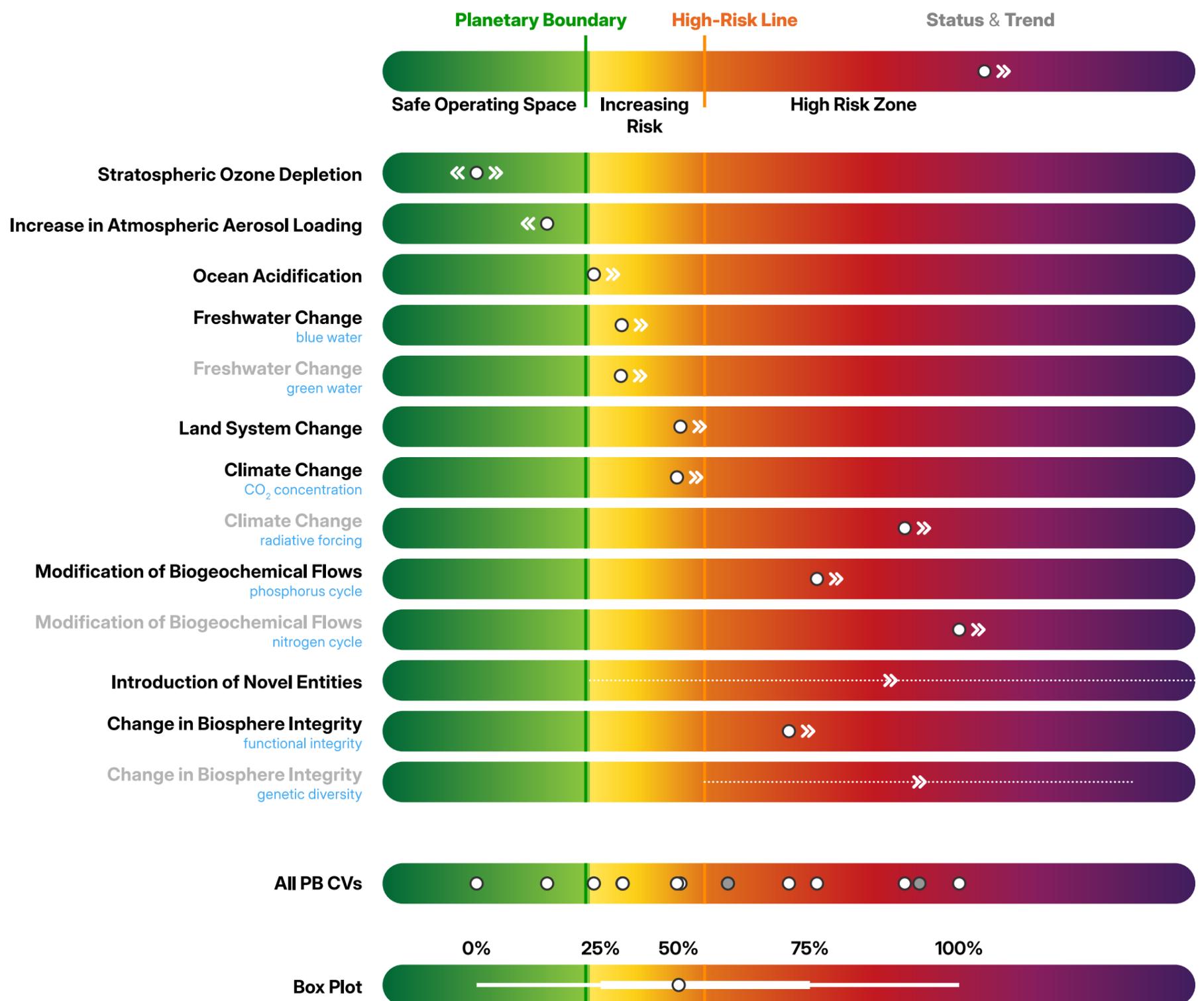


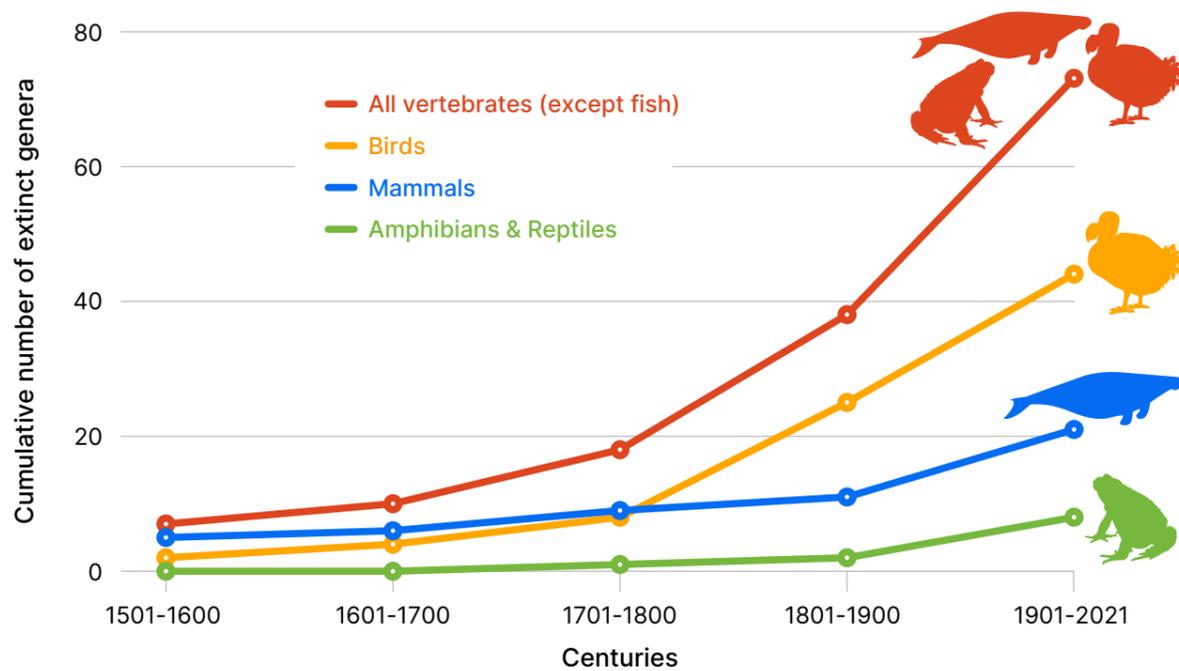
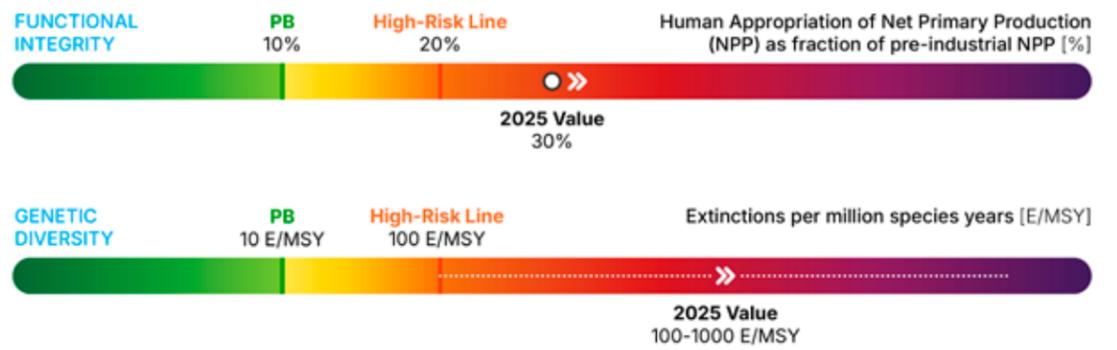
The State of the Planet

