Vol. 87: 199–202, 2022
https://doi.org/10.3354/cr01695

CLIMATE RESEARCH
Clim Res

Published online April 21

OPINION PIECE

Pandemic shows that global climate and biodiversity science assessments need to be annual

Mark John Costello*, Katherine Susan Kelly

Faculty of Bioscience and Aquaculture, Nord University, 8049 Bodø, Norway

ABSTRACT: The coronavirus disease 2019 (COVID-19) pandemic has demonstrated that with daily data informing citizens and governments of the situation, society can respond to a crisis rapidly. We suggest that the current multi-yearly assessments of the, by comparison, chronic crises of climate change and biodiversity loss are no longer fit for purpose. Instead, annual assessments (as is standard for governmental budgets, commercial and personal taxes) are now required. As with COVID-19 data, the annual progress reports proposed here must be accompanied by new biodiversity and climate data that are both timely and open access, thus supporting scientific advice. With public transparency and accessibility of facts and figures, annual reports will lead to more accountability and progress in addressing the causes of these crises.

KEY WORDS: Adaptation · Assessment · Biodiversity · Climate change · COVID-19 · Pandemic · Policy

1. LESSONS FROM THE PANDEMIC

The global coronavirus disease 2019 (COVID-19) pandemic has demonstrated that denying the severity of a global crisis does not remove or lessen the problem and that we cannot delay changing our behaviour because it does not suit our standing social and economic norms. The crisis must dictate the timetable.

The pace of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2, the virus that causes COVID-19) infections, with nearly one-third of a billion people infected and over 5.5 million deaths to date, demanded daily epidemiological data from the onset (and still continues) to manage social distancing and other responses to safeguard people's health (Dong et al. 2020, WHO 2021, and see the John Hopkins University COVID-19 dashboard https://coronavirus.jhu.edu/map.html). The failures in timely or accurate monitoring and reporting and naïve responses led to more deaths and illness and set in place a significant proportion of people with chronic illness (long COVID) (Paul et al. 2021). Nature does not wait for changes in scientific knowledge or public opinion nor for electoral cycles to shift politicians' priorities.

2. CONNECTED CLIMATE AND BIODIVERSITY CRISES

The evidence that fossil fuel burning caused climate change has been accumulating for decades and is now considered a fact (Masson-Delmotte et al. 2021). Since preindustrial (assumed to be 1850–1900 for climate model projections) times, the planet surface warmed by an annual average of 1.1°C by 2021 and will reach 1.5°C by the early 2030s (Masson-Delmotte

*Corresponding author: mark.j.costello@nord.no

Publisher: Inter-Research · www.int-res.com

et al. 2021). The frequency, intensity and duration of extreme events, such as wildfires, droughts, floods, landslides and heatwaves, are increasing and causing the loss of property, food security and livelihoods and wide-ranging human health impacts (WMO 2021). While regionally variable, these effects have international social and economic consequences, including famine, mass immigration and fuelling of military conflicts (Yaghmaei 2020, Ware & Kramer 2021). Thus, they have roused the collective consciousness to acknowledge the impact that our 'head-in-the-sand' lifestyle is having on world climate and the biodiversity on which our food security, and health of the ecosystems we live in, depends (Sambrook et al. 2021).

The concurrent crises (COVID-19 pandemic, biodiversity loss and climate change) are all connected (Fig. 1) (Bates et al. 2021, Pelling et al. 2021). Pelling et al. (2021) list 52 interactions between climate change, the COVID-19 pandemic and equity in society, covering governance, public health and food systems, water availability and hygiene, urbanisation and infrastructure, and biodiversity. SARS-CoV-2 is but another of the many diseases that have jumped from wild animals to people (i.e. zoonoses) following human invasion and disruption of wildlife habitats (Pelling et al. 2021). These 3 crises reflect the unsustainable impacts human society inflicts on the planet and its biodiversity.

