10 NEW INSIGHTS IN CLIMATE SCIENCE 2022

Insight 3:

気候と健康の相互作用により、新たな脅威が出現した

Future Earth/国立環境研究所・Giles Sioen氏

New threats on the horizon from climate- health interactions

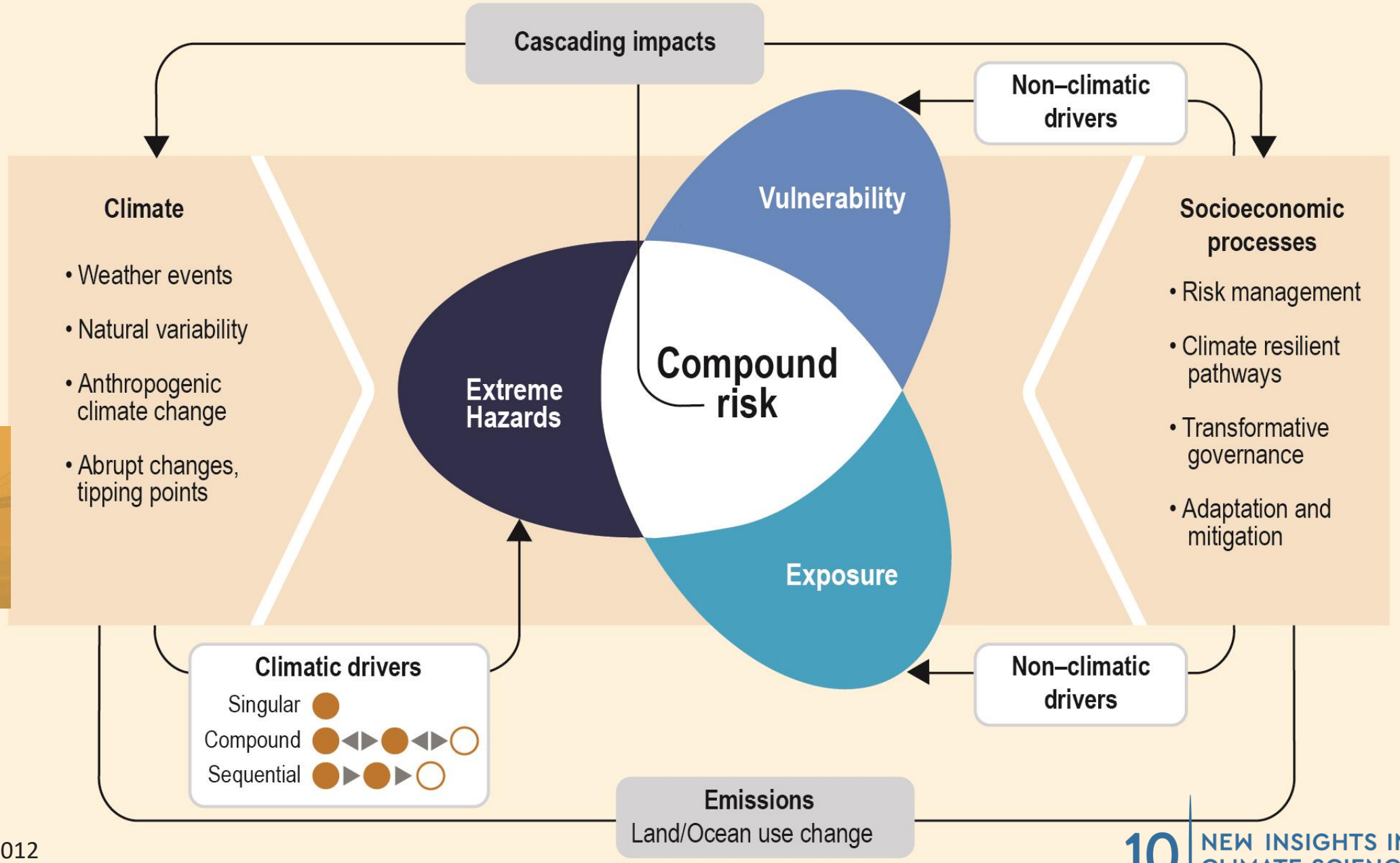
The impacts of climate change on the health of humans, animals and entire ecosystems are increasingly widespread, and new risks are emerging.