The latest Planetary Health Check report finds that 7 out of the 9 systems are outside the safe operating space, meaning they are at risk or in the danger zone. Solutions to bring us back inside the Planetary Boundaries and the safe operating space are needed urgently.

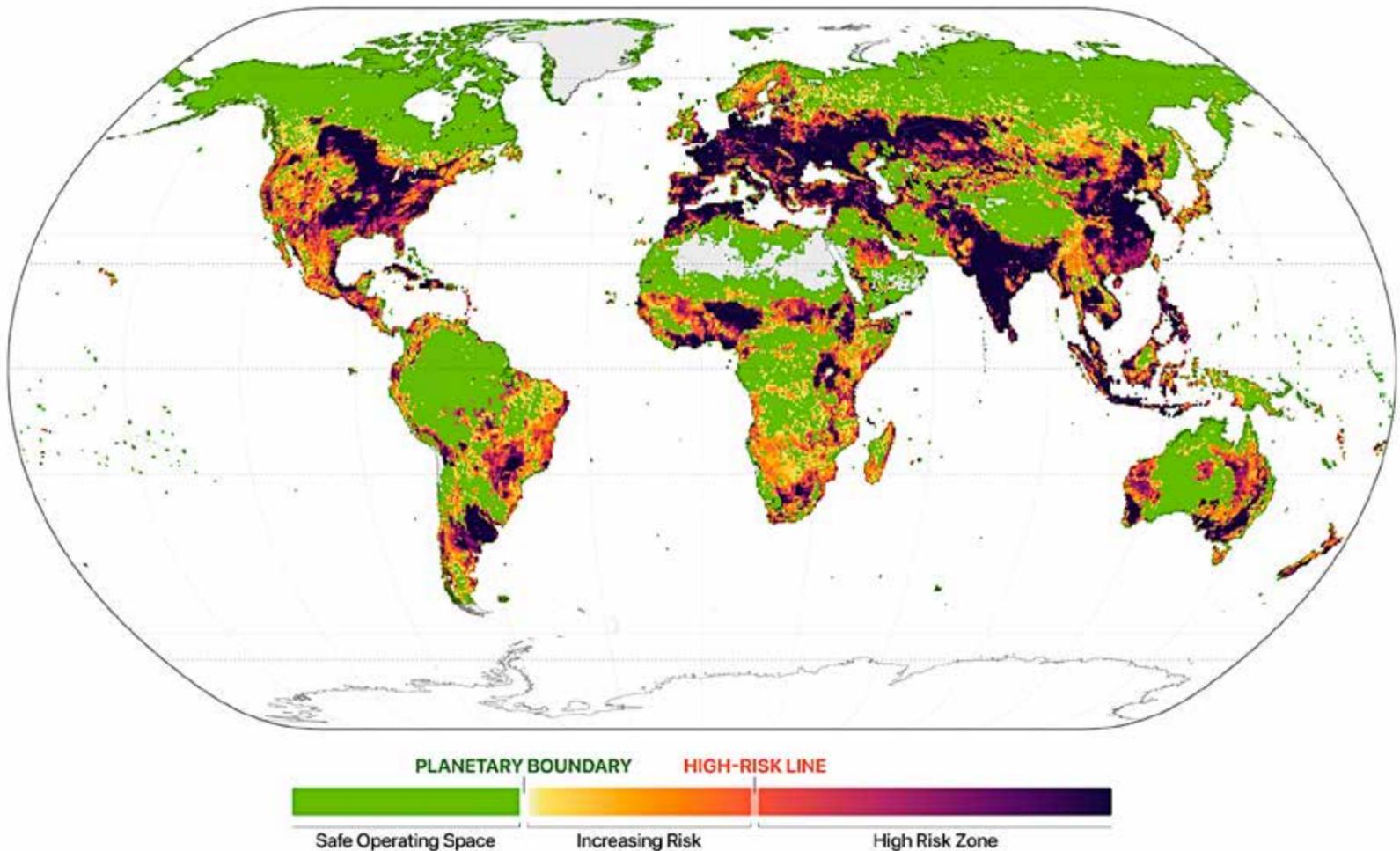


Biosphere integrity

Extinctions and disruptions to the biosphere damage its ability to absorb impacts, stay stable, and help to regulate other Earth systems like the climate.