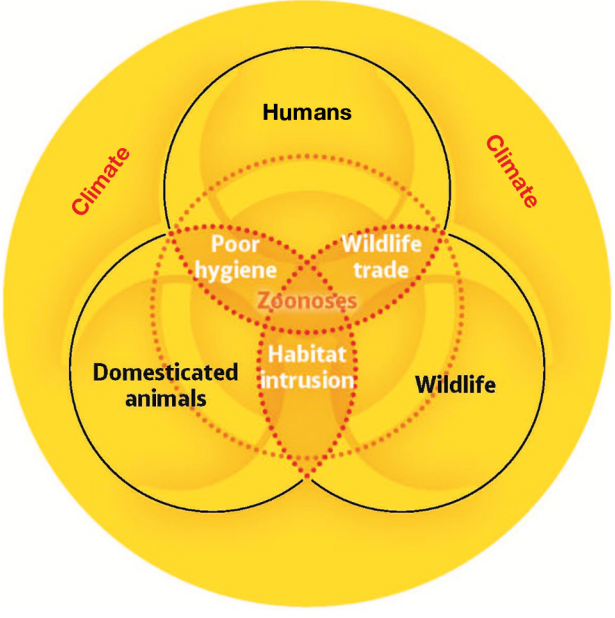

Fig. 1. Origins of zoonoses, showing the intrusion of people and their domestic animals into wildlife habitats combined with poor hygiene in marketplaces. All are exacerbated by climate change, which additionally drives shifts in the distribution of people, domestic animals and wildlife (adapted from Pelling et al. 2021)

Since its inception in 1988, the IPCC (https://ipcc.ch) has scheduled rigorous assessments of scientific data and knowledge of climate change, involving thousands of scientists and numerous meetings at 5 to 8 yr intervals. The costs are considerable, not only to the IPCC but also to the authors who volunteered time away from their personal lives and employers. The recently established Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES, https://ipbes.net) is following a similar path, and special reports and assessments from both run to thousands of pages. The accelerating pace of climate change, loss of biodiversity and the now regular occurrences of extreme events dictate that the IPCC and IPBES evaluation methods, which aim to provide salient and up-to-date scientific information to governments worldwide, must keep abreast. Therefore, the assessment cycles should shift from multi-annual to yearly.

3. BENEFITS OF ANNUAL REPORTING

Annual reports may not cover every aspect in depth every year. However, they would benefit from fewer authors per year, and having at least a 20% annual turnover of authors could involve a similar number and breadth of expertise, geographic representation and diversity as present assessments. The overall workload and costs may be less because (as is currently the case but on a longer timescale) only significant progress in data availability, data synthesis and new knowledge since the last report would need to be assessed. Focusing on the data (facts) and what they mean would streamline the production of annual assessments and increase efficiencies.

Annual financial reports within governments, businesses and for tax purposes are the norm. The climate and biodiversity crises are likewise economic problems (Guo et al. 2021) and thus should be addressed in synchrony with other economic budgets and planning. Fortunately, for weather-related measures of climate change, we have near real-time data. Unfortunately, the availability of biodiversity data has a time lag, and it can be years before the data are sufficiently available in the international government-funded Global Biodiversity Information Facility (GBIF, https://gbif.org) and Ocean Biodiversity Information System (OBIS, https://iobis.org) to detect annual trends in biodiversity (Fig. 2). The shorter time lag in the publication of data into GBIF compared to OBIS is because two-thirds of GBIF data are automatically received from citizen science initiatives. However, while valuable, 80% of the citizen science