3

10 NEW INSIGHTS IN CLIMATE SCIENCE

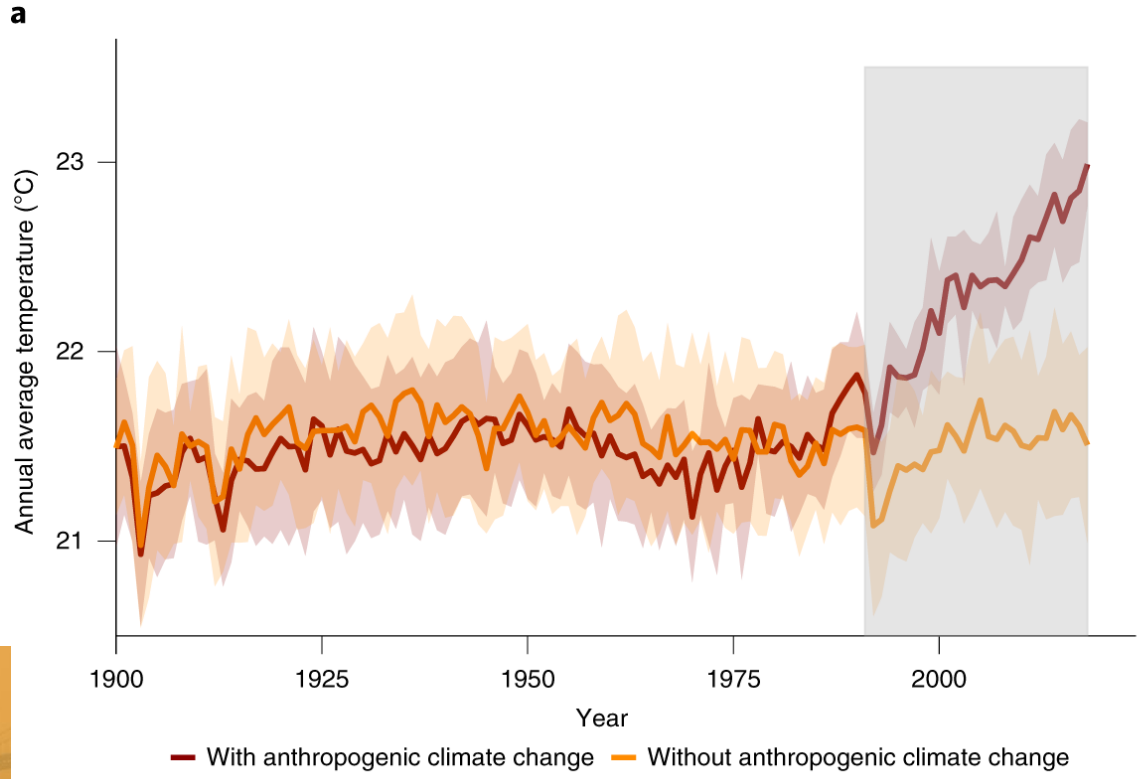
April 18th, 2023

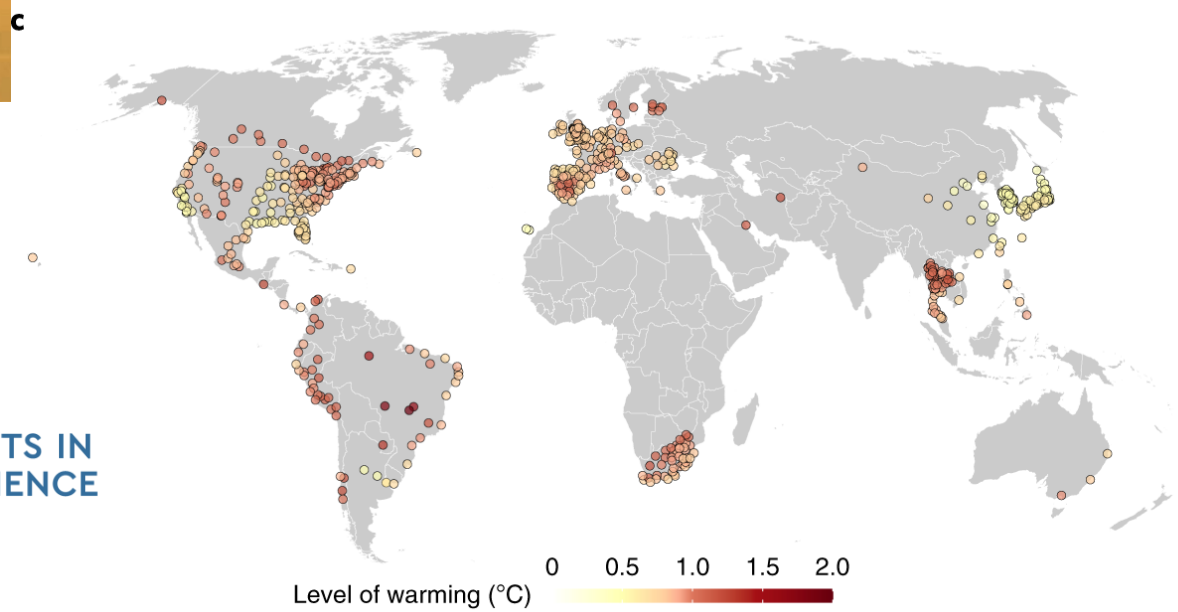
Giles B. Sioen
Co-lead Research and Innovation, Future Earth
Research Associate, National Institute for Environmental Studies, Japan

