Biota Neotropica 21(4): e2021e001, 2021
www.scielo.br/bn

biotaneotropica
ISSN 1676-0611 (online edition)

Editorial

It's biodiversity, stupid!

***Carlos A. Joly*[1]* & *Cristina S. Seixas*[2]**

[1]*Universidade Estadual de Campinas, Instituto de Biologia, Departamento de Biologia Vegetal, Campinas, SP, Brasil.*
[2]*Universidade Estadual de Campinas, Núcleo de Estudos e Pesquisas Ambientais/NEPAM, Campinas, SP, Brasil.*
[*]*Corresponding author: cjoly@unicamp.br*

JOLY, C.A., SEIXAS, C.S. **It's biodiversity, stupid!** Biota Neotropica 21(4): e2021e001. https://doi.org/10.1590/1676-0611-BN-2021-E001

Paraphrasing James Carville, a strategist in Bill Clinton's successful 1992 presidential campaign, **"It's biodiversity, stupid!"**, the phrase we must shout out for the world to realize that the destruction of biodiversity and associated ecosystem services underlies both the SARS-Cov2 pandemic and the climate crisis.

Pandemics emerge from microbial diversity found in nature. Emerging diseases (e.g., Ebola, Zika, Dengue, Chikungunya) and almost all known pandemics (e.g., Influenza, HIV/AIDS, COVID-19) are zoonoses; that is, they are caused by microbes of animal origin. Mammals (mainly bats, rodents, primates) and some birds (such as waterfowl), as well as livestock (e.g., poultry), are the most important reservoirs of pathogens with pandemic potential (IPBES 2020)

Blaming biodiversity for the emergence of pandemics is wrong because the risk of a pandemic is driven by exponentially increasing anthropogenic changes. Land-use change, agricultural expansion and intensification, wildlife trade and consumption, overharvesting natural resources, pollution, among other unsustainable use of the environment, disrupt natural interactions among wildlife and their microbes, increase contact among wildlife, livestock, people, and their pathogens, and have led to almost all pandemics (IPBES 2020).

Currently, a pandemic preparedness strategy is non-existent and the world responds to a pandemic after it has emerged. Nonetheless, the IPBES Workshop Report on Biodiversity and Pandemics (IPBES 2020) identifies substantial knowledge that provides pathways to predict and prevent pandemics. Further, an increase in knowledge about microbial diversity and reducing the expansion of agribusiness, mining, and logging over pristine areas could allow us to prevent the development of yet another pandemic in a few years.

Research work that predicts geographic origins of future pandemics, identifies key host reservoirs and pathogens most likely to emerge, and demonstrates how environmental and socioeconomic changes correlate with disease emergence, is urgently needed. Pilot projects, often at a large scale, have demonstrated that such knowledge can be used to effectively target viral discovery, surveillance, and outbreak investigation. The major impact on the public health of COVID-19, of HIV/AIDS, Ebola, Zika, Influenza, SARS, and many other emerging diseases underlines the critical need for science-based policies that promote pandemic prevention (IPBES 2020). The public health crisis also calls for the implementation of policies leading to transformative changes (see IPBES 2019 and 2020 for these policy options).

Climate change has implications in disease emergence and will likely increase substantial future pandemic risk by driving movements of people, wildlife, host reservoirs, and pathogen vectors. Such movements will lead to new and increased contact among species and disrupt natural host-pathogen dynamics. Biodiversity loss associated with landscape degradation can lead to an increased risk of an emerging disease. This happens in cases in which species well adapted to human-dominated landscapes are also able to harbor pathogens that pose a high risk of zoonotic transmission. Pathogens of wildlife, livestock, and people can directly threaten biodiversity as well; they emerge via the same activities that drive disease risk in people (e.g., the emergence of chytridiomycosis in amphibians worldwide due to the wildlife trade).

> "Climate change and biodiversity loss are two of the most pressing issues of the Anthropocene. While there is recognition in both scientific and policy-making circles that the two are interconnected, in practice they are largely addressed in their own domains. The research community dedicated to investigating the climate system is somewhat, but not completely, distinct from that which studies biodiversity. Each issue has its own international Convention (the UN Framework Convention on Climate Change and the Convention on Biological Diversity), and each has an intergovernmental body that assesses available knowledge [the Intergovernmental Panel on Climate Change (IPCC) and the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES)]. This functional separation creates a risk of incompletely identifying, understanding, and dealing with the connections between the two. In the worst case, it may lead to taking actions that inadvertently prevent the solution of one or the other, or both issues. It is the nature of complex systems that they have unexpected outcomes and thresholds, but also that the individual parts cannot be managed in isolation from one another" (Pörtner et al 2021).