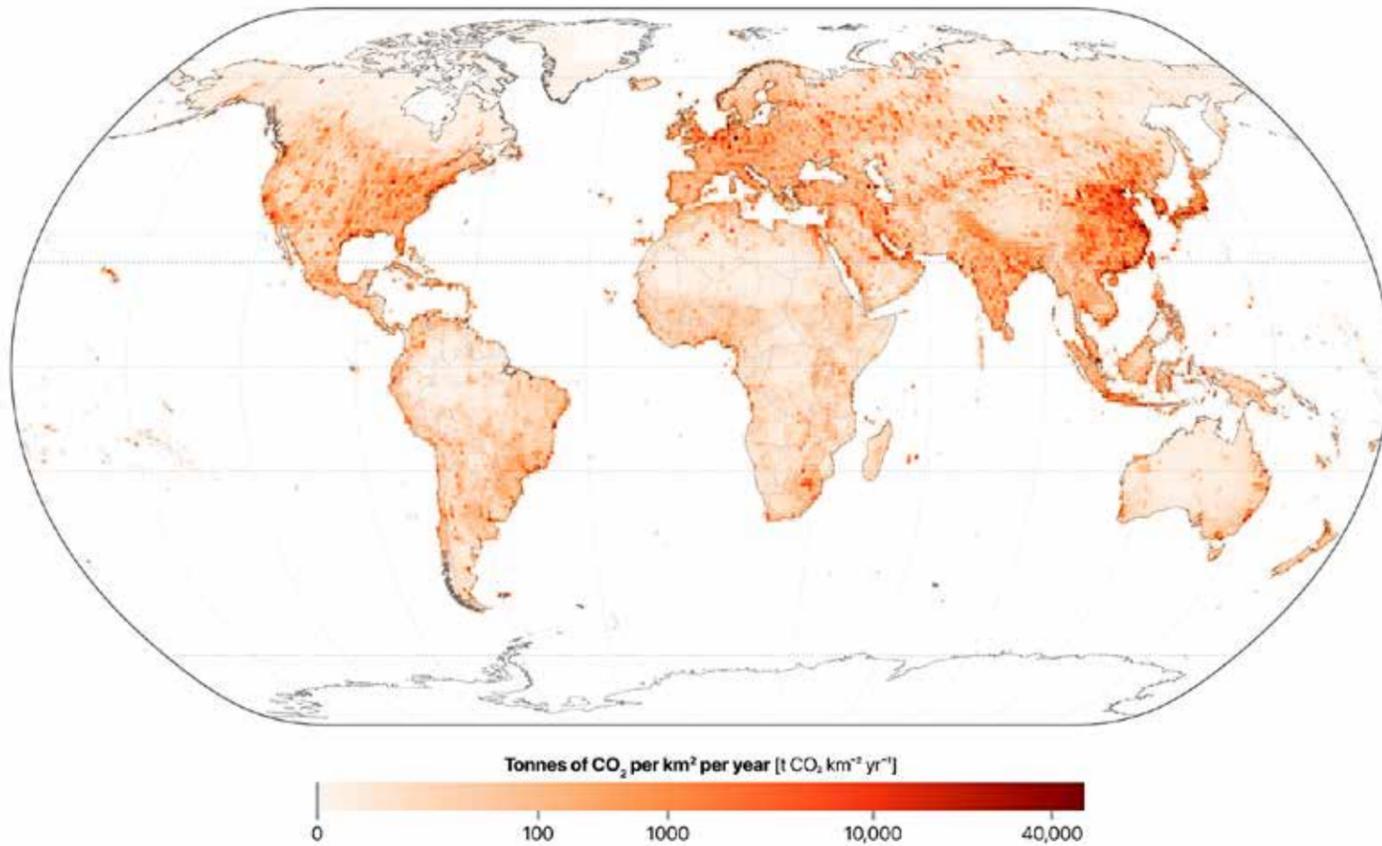
Species extinctions accelerating globally. The significant and steadily increasing loss of global diversity raises concerns that Earth's biosphere is losing resilience, adaptability and hence its ability to buffer against other PB transgressions.



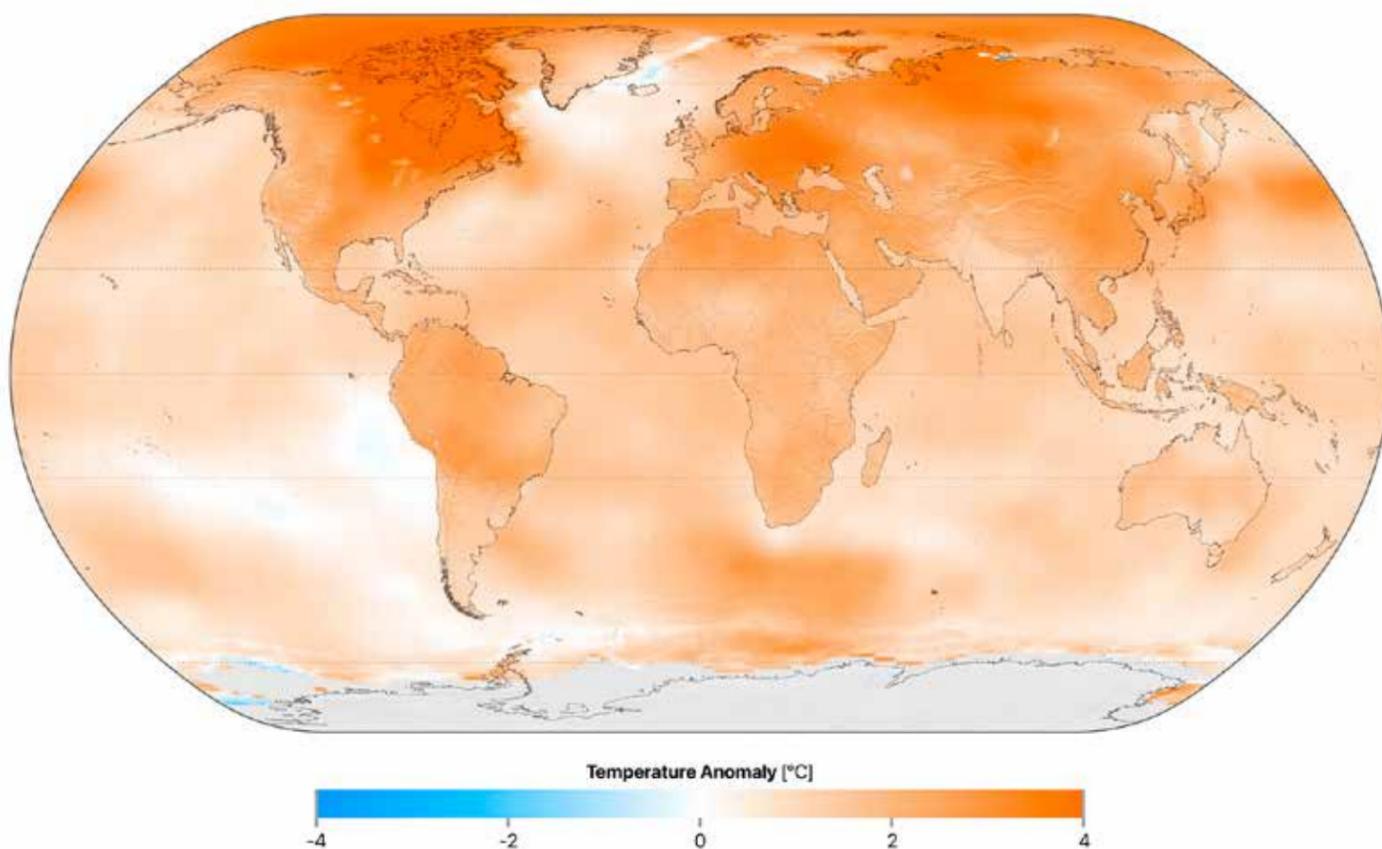
Global risk map of Change in Biosphere Integrity (2010). Most boundary transgressions occur in large, continuous regions with high land-use. Regions without transgressions, e.g. the Amazon, Congo Basin, and boreal forests, are primarily natural or semi-natural.

Climate change

Global weather is changing because of the increase in greenhouse gases and other planetary changes.