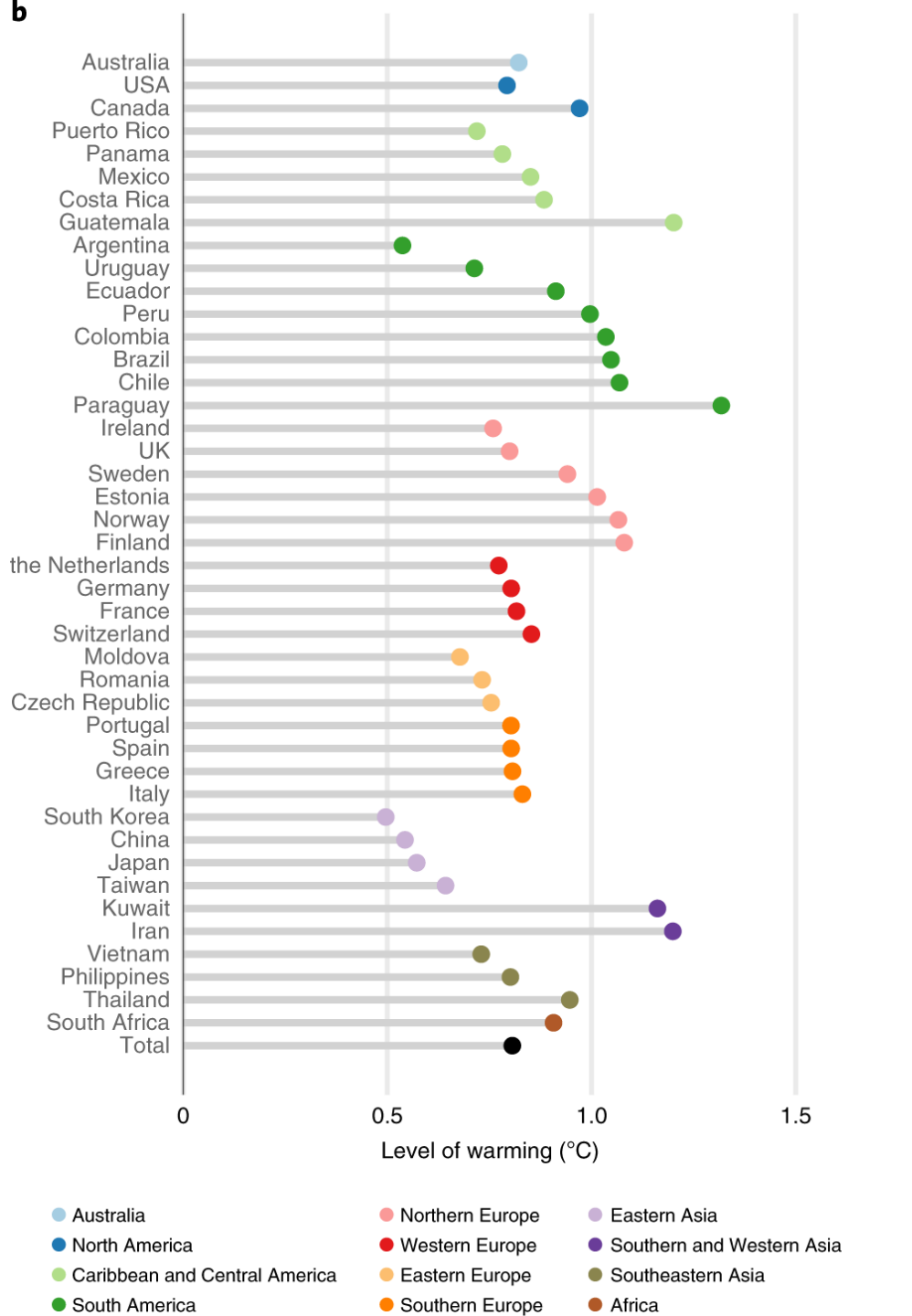

Cascading impacts
Non–climatic drivers
Climate
• Weather events
• Natural variability
• Anthropogenic climate change
• Abrupt changes, tipping points
Vulnerability
Extreme Hazards
Compound risk
Exposure
Socioeconomic processes
• Risk management
• Climate resilient pathways
• Transformative governance
• Adaptation and mitigation
Climatic drivers
Singular
Compound
Sequential
Non–climatic drivers
Emissions
Land/Ocean use change

