investee companies to ensure this is raised as an issue at every level.
Business continuity risks arising from pandemics – need to ensure every part of an organisation's supply chain is free from being involved in wildlife trafficking but also ensure that precautions

are taken by employees, customers to avoid cross-species contamination at every point of the supply chain/within investee companies
Enhance and protect biodiversity, species populations and habitats in order to protect against transmission of viruses such as coronavirus from animals to humans throughout the supply chain/within investee companies
Ensure that businesses have no connection with 'wet markets' or the human consumption of endangered wildlife, such as pangolin and bats

## 1. Conclusions and Recommendations

This paper seeks to integrate risk management of global pandemics into the existing extinction accounting and engagement frameworks. In addition to the financial rationale for preventing extinctions and protecting species, habitats and ecosystems that has been explored in earlier papers, the onslaught of Covid19 and its causality lying in animal to human species transmission (and associated links with habitat loss and biodiversity issues) there is now another pertinent rationale for preventing poaching, illegal wildlife trafficking and the human consumption of endangered species. By making explicit various elements within the frameworks, their implementation can assist in reducing the risk of a re-occurrence of the current crippling Covid19 outbreak. If business and financial institutions incorporate these elements into their reporting and governance frameworks then there should be greater protection from potential future crises. A more respectful and holistic approach to human's relationship with nature and wildlife around the world is needed if we are to prevent extinction of the human race.

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## Incorporating global pandemic risk management into extinction accounting

| | Element | Purpose | Elements |
|---|---|---|---|
| **1** | Extinction accounting context | Describe the extinction risk in the context of the organisation's business and the diverse reasons for wanting to address this risk | Record a list of plant and animal species, identified as endangered by the IUCN Red List, whose habitats are affected by the company's activities<br>Report where, geographically, the company's activities pose a threat to endangered plant and animal species, as identified by the IUCN Red List<br>Report potential risks/impacts on these specific species arising from the company's operations<br>Incorporate images (such as photographs, etchings, botanical drawings example) of vulnerable, threatened, endangered, critically endangered species which are affected by the company's operations and which the company has a duty of care to protect as well as aesthetic narrative elements<br>Report full details (narrative as well as financial figures) relating to any fines or ongoing claims relating to endangered species legislation arising from the company's activities (e.g. CITES) as well as locational information relating to specific species within their habitats<br>***Report on how the risk of disease transmission from animals, birds, aquatic life to humans is managed throughout the value chain***<br>Report corporate expressions of moral, ethical, emotional, financial and reputational motivations for preserving species and preventing extinction (to respond to diverse needs and requirements of different stakeholders/readers) |
| **2** | Action-focused reporting | Explain the actions the company takes and plans to take to reduce extinction risk | Report actions/initiatives taken by the company to avoid harm to, and to prevent extinction of, endangered plant and animal species including efforts to protect habitats and local ecosystems |
| **3** | Partnership reporting | Complement action-focused reporting by explaining broader partnerships/initiatives formed to combat/reverse extinction trends | Report partnerships/engagement between wildlife/nature/conservation organisations and the company which aim to address corporate impacts on endangered species and report the outcome/impact of engagement/partnerships on endangered species, habitats and ecosystems |
| **4** | Analysis and reflection | Evaluation of extinction prevention initiatives against aims/targets to inform changes to actions and partnerships | Report assessment and reflection on outcome/impact of engagement/partnerships and decisions taken about necessary changes to policy/initiatives going forward |
| **5** | Assessment | Audit of affected species/populations/biomes | Report regular assessments (audit) of species populations in areas affected by corporate operations as well as assessments of habitat degradation or improvement |
| **6** | Reporting | Provide an account of the progress made to date on preventing or mitigating extinction, planned future actions and risk exposure | Report assessment of whether or not corporate initiatives/actions are assisting in prevention of species extinction and habitat protection<br>Report strategy for the future development and improvement of actions/initiatives: an iterative process<br>Ensure that the whole process of 'extinction accounting' is integrated into corporate strategy and is incorporated into the company's integrated report, the company's business plan, corporate strategy and risk management/internal control system not resigned to separate sustainability reports or websites.<br>Potential liabilities relating to future possible legal fines/claims relating to endangered species impacts.<br>Discussion of ways in which the company is working to prevent future liabilities related to harming endangered species.<br>Provide pictorial representation of success in conservation – and of failure (i.e. species loss) |

## A framework for investor engagement on extinction and biodiversity risk management

How do you inform yourselves about species decline and extinction threats in relation to your business activities?

In what ways do you enhance and protect biodiversity, species populations and habitats in order to protect against transmission of viruses such as coronavirus from animals to humans throughout your supply chain

How do you ensure every part of your supply chain is not involved in wildlife trafficking but also ensure that precautions are taken by employees, customers to avoid cross-species contamination at every point of the supply chain/within investee companies

How do you ensure that your businesses has no connection with 'wet markets' or the human consumption of endangered wildlife throughout your supply chain?

Can you explain how your business continuity strategies incorporate effective measures to deal with global pandemics

In what ways is your supply chain, both upstream and downstream, likely to be affected by species loss?

Have you commissioned any studies to determine which species threatened with extinction on the IUCN Red List are directly or indirectly affected by your operations, or those of organizations within your supply chain?

If you have commissioned studies, what were the outcomes? Have you identified which species are most at risk and what the financial (and other: reputational, social responsibility, ethical, moral) consequences of decline and extinction of these species are for your organization?

Are you engaging, or partnering, with any wildlife organization regarding species threatened with extinction, for example the WWF? If so what are the outcomes of these engagements/partnerships?

Are you engaging, or partnering, with any NGOs regarding the reduction of wildlife trafficking and the trade in endangered animals in order to reduce risks of disease transmission from animals to humans?

What contingency measures, risk scenarios and mitigation strategies have you considered regarding species decline and extinction?

What measures are you taking to reduce and limit the impact of your operations on the ecosystem?

What measures are you taking to protect and enhance habitats which you own or have an impact on in order to protect wildlife and keep them away from human activity?

What initiatives, policies and strategies have you implemented in order to prevent species extinction?

Have you assessed the impact of these initiatives, policies and strategies on species populations?

Have your assessments led to alterations and improvements in your initiatives, policies and strategies?

If they have, in what ways has your extinction prevention strategy altered?

Can you identify where you may have weaknesses in your systems of internal control and risk management that relate to disease transmission, such as coronavirus?