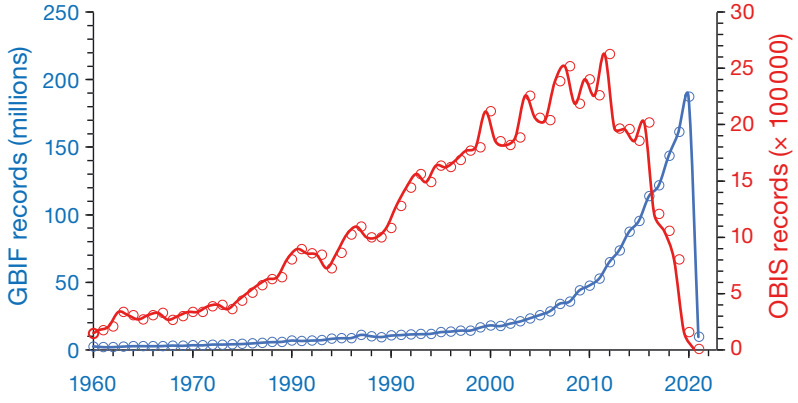

Fig. 2. Number of records (millions per year) of species in the Global Biodiversity Information Facility (GBIF, blue line and axis, from https://analytics-files.gbif.org/2021-07-01/global/csv/ [accessed 1 April 2021]) and Ocean Biodiversity Information System (OBIS, red line and axis, https://obis.org [accessed 20 July 2021]). There are fewer records further back in time but also a time lag of several years before data are published

data are for birds, and available data are extremely biased spatially and not representative of biodiversity (Hughes et al. 2021). To be fit for purpose, these data need to be globally representative of the abundance of species across ecological habitats in marine, freshwater and terrestrial environments. These shortfalls need to be rectified urgently to provide timely data to inform conservation action.

Lengthy intervals between assessments and goals favour inaction. Almost all the United Nations Sustainable Development Goals for 2030 have yet to be met even before the COVID-19 pandemic (United Nations 2021). One example was the failure to protect 10% of the oceans under the Convention on Biological Diversity Aichi Targets by 2020 (Saeedi et al. 2019). Only 2.8% of the ocean is designated to be fully protected from human impacts and another 3.2% partially (i.e. they allow limited fishing) (Morgan et al. 2018, and see https://mpatlas.org). Thus, despite international commitments under the United Nations Law of the Sea in 1982, 94% of the ocean is not managed in an environmentally sustainable way (Costello & Ballantine 2015).

Producing a succinct and shorter assessment each year would enable government bodies to respond by adjusting policies and funding priorities, investments, taxes and fines on an annual basis. Crucially, it would also highlight any failures to meet the previous year's promises. O'Dochartaigh et al. (2022) call for not only annual national reporting of progress on climate change targets but monthly data on emissions. Action is never guaranteed, but the availability of a yearly and more accessible assessment to an increasingly more well-informed population who have access to the evidence is likely to lead to more accountability, particularly as several assessments would be within many election cycles. Attempting to continue with the status quo amid biodiversity and climate crises will not mitigate our numerous and interrelated problems. This is demonstrated by the COVID-19 pandemic.

Glavovic et al. (2021) agree with us that the present IPCC assessment process is untenable because it has not resulted in the necessary action. They argue that a social contract between science and society has been broken and 'call for a halt to further IPCC assessments' (Glavovic et al. 2021, p. 4) and associated research. However, there is no more an obligation on society to take the advice of scientists than there is for patients to take the advice of their doctors. We agree that the past *modus operandi* is no longer appropriate but disagree on the solution. Other shifts in societal behaviour, such as addressing smoking, alcohol abuse, obesity, drinking and driving, and recycling, took years to become mainstreamed following convincing scientific evidence. Persistent evidence-based campaigning leads to a growing realisation of a problem in society and shifts in individual behaviours which eventually translate into government action (Harré 2011). This process is well underway with regard to the climate and biodiversity crises, so we are optimistic of increased government efforts to address them, although they are probably too late to prevent global warming of 2°C.

4. CONCLUSIONS

The ongoing COVID-19 pandemic illustrates that complacency can lead to tragedy. However, we have witnessed the ability for both governments and most of the public to respect scientific information daily. When governments acted swiftly to bring in sweeping regulations to safeguard their citizens, people adapted how they lived and worked overnight. And with the influx of sufficient government and private sector funding, the research community produced effective vaccines at unprecedented rates (Ball 2021).