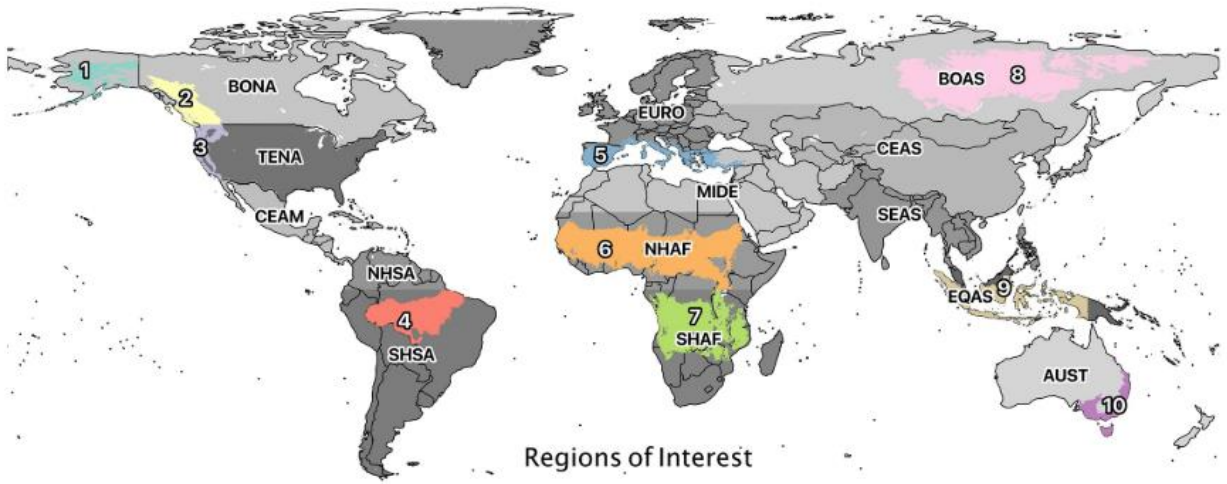
IPCC, 2012

Vicedo-Cabrera et al., 2021





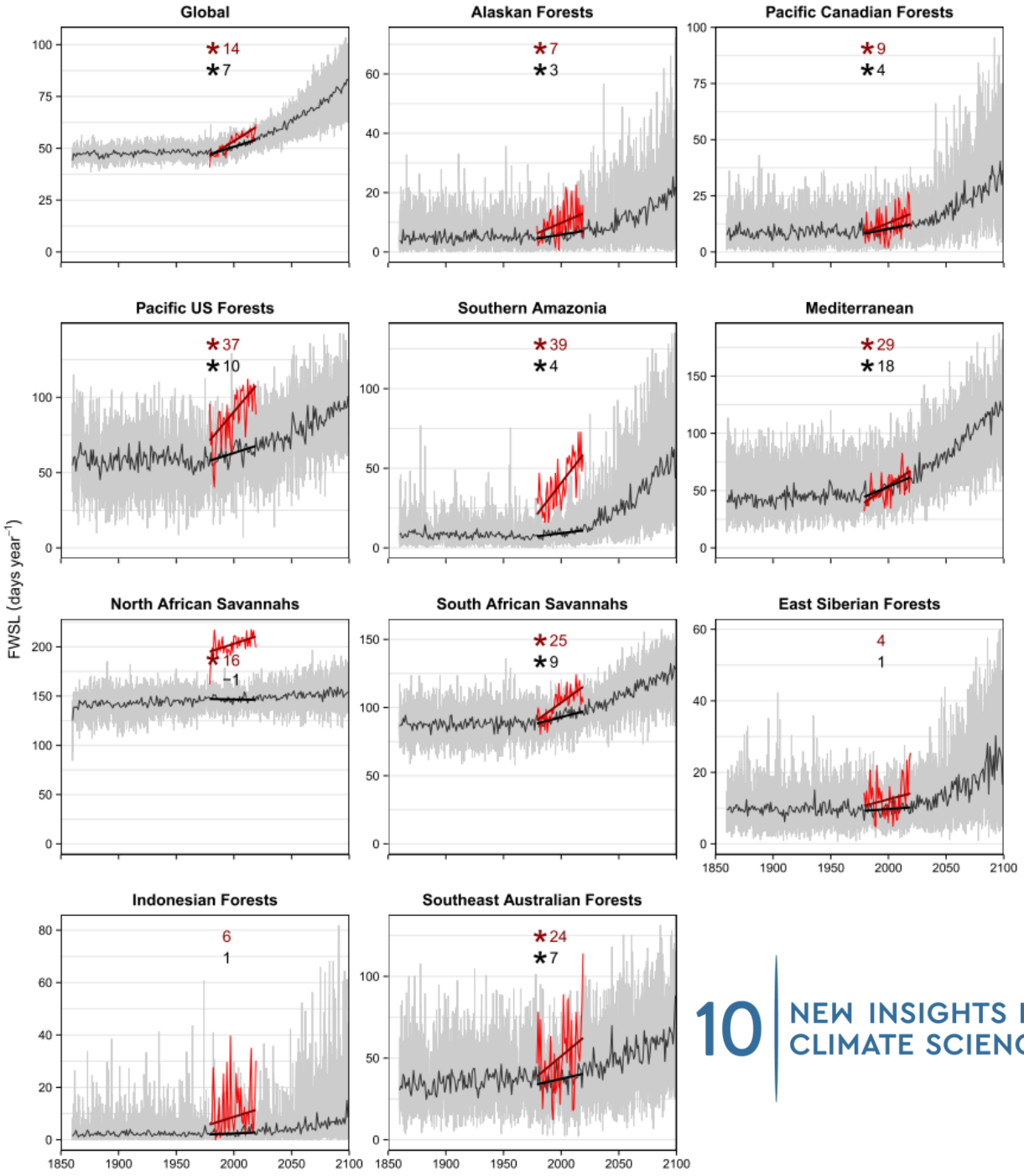




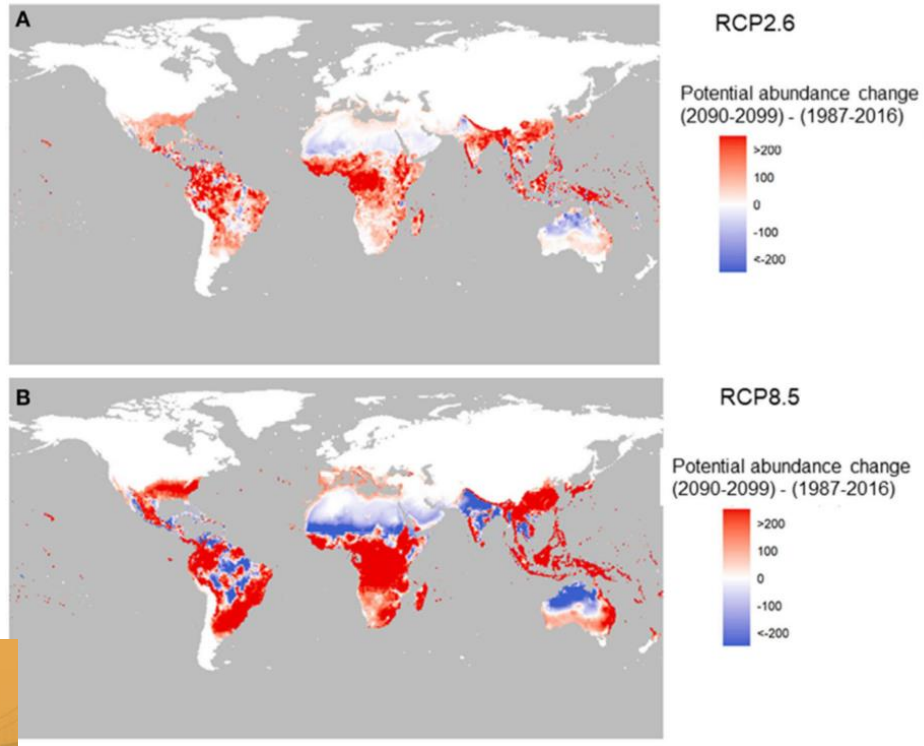
3

Jones et al., 2022

Wildfires contain ambient air pollution that has greater toxicity than measured fine particulate matter ($PM_{2.5}$) values suggest (Yang et al., 2022)



