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Rewilding for human health

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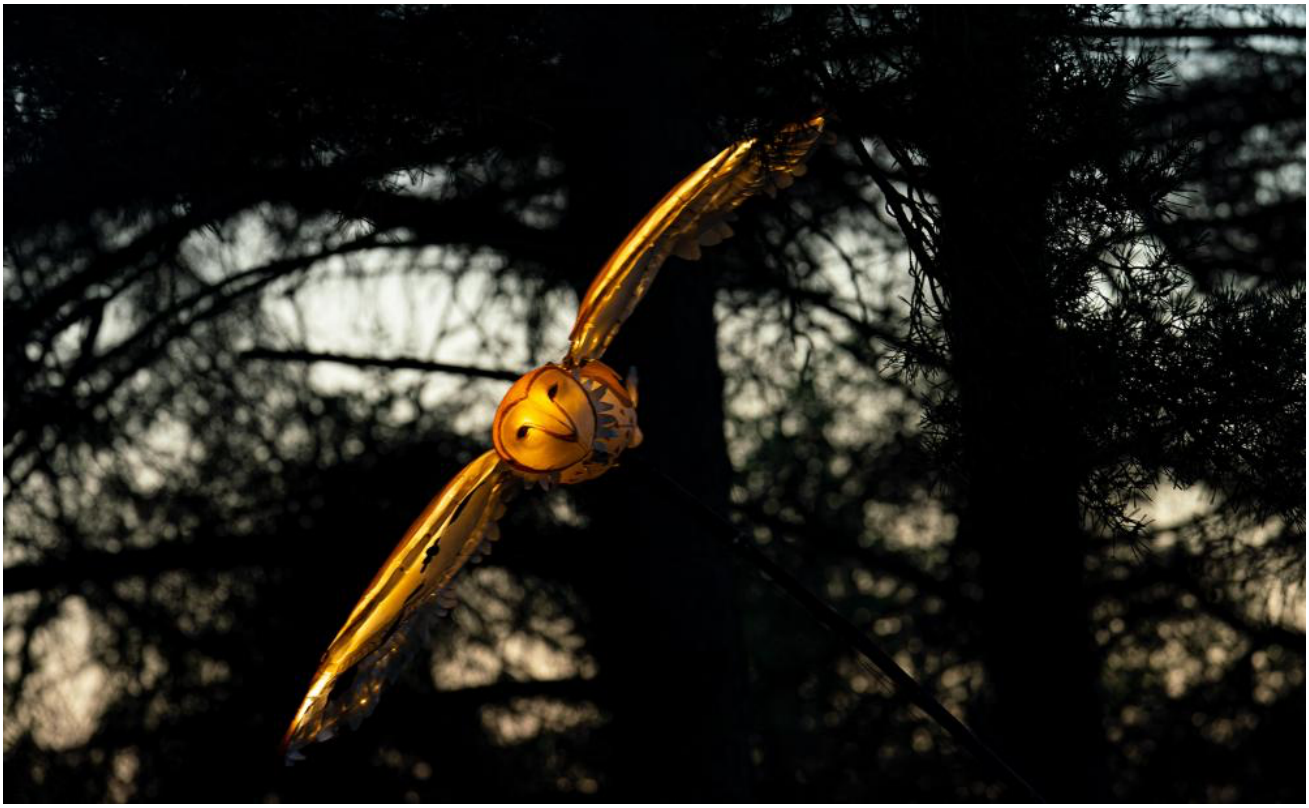

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🌳 Exploring the connections between zoonotic diseases,

human health and well-being, ecosystem degradation and biodiversity loss.

Had we been meeting at Feanedock for this year's Timber Festival as planned, it is likely that the COVID-19 pandemic would have been a recurring topic of conversation.

The pandemic has reminded us of the complex interactions between humans and the environment, and in particular how the emergence of zoonotic diseases such as COVID-19 can be linked to habitat encroachment, loss of biodiversity, climate change, urbanization, the legal/illegal wildlife trade, and other forms of ecosystem degradation.

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Increasing understanding about the linkages between nature and human health and well-being may allow better prediction of future pandemics. This understanding can

potentially be used to prevent future pandemics and reduce risks, through re-establishing the biodiversity and health of ecosystems with strategies such as ecological restoration and rewilding.

Degradation

Improving socio-ecological relationships points toward a growing need to understand that the current situation is a complex, multi-layered historical problem; but just how far back in time do we need to go?

Microbes have been causing epidemic problems for humans at least since the widespread domestication of animals for food production, allowing for infection of humans via our animal companions.

As Jared Diamond notes in his influential book *Guns, Germs and Steel*, the spread of diseases went from wild animals first to the domesticated ones and then to humans. These new germs may have killed most humans previously unexposed to them. For instance, European conquests brought many new diseases, such as measles and smallpox, to peoples of the Americas, Africa and Australia and caused widespread mortality of indigenous populations and in some cases to the extinction of local communities. Therefore this is not a new phenomenon!

As human populations, trade and globalization have expanded, landscapes have been extensively modified for agriculture, with large urban centres connected via extensive road systems and the growth in air travel.

Land use change and degradation linked to deforestation and greater fragmentation among ecosystems have increased the risk to biodiversity through broken connections and shrinking habitats, especially for those species requiring large territories. However, such fragmentation through the construction of highways and roads, even in areas where they didn't exist until recently such as in the Amazon, are bringing a new type of connectivity: between humans and novel diseases. Globalization and landscape modification have played a central role here.