A similar timely response by the global community to our interconnected climate and biodiversity crises is crucial. Shortening the information chain to make primary data accessible to society, as demonstrated

during the COVID-19 pandemic and practiced in the reporting of weather and climate (e.g. WMO 2021), but not (yet) biodiversity trends, is a starting point. As with current assessments, this process can be overseen by a globally representative and diverse panel of scientists who interpret the observations in the light of peer-reviewed research. Key components to swift implementation of the sought-after solutions, thus ensuring the health of our planetary ecosystem and the future of all its inhabitants, are succinct and accessible annual assessments.

Acknowledgements. We thank Greg Dodds (La Fábrica, New Zealand) for the production of Fig. 1.

LITERATURE CITED

Ball P (2021) What the lightning-fast quest for COVID vaccines means for other diseases. Nature 589:16–18

Bates AE, Primack RB, Biggar BS, Bird TJ and others (2021) Global COVID-19 lockdown highlights humans as both threats and custodians of the environment. Biol Conserv 263:109175

Costello MJ, Ballantine B (2015) Biodiversity conservation should focus on no-take marine reserves: 94% of marine protected areas allow fishing. Trends Ecol Evol 30:507–509

Dong E, Du H, Gardner L (2020) An interactive web-based dashboard to track COVID-19 in real time. Lancet Infect Dis 20:533–534

Glavovic BC, Smith TF, White I (2021) The tragedy of climate change science. Clim Dev (in press), doi:10.1080/17565529.2021.2008855

Guo J, Kubli D, Saner P (2021) The economics of climate change: no action not an option. Swiss Re Institute, Zurich

Harré N (2011) Psychology for a better world: strategies to inspire sustainability. University of Auckland, Auckland

Hughes AC, Orr MC, Ma K, Costello MJ and others (2021) Sampling biases shape our view of the natural world. Ecography 44:1259–1269

Masson-Delmotte V, Zhai P, Pirani A, Connors SL and others (eds) (2021) Summary for policymakers. In: Climate change 2021: the physical science basis. Working Group I contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge

Morgan L, Pike E, Moffitt R (2018) How much of the ocean is protected? Biodiversity (Nepean) 19:148–151

O'Dochartaigh A, Price P, McMullin B (2022) How to keep the government honest on climate change. The Irish Times, 1 February 2022. www.irishtimes.com/opinion/how-to-keep-the-government-honest-on-climate-change-1.4790116 (accessed 4 February 2022)

Paul BD, Lemle MD, Komaroff AL, Snyder SH (2021) Redox imbalance links COVID-19 and myalgic encephalomyelitis/chronic fatigue syndrome. Proc Natl Acad Sci USA 118:e2024358118

Pelling M, Kerr RB, Biesbroek R, Caretta MA and others (2021) Synergies between COVID-19 and climate change impacts and responses. J Extreme Events 8:2131002

Saeedi H, Reimer JD, Brandt MI, Dumais PO (2019) Global marine biodiversity in the context of achieving the Aichi Targets: ways forward and addressing data gaps. PeerJ:e7221

Sambrook K, Konstantinidis E, Russell S, Okan Y (2021) The role of personal experience and prior beliefs in shaping climate change perceptions: a narrative review. Front Psychol 12:669911

United Nations (2021) Sustainable development goals progress chart 2021. Statistics Division, Department of Economic and Social Affairs, United Nations, Geneva

Ware J, Kramer K (2021) Counting the cost 2021: a year of climate breakdown. Christian Aid, London

WHO (World Health Organization) (2021) WHO coronavirus (COVID-19) dashboard. https://covid19.who.int (accessed 31 October 2021)

WMO (World Meteorological Organization) (2021) State of the global climate 2020. WMO, Geneva

Yaghmaei N (ed) (2020) Human cost of disasters: an overview of the last 20 years, 2000–2019. United Nations Office for Disaster Risk Reduction, Geneva

Editorial responsibility: Nils Chr. Stenseth, Oslo, Norway
Reviewed by: 3 anonymous referees

Submitted: November 2, 2021
Accepted: February 21, 2022
Proofs received from author(s): April 12, 2022