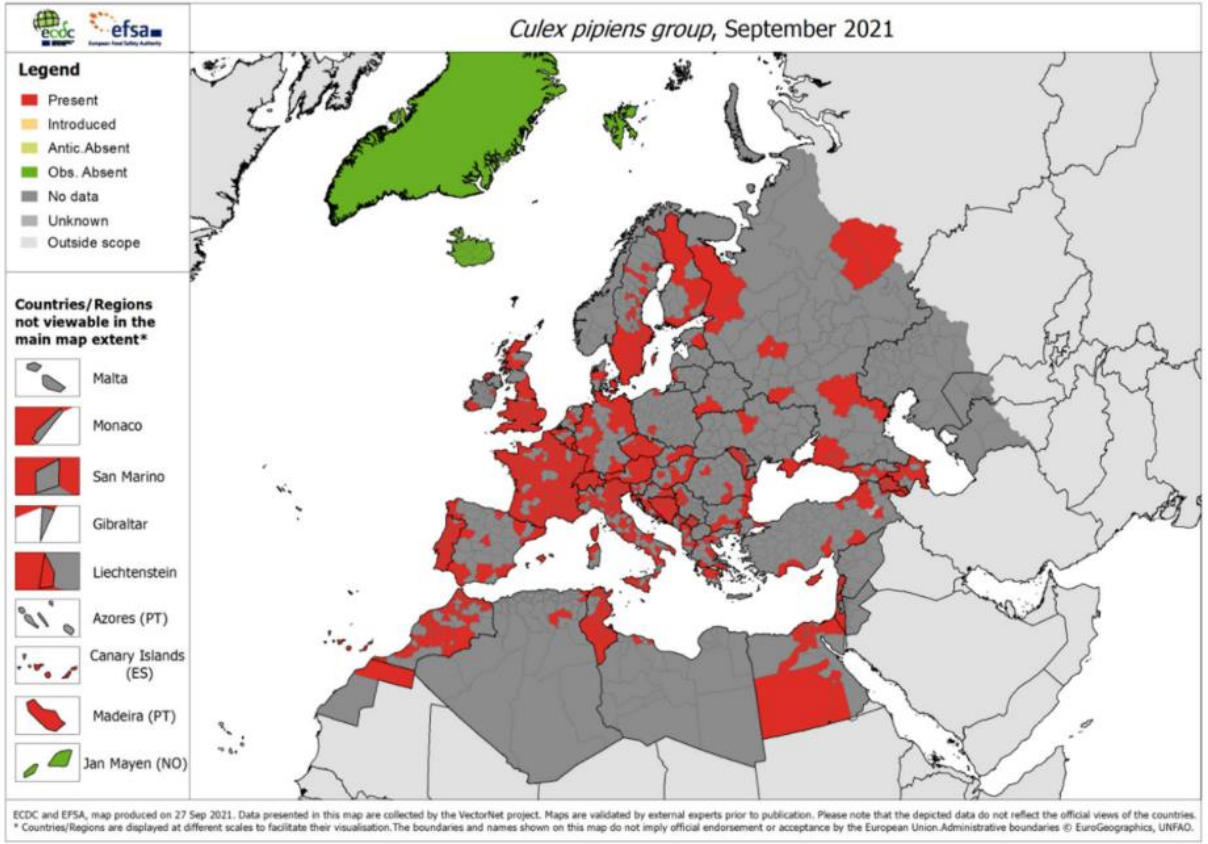
10 NEW INSIGHTS IN CLIMATE SCIENCE



Yellow fever mosquito abundance change

3

Semenza et al., 2022

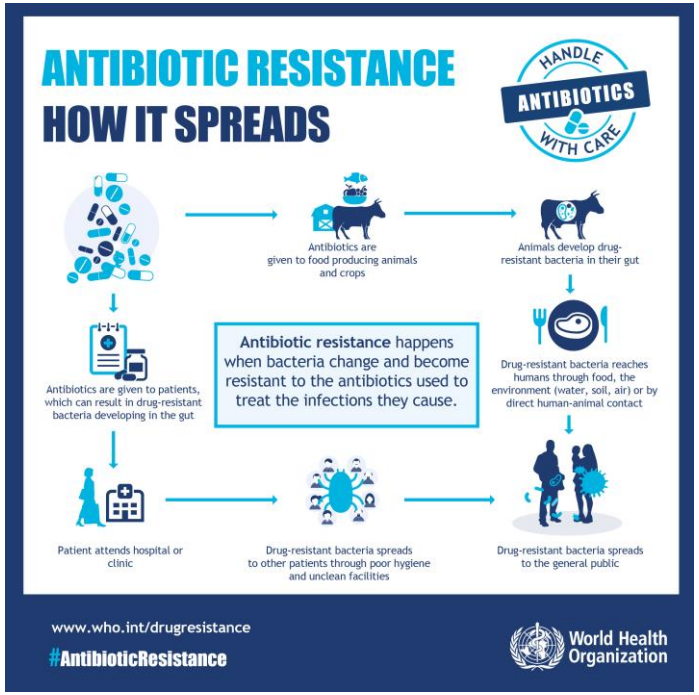


Presence of West Nile virus carrying mosquito distribution in Europe September 2021 due to changes in weather patterns