Impacts of climate change on biodiversity affect species geographical distribution, species phenology, population dynamics, community structure, ecosystem function, and, therefore, the ecosystem services they can provide. Although the Paris Agreement focuses on keeping the increase in global average temperature below 1,5ºC until de end of the century, most experts in climate change, when privately asked, agree that the best we will achieve is more like an increase of up to 3ºC (Tollefson, 2021)

The scientific community has been working for some time on the synergies and trade-offs between climate and biodiversity. Examples of synergy include an action taken to protect the biodiversity that simultaneously contributes to mitigating climate change and action to increase the capacity of species or ecosystems to adapt to climate change, which cannot be avoided. In contrast, negative trade-offs may also result. For instance, an action taken to mitigate climate change by using the land or ocean to absorb greenhouse gases may result in loss of biodiversity or other nature-based benefits that flow from the affected ecosystems. Only by considering climate and biodiversity as parts of the same complex problem – which also includes the actions, motivations, and aspirations of society – scientists and policymakers can advance in designing and implementing solutions that avoid maladaptation and maximize beneficial outcomes for climate and biodiversity and, consequently, for public health. Seeking such solutions is important if society wants to protect development gains and expedite the move towards a more sustainable, healthy, and equitable world for all. The role of science in addressing the current pandemic illustrates how science can inform policy and society for identifying possible solutions.

Connecting the climate and biodiversity spheres is especially crucial at this moment when the world seems to be gearing up for stronger actions on both. Urgent, timely, and targeted actions can minimize detrimental trends and counteract escalating risks while avoiding costly ones. Humankind has no time to lose, and we hope that this Editorial will support such urgent actions toward "The Future We Want". Biodiversity and associated ecosystem services loss and Climate Change are two sides of the same coin. Neither will be successfully resolved unless both are tackled together. What are the solutions to the multiple crises we leave? We would say "Its biodiversity coupled with reduction of fossil fuel, consumerism, waste, pollution, and deforestation, stupid!"

Author Contributions

Carlos A. Joly: Substantial contribution in the concept and design of the study; Contribution to data collection; Contribution to data analysis and interpretation; Contribution to manuscript preparation; Contribution to critical revision, adding intellectual content.

Cristina S. Seixas: Substantial contribution in the concept and design of the study; Contribution to data collection; Contribution to data analysis and interpretation; Contribution to manuscript preparation; Contribution to critical revision, adding intellectual content.

Conflicts of Interest

The authors declare that they have no conflict of interest related to the publication of this manuscript.

References

Pörtner, H.O., Scholes, R.J., Agard, J., Archer, E., Arneth, A., Bai, X., Barnes, D., Burrows, M., Chan, L., Cheung, W.L., Diamond, S., Donatti, C., Duarte, C., Eisenhauer, N., Foden, W., Gasalla, M., Handa, C., Hickler, T., Hoegh-Guldberg, O., Ichii, K., Jacob, U., Insarov, G., Kiessling, W., Leadley, P., Leemans, R., Levin, L., Lim, M., Maharaj, S., Managi, S., Marquet, P., McElwee, P., Midgley, G., Oberdorff, T., Obura, D., Osman, E., Pandit, R., Pascual, U., Pires, A. P. F., Popp, A., Reyes-García, V., Sankaran, M., Settele, J., Shin, Y. J., Sintayehu, D. W., Smith, P., Steiner, N., Strassburg, B., Sukumar, R., Trisos, C., Val, A.L., Wu, J., Aldrian, E., Parmesan, C., Pichs-Madruga, R., Roberts, D.C., Rogers, A.D., Díaz, S., Fischer, M., Hashimoto, S., Lavorel, S., Wu, N., Ngo, H.T. 2021. IPBES-IPCC co-sponsored workshop report on biodiversity and climate change; IPBES and IPCC. IPBES secretariat, Bonn, Germany. https://doi.org/10.5281/zenodo.4782538

IPBES 2019. Global assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Brondízio, E. S., Settele, J., Díaz, S., Ngo, H. T. (eds). IPBES secretariat, Bonn, Germany. https://doi.org/10.5281/zenodo.3831852

IPBES 2020. Workshop Report on Biodiversity and Pandemics of the Intergovernmental Platform on Biodiversity and Ecosystem Services. Daszak, P., Amuasi, J., das Neves, C. G., Hayman, D., Kuiken, T., Roche, B., Zambrana-Torrelio, C., Buss, P., Dundarova, H., Feferholtz, Y., Földvári, G., Igbinosa, E., Junglen, S., Liu, Q., Suzan, G., Uhart, M., Wannous, C., Woolaston, K., Mosig Reidl, P., O'Brien, K., Pascual, U., Stoett, P., Li, H., Ngo, H. T., IPBES secretariat, Bonn, Germany. https://doi.org/10.5281/zenodo.4147317

Tollefson, J. 2021. Top climate scientists are skeptical that nations can rein in global warming. Nature 599: 22-24 https://doi.org/10.1038/d41586-021-02990-w

Received: 28/10/2021
Accepted: 23/11/2021
Published online: 17/12/2021