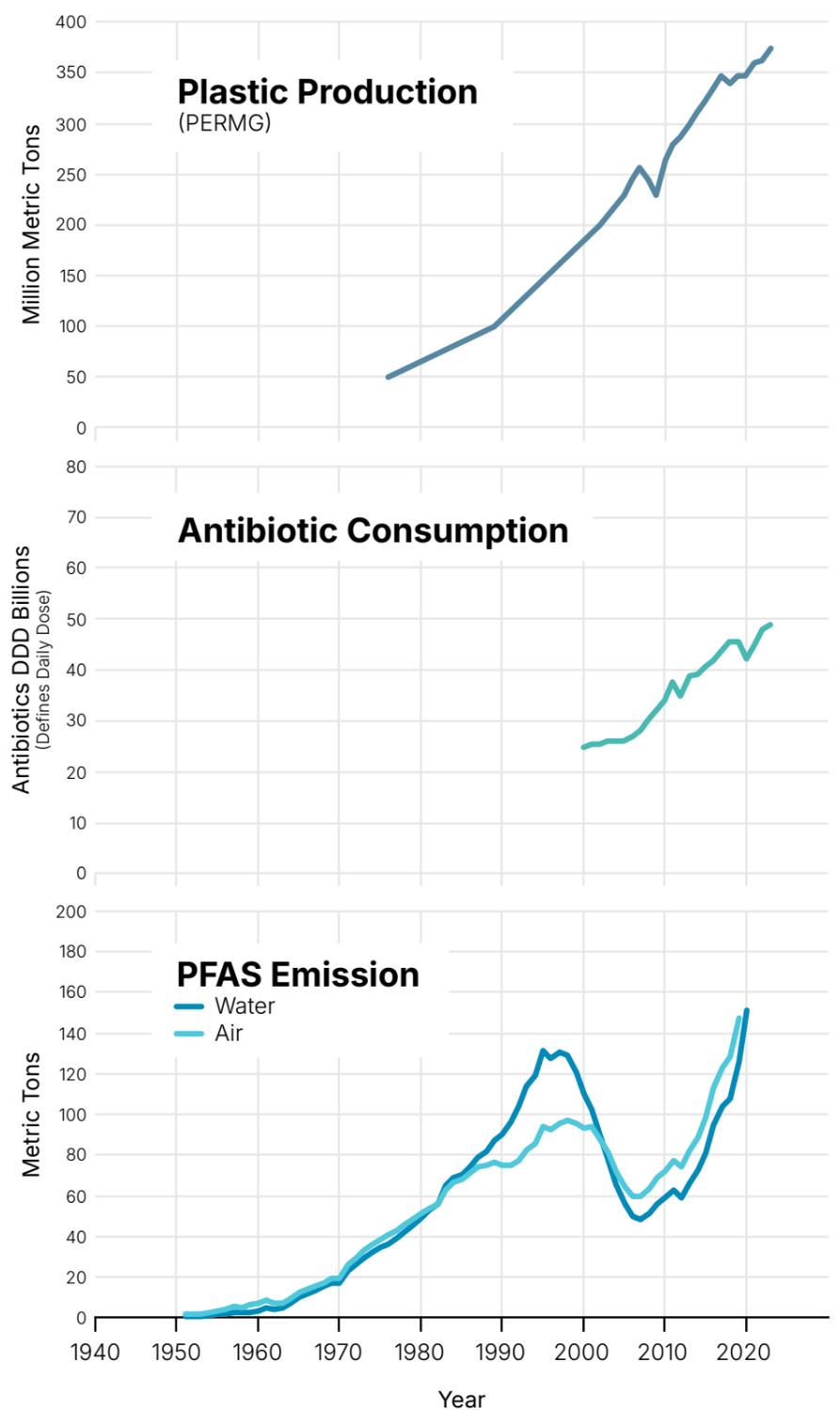
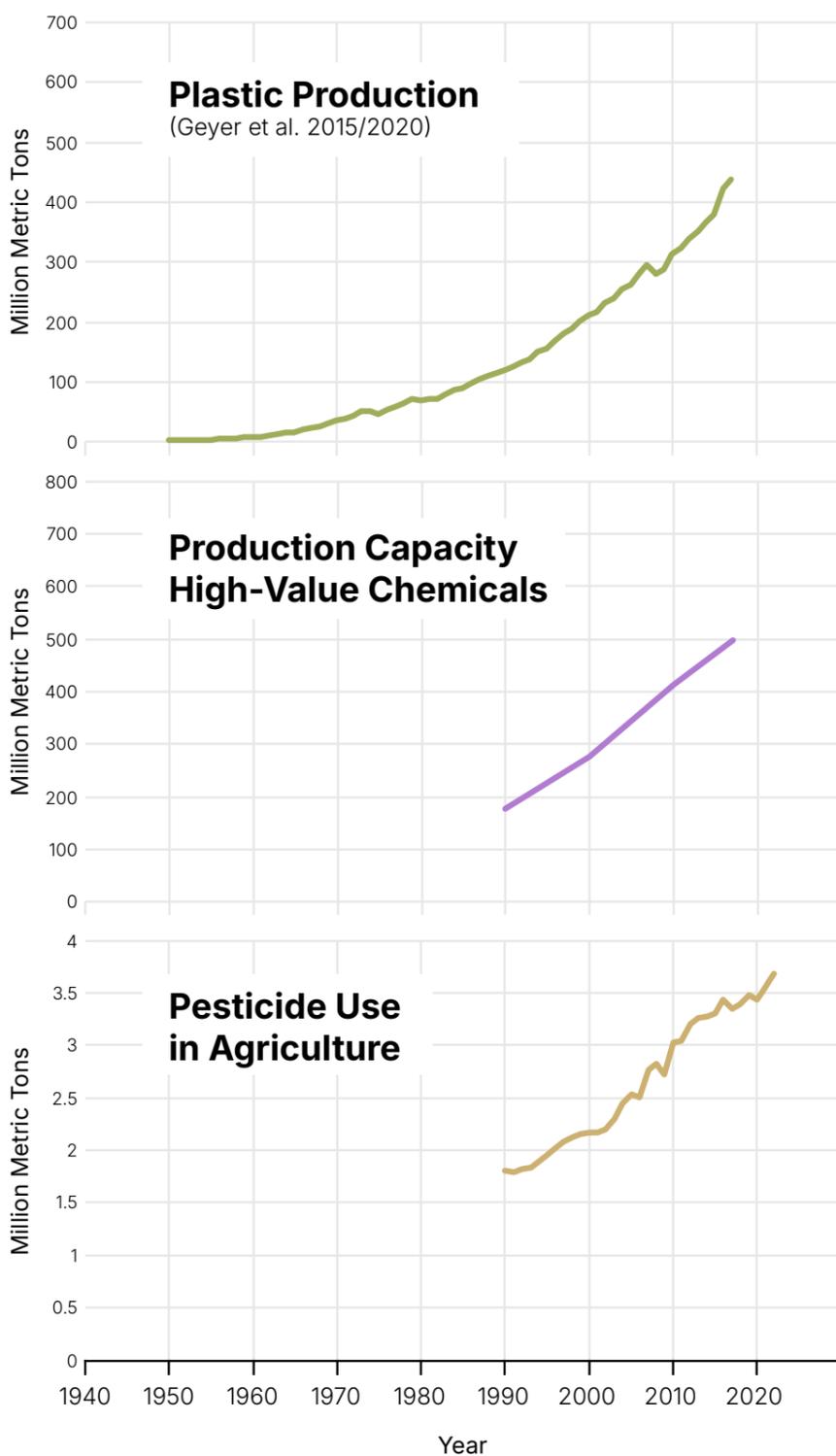
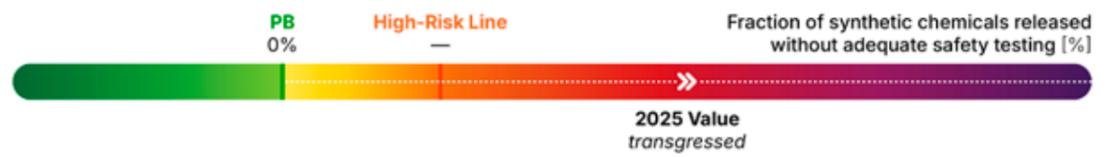
Where climate change begins - Global patterns of fossil CO₂ emissions (2024). Emissions are highly uneven across the globe - concentrated in heavily populated areas, with hotspots such as industrial operations, resource extraction and fires.



How Earth's temperature has changed since the late 19th century. A clear global warming trend, almost every region showing increased temperatures. Land has warmed faster than oceans, the Arctic is heating more than twice as fast as the global average.

Novel entities

Artificial substances unknown in nature are released into the biosphere without knowing their impacts: e.g. plastics, chemicals, pharmaceuticals, radioactivity, genetically modified organisms.

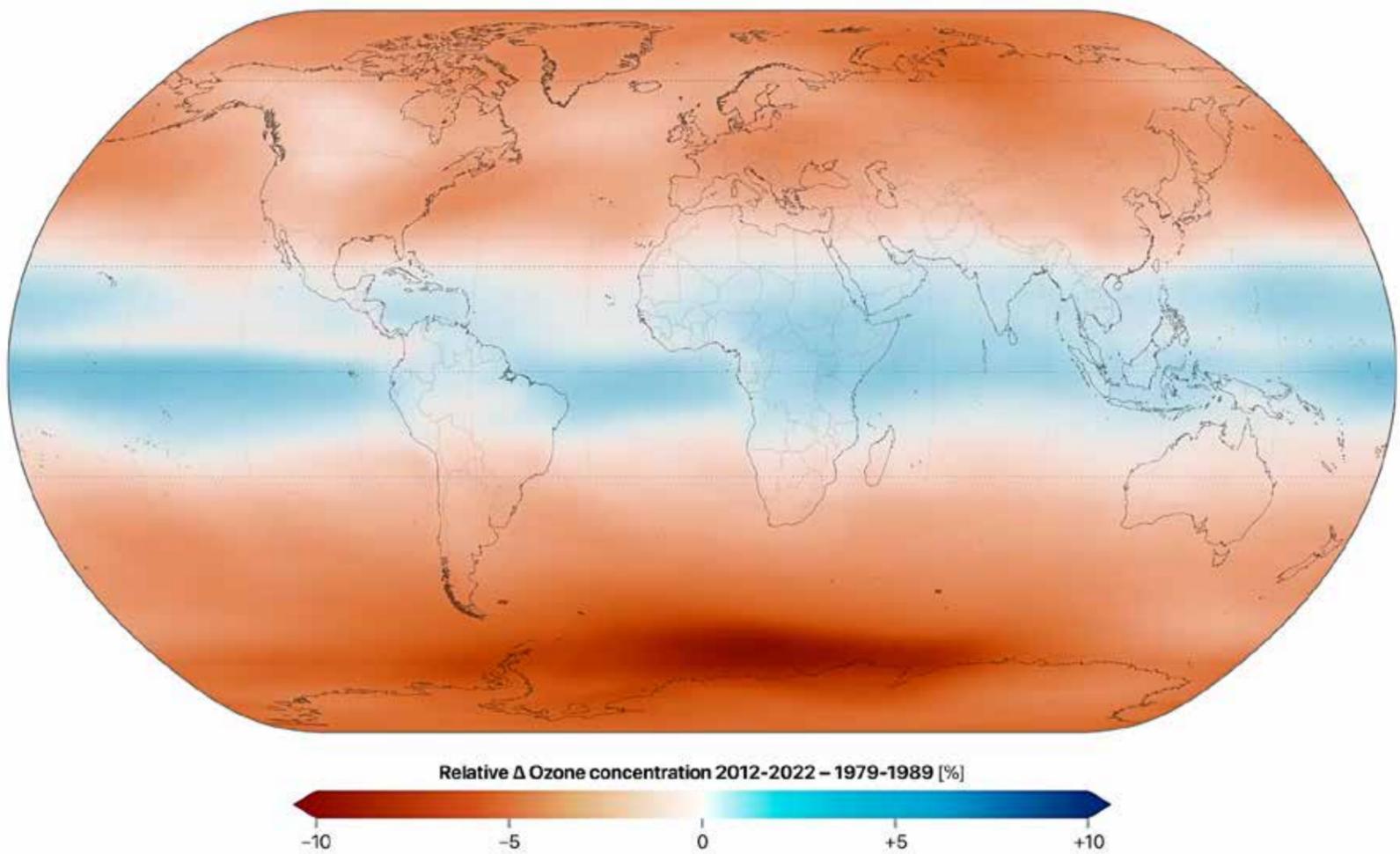
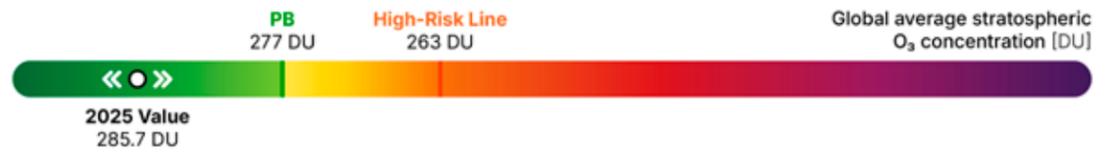


From conception to contamination: The rise of novel entities. Production of many human-made substances such as plastics, antibiotics, pesticides and harmful chemicals are steadily rising, posing significant threats to the Earth system and human health.



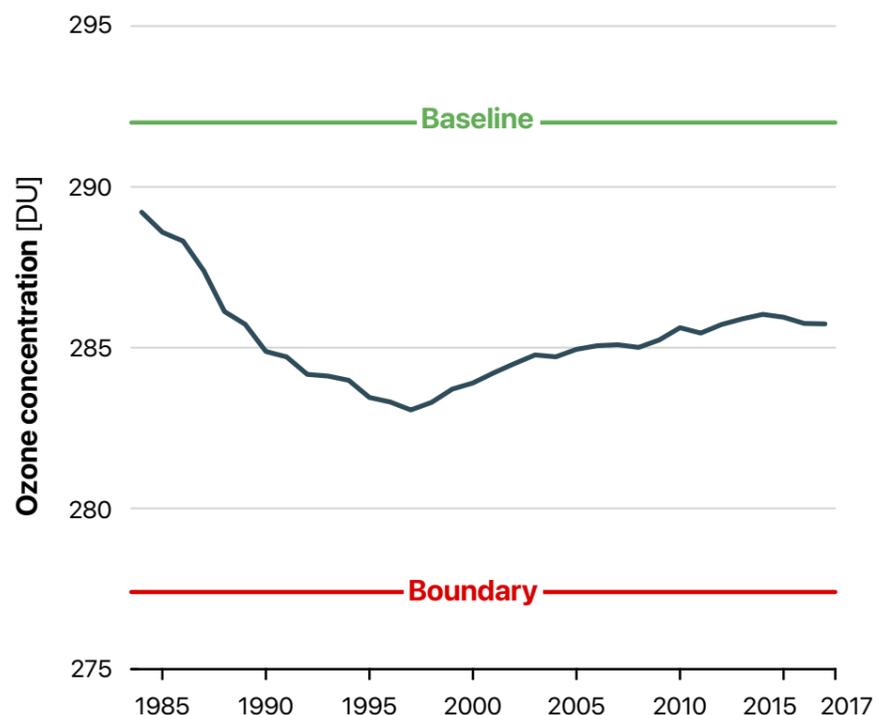
Ozone layer loss

The high altitude stratospheric ozone layer blocks some of the sun's harmful ultraviolet radiation. Some of the artificial chemicals which damage it are banned globally, others are not.



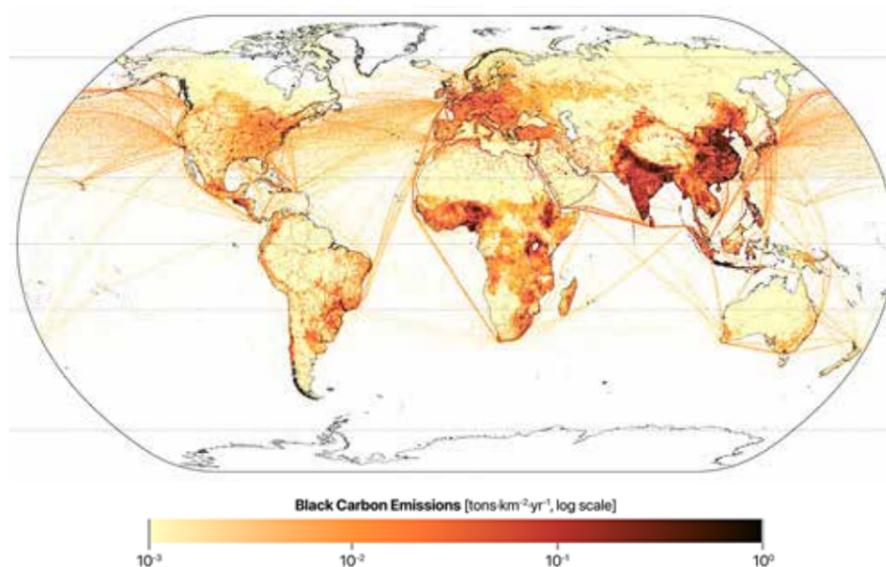
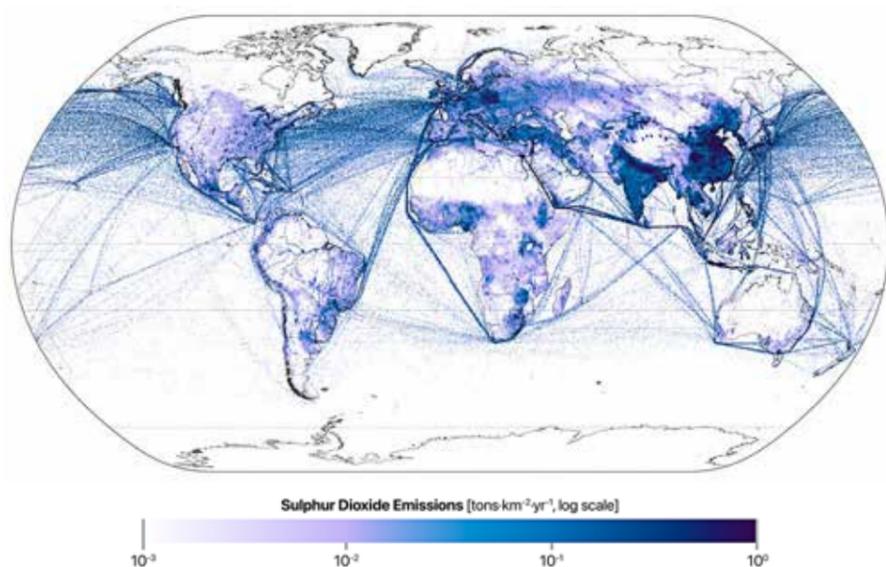
Global map of recent ozone layer changes (2022). Global changes in stratospheric ozone concentration between 1979-1989 and 2012-2022 show mixed trends, with increases in some regions and decreases in others. The persistent Antarctic ozone hole highlights ongoing recovery challenges. Areas where ozone has increased shown in blue, areas where it has decreased shown in red.

Ozone layer revival: A success story (2020). While the global stratospheric ozone layer has recovered since the mid-1990's following a significant decline, this recovery may have plateaued in recent years.



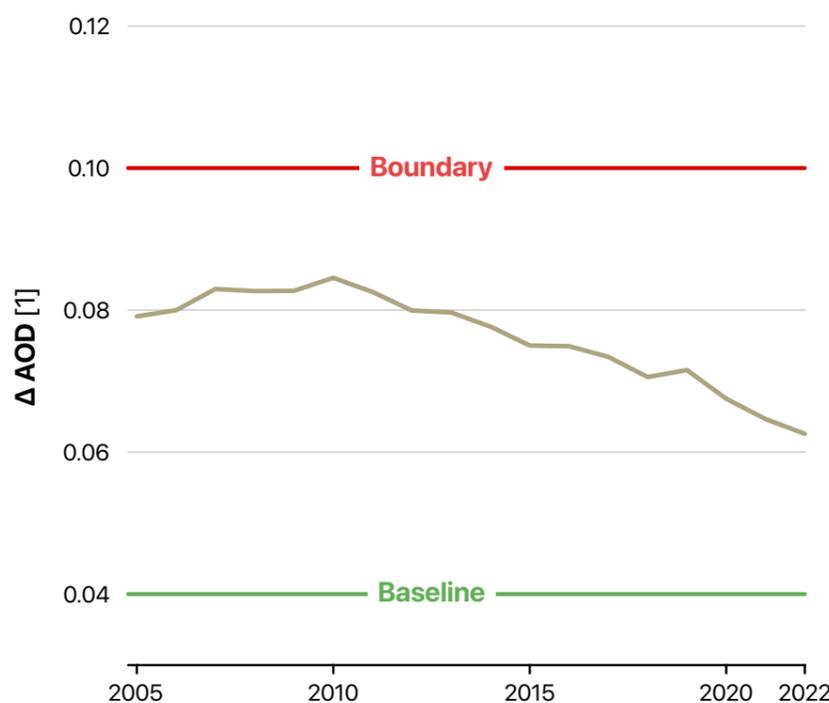
Aerosols

These are fine dust and gases from industry and other activities. They form clouds and affect how Earth reflects or absorbs energy, which can change temperatures, rain and snowfall patterns. This Planetary Boundary measures the difference between aerosols in the northern and southern hemispheres, as a large difference may disrupt the monsoon and other weather patterns, leading to lower rainfall and impacting biosphere integrity.



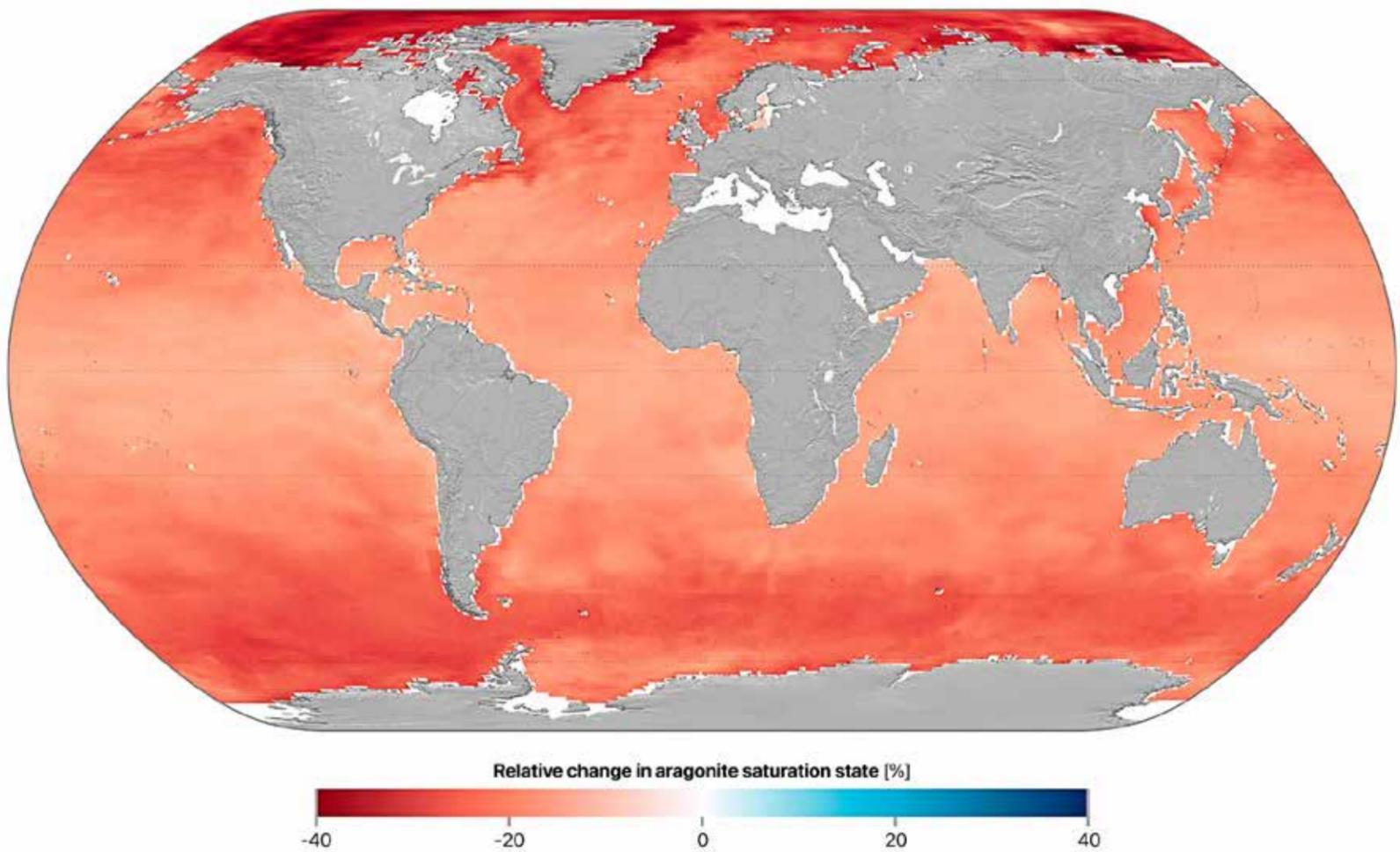
Global aerosol emissions, averaged annually over 2010-2020. Aerosol emissions are centred on population and industrial centres, as well as transportation corridors.

Bridging the divide: Declining interhemispheric difference in Aerosol Loading. The difference in aerosol optical depth between the Northern and Southern Hemispheres has been decreasing from 2010 to 2024, indicating that we are moving further into the Safe Operating Space.



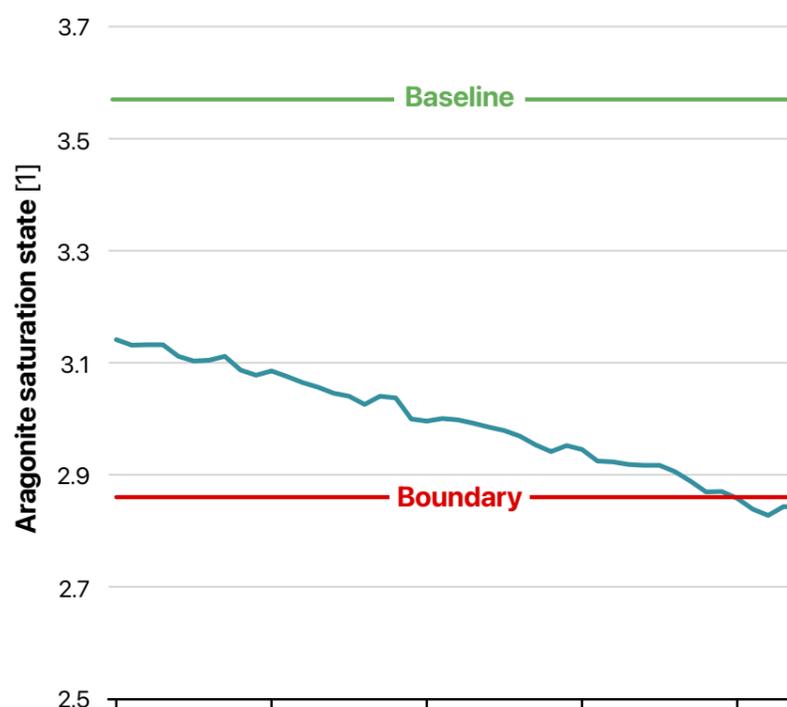
Ocean acidity

Carbon dioxide from fossil fuel burning and other sources dissolves in seawater, making it more acidic. This disrupts marine life, including coral reefs and plankton, the base of the food chain, and makes it harder for the oceans to absorb more CO₂.



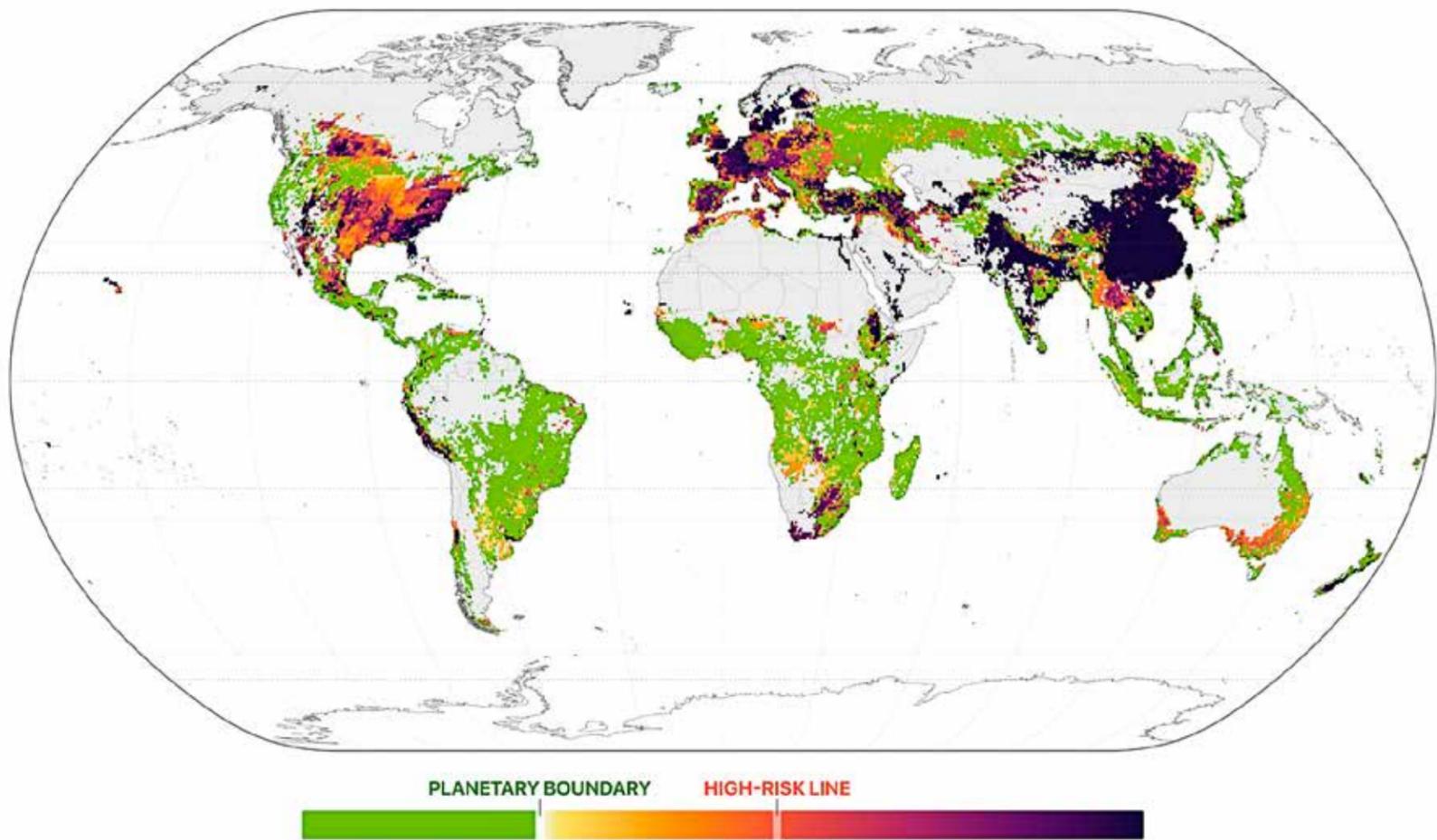
Global map of Ocean Acidification, as indicated by aragonite saturation state. The Ocean has significantly acidified globally, particularly in the Arctic and Southern Ocean regions.

Ocean acidification has transgressed its Planetary Boundary. Ocean acidification has gone beyond safe limits, increasingly endangering marine ecosystems.



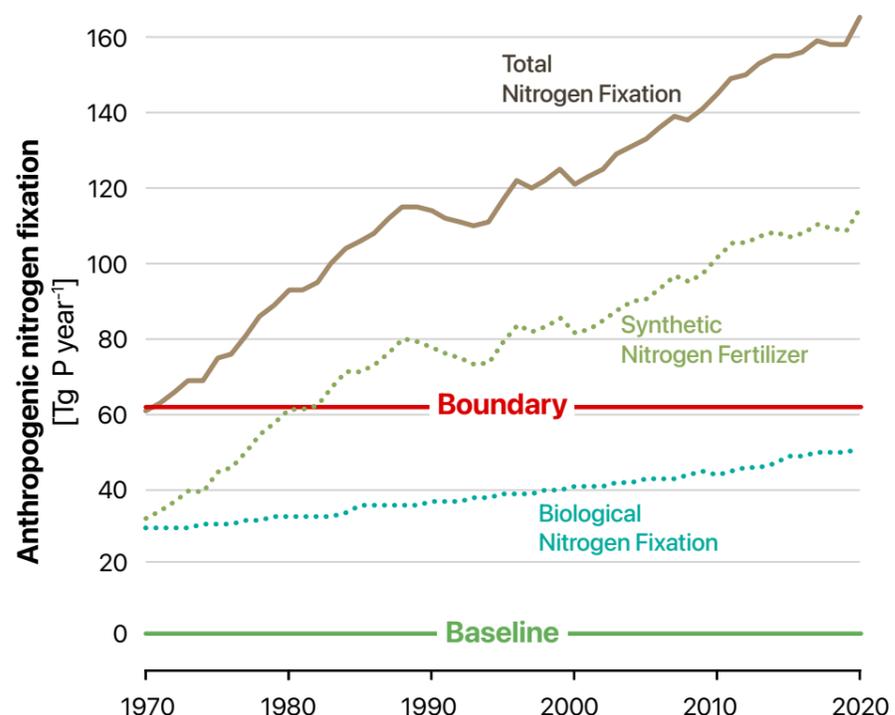
Biogeochemical flows

The overuse of fertilisers reduces water and soil quality and flushes nitrates and phosphates into rivers and oceans, creating 'dead zones'.