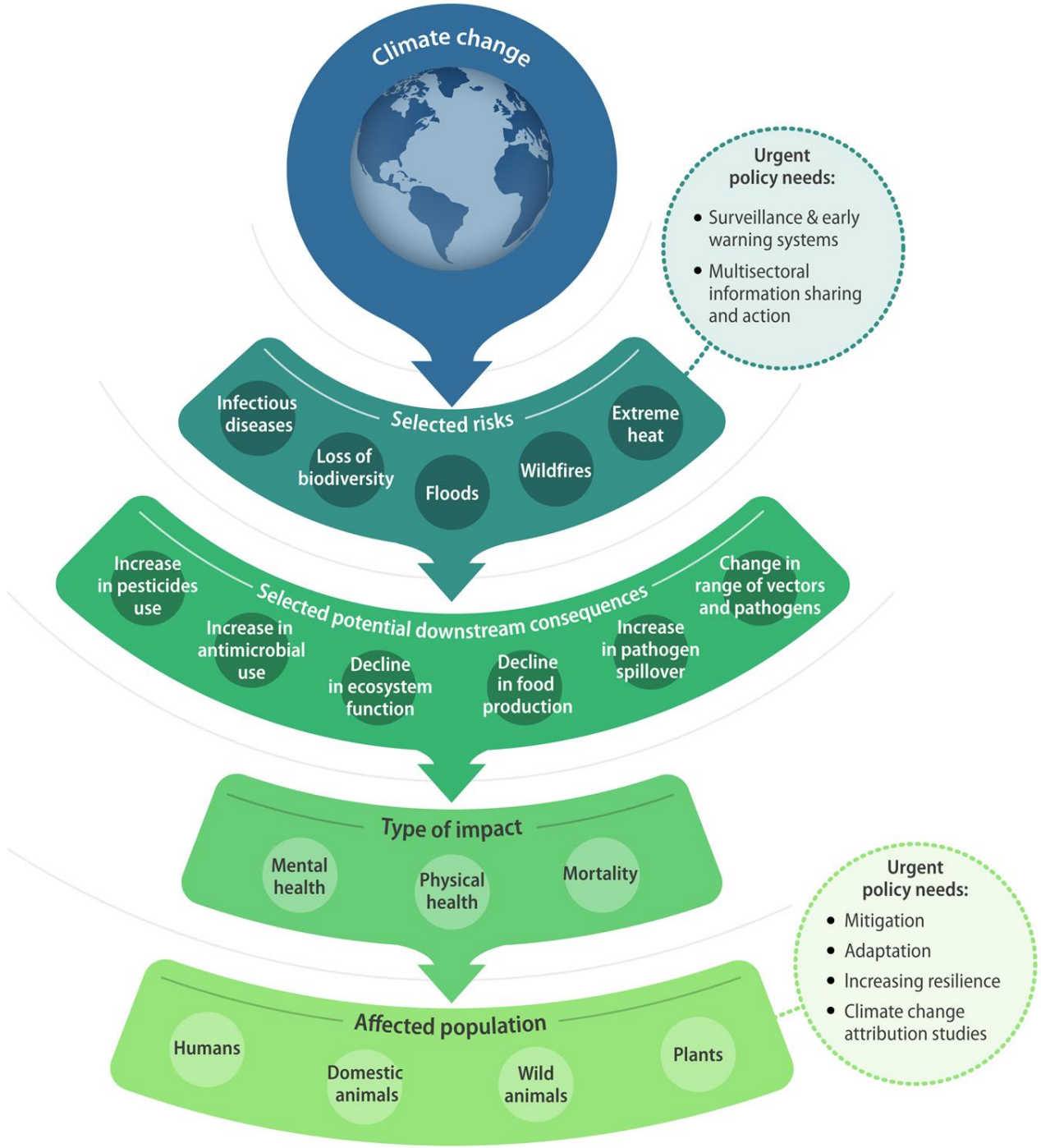
3

©Getty

Manish Swarup / AP Photo



3


Climate change
Urgent policy needs:
• Surveillance & early warning systems
• Multisectoral information sharing and action
Selected risks
Infectious diseases
Loss of biodiversity
Floods
Wildfires
Extreme heat
Selected potential downstream consequences
Increase in pesticides use
Increase in antimicrobial use
Decline in ecosystem function
Decline in food production
Increase in pathogen spillover
Change in range of vectors and pathogens
Type of impact
Mental health
Physical health
Mortality
Affected population
Humans
Domestic animals
Wild animals
Plants
Urgent policy needs:
• Mitigation
• Adaptation
• Increasing resilience
• Climate change attribution studies

Key references

Adams, N., Dhimal, M., Mathews, S., Iyer, V., Murtugudde, R., Liang, X.-Z., … Sapkota, A. (2022). El Niño Southern Oscillation, Monsoon Anomaly and Childhood Diarrheal Disease Morbidity in Nepal. *PNAS Nexus*, (March), 1–7. https://doi.org/10.1093/pnasnexus/pgac032

Blando, J., Allen, M., Galadima, H., Tolson, T., Akpinar-Elci, M., & Szklo-Coxe, M. (2022). Observations of Delayed Changes in Respiratory Function among Allergy Clinic Patients Exposed to Wildfire Smoke. *International Journal of Environmental Research and Public Health*, *19*(3), 1241. https://doi.org/10.3390/ijerph19031241

Burnham, J. P. (2021). Climate change and antibiotic resistance: a deadly combination. *Therapeutic Advances in Infectious Disease*, *8*, 2049936121991374. https://doi.org/10.1177/2049936121991374

Carlson, C. J., Albery, G. F., Merow, C., Trisos, C. H., Zipfel, C. M., Eskew, E. A., … Bansal, S. (2022). Climate change increases cross-species viral transmission risk. *Nature*, 0–1. https://doi.org/10.1038/s41586-022-04788-w

Cheung, W. W. L., Frölicher, T. L., Lam, V. W. Y., Oyinlola, M. A., Reygondeau, G., Rashid Sumaila, U., … Wabnitz, C. C. C. (2021). Marine high temperature extremes amplify the impacts of climate change on fish and fisheries. *Science Advances*, *7*(40), 1–16. https://doi.org/10.1126/sciadv.abh0895

Dalugoda, Y., Kuppa, J., Phung, H., Rutherford, S., & Phung, D. (2022). Effect of Elevated Ambient Temperature on Maternal, Foetal, and Neonatal Outcomes: A Scoping Review. *International Journal of Environmental Research and Public Health*, *19*(3). https://doi.org/10.3390/ijerph19031771