Species

All the above leads us to the following question: Can restoring landscapes and enhancing the connectivity of natural ecosystems through restoration and rewilding help reduce the risks of disease (or ease of) transmission?

Over the last twenty to thirty years there has been increasing interest in this question, and the current pandemic has highlighted once again the complex relationships that

connect human health and well-being to ecosystem degradation, biodiversity loss, and climate change via our modification of natural systems and patterns in human geography.

Indeed, the COVID-19 pandemic has increased the urgency of understanding these relationships, as well as understanding the extent to which ecosystem management, including ecological restoration and rewilding, can improve human health.

There is good evidence to suggest that pandemics (and disasters generally) disproportionately affect the poorest and most disadvantaged members of society. When individual or community capabilities to withstand vulnerabilities, disturbances and shocks are overwhelmed, as has happened globally with COVID-19, it becomes much more difficult to maintain a sustainable livelihood system.

The processes that drive disease emergence and transmission risk are therefore related to social justice issues, as well as ecological integrity and socio-economic activities such as agriculture, and trade of animals and animal products. Pandemics originate because of the human development that occurs when we open a road, when we clear the forest for livestock or when we mix species that usually are not together in nature.

Restoring

Although efforts to synthesize the primary literature related to some of these drivers have started, further analysis is needed to better understand the relationships between disease transmission and biodiversity and ecosystem health.

These relationships are inevitably complex and are influenced from local to global scales by other factors such as climate change that serve to further complexify these relationships. Efforts must be made to understand more about the effects of ecosystem degradation on disease emergence and transmission. Climate breakdown may exacerbate these effects through transformation of species interactions, creation of novel ecosystems and novel host communities transferring pathogens to new hosts and new areas.

This leads us to a further question: Can all these factors be considered during ecological restoration and rewilding efforts? Indeed, can we afford to not to?

This is what the IUCN CEM (Commission on Ecosystem Management of the International Union for Conservation of Nature) IGNITE team is now attempting to explore.

Our work will help improve surveillance and long-term Emergence of Infectious Disease (EID) monitoring programs, will assist in the development of field experiments to test underlying mechanisms of how zoonotic diseases infect the human populations as well

as the role restoration and rewilding can play in preventing disease emergence and transmission, and will help in prioritizing areas for restoration and rewilding.

Socio-economic

Some of you perhaps attended the Rewilding Panel event at Timber Festival 2019, and you may have read the subsequent article in *The Ecologist* (see *Rewilding Continuing the Debate*). We are using many of the rewilding ideas discussed last year as part of our work with the IGNITE group to develop a multi-scale approach to risk assessment and evaluation.

As you would probably expect, this requires us drawing on a broad range of data on relevant factors (i.e. biological, climatic, social, cultural, etc.) and builds on current scientific models and understanding regarding the transmission of diseases between wildlife, livestock and humans.

The intention is to further bolster this information with the detailed knowledge of local experts to pinpoint areas of disease emergence and identify local and global risk factors using fuzzy logic and systems thinking. These will be used to inform policy, public health and legal/regulatory frameworks required to remove or minimise risks before they become a global threat.

It is envisaged that part of these measures will include actions to protect habitats and biodiversity through restoration and rewilding. In doing so, the aim is to create the necessary space between wildlife and human/livestock populations to prevent or limit the opportunities for novel diseases to jump from wildlife hosts into human populations.

Since we've mentioned an "F" word, you might be wondering what is fuzzy logic? Many environmental problems that influence human health and well-being are caused by just the sorts of complex combinations of socio-economic and ecological factors that occur in the coupled systems described here.

Mitigating

Understanding these complex interactions presents a problem that moves beyond approaches such as simple counting, requiring knowledge about structure, connection and dynamic behaviour. These systems are usually associated with high levels of uncertainty, imprecision, partial knowledge and hard-to-define concepts which are non-uniformly distributed across both time and space at different scales, and so can be difficult to observe directly.

Fuzzy logic is a technique for representing and manipulating uncertain information. The

importance of such representations lies in the need to integrate systems thinking into decisions and ecosystem management. In essence, it means that we can no longer continue looking at a singular aspect at one time or only a few parts of the system; we need to integrate all parts of global socio-ecological system to better monitor and predict changes.

Ecological restoration is now considered an important strategy to conserve biodiversity and reduce land degradation and ambitious global targets have been set to restore degraded ecosystems - e.g. 350 million ha of forest restoration by 2030.

But where does rewilding come into all this? Rewilding is the process of rebuilding of natural ecosystems - usually following major human disturbance - to create a complete food web at all trophic levels that forms a sustainable and resilient ecosystem using biota that would have been present had the disturbance not occurred.

It has already generated widespread interest and debate within the conservation sector and beyond. The idea that we can encourage the reversal of biodiversity declines and create natural habitats and wild landscapes simply by allowing wildlife and natural processes to reclaim areas of land no longer under human management has captured both scientific and public imagination.

Governments, NGOs, communities and individuals are actively considering rewilding options, and many rewilding projects have been initiated around the world. While rewilding may aim to overturn human dominance in the target ecosystems, the self-perpetuation of those ecosystems relies on our tolerance and willingness to accept a more meaningful coexistence between ourselves and wild nature.

Problems have arisen when we moved to dominate and control all the core habitats and connecting spaces across all global ecosystems. Therefore, for any rewilding strategy to succeed, society and nature need to be fully reconnected. Restoration and rewilding are thus empowering narratives to bring back nature and encourage a greater ecocentric view of the world... and may prove to be a useful tool for mitigating harmful diseases. Let’s continue this conversation at Timber 2021!

These Authors

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