IPCC AR6 WGII. (2022). *Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (H.-O. Pörtner, D. C. Roberts, M. Tignor, E. S. Poloczanska, K. Mintenbeck, A. Alegría, … B. Rama, eds.). Cambridge University Press. In Press. Retrieved from Cambridge University Press. In Press. website: https://www.ipcc.ch/report/sixth-assessment-report-working-group-ii/

Jones, M. W., Abatzoglou, J. T., Veraverbeke, S., Andela, N., Lasslop, G., Forkel, M., … Le Quéré, C. (2022). Global and regional trends and drivers of fire under climate change. *Reviews of Geophysics*, 1–76. https://doi.org/10.1029/2020rg000726

Kendon, M., McCarthy, M., Jevrejeva, S., Matthews, A., Sparks, T., & Garforth, J. (2021). State of the UK Climate 2020. *International Journal of Climatology*, *41*(S2), 1–76. https://doi.org/10.1002/joc.7285

McElroy, S., Ilango, S., Dimitrova, A., Gershunov, A., & Benmarhnia, T. (2022). Extreme heat, preterm birth, and stillbirth: A global analysis across 14 lower-middle income countries. *Environment International*, *158*(October 2021), 106902. https://doi.org/10.1016/j.envint.2021.106902

Riddell, E. A., Iknayan, K. J., Hargrove, L., Tremor, S., Patton, J. L., Ramirez, R., … Beissinger, S. R. (2021). Exposure to climate change drives stability or collapse of desert mammal and bird communities. *Science*, *371*(6529), 633–638. https://doi.org/10.1126/SCIENCE.ABD4605/SUPPL_FILE/ABD4605_RIDDELL_SM.PDF

Ristaino, J. B., Anderson, P. K., Bebber, D. P., Brauman, K. A., Cunniffe, N. J., Fedoroff V, N., … Wei, Q. (2021). The persistent threat of emerging plant disease pandemics to global food security. *Proceedings of the National Academy of Sciences of the United States of America*, *118*(23), e2022239118. https://doi.org/10.1073/pnas.2022239118

Rodney, R. M., Swaminathan, A., Calear, A. L., Christensen, B. K., Lal, A., Lane, J., … Walker, I. (2021). Physical and Mental Health Effects of Bushfire and Smoke in the Australian Capital Territory 2019–20. *Frontiers in Public Health*, *9*(October), 1–13. https://doi.org/10.3389/fpubh.2021.682402

Semenza, J. C., Rocklov, J., & Ebi, K. L. (2022). Climate Change and Cascading Risks from Infectious Disease. *Infectious Diseases and Therapy*. https://doi.org/10.1007/s40121-022-00647-3

Sexton, J., Andrews, C., Carruthers, S., Kumar, S., Flenady, V., & Lieske, S. (2021). Systematic review of ambient temperature exposure during pregnancy and stillbirth: Methods and evidence. *Environmental Research*, *197*(October 2020), 111037. https://doi.org/10.1016/j.envres.2021.111037

Thornton, P., Nelson, G., Mayberry, D., & Herrero, M. (2021). Increases in extreme heat stress in domesticated livestock species during the twenty-first century. *Global Change Biology*, *27*(22), 5762–5772. https://doi.org/10.1111/gcb.15825

Tong, N., Witherspoon, L., Dunne, C., & Flannigan, R. (2022). Global decline of male fertility: Fact or fiction? *BC Medical Journal*, *64*(3), 126–130. Retrieved from https://bcmj.org/sites/default/files/BCMJ_Vol64_No3_bcmd2b.pdf

UN Statistical Commission. (2022). *Background document to the report of the secretary-general on climate change statistics (E/CN.3/2022/17): Global Set and metadata* (p. 354). p. 354. United Nations Statistics Division. Retrieved from https://unstats.un.org/unsd/statcom/53rd-session/documents/BG-3m-Globalsetandmetadata-E.pdf

Vicedo-Cabrera, A. M., Scovronick, N., Sera, F., Royé, D., Schneider, R., Tobias, A., … Gasparrini, A. (2021). The burden of heat-related mortality attributable to recent human-induced climate change. *Nature Climate Change*, *11*(6), 492–500. https://doi.org/10.1038/s41558-021-01058-x

Yang, C.-E., Fu, J. S., Liu, Y., Dong, X., & Liu, Y. (2022). Projections of future wildfires impacts on air pollutants and air toxics in a changing climate over the western United States. *Environmental Pollution*, *304*(March), 119213. https://doi.org/10.1016/j.envpol.2022.119213

Zhang, R., Tang, X., Liu, J., Visbeck, M., Guo, H., Murray, V., … Zhou, L. (2022). From concept to action: a united, holistic and One Health approach to respond to the climate change crisis. *Infectious Diseases of Poverty*, *11*(1), 4–9. https://doi.org/10.1186/s40249-022-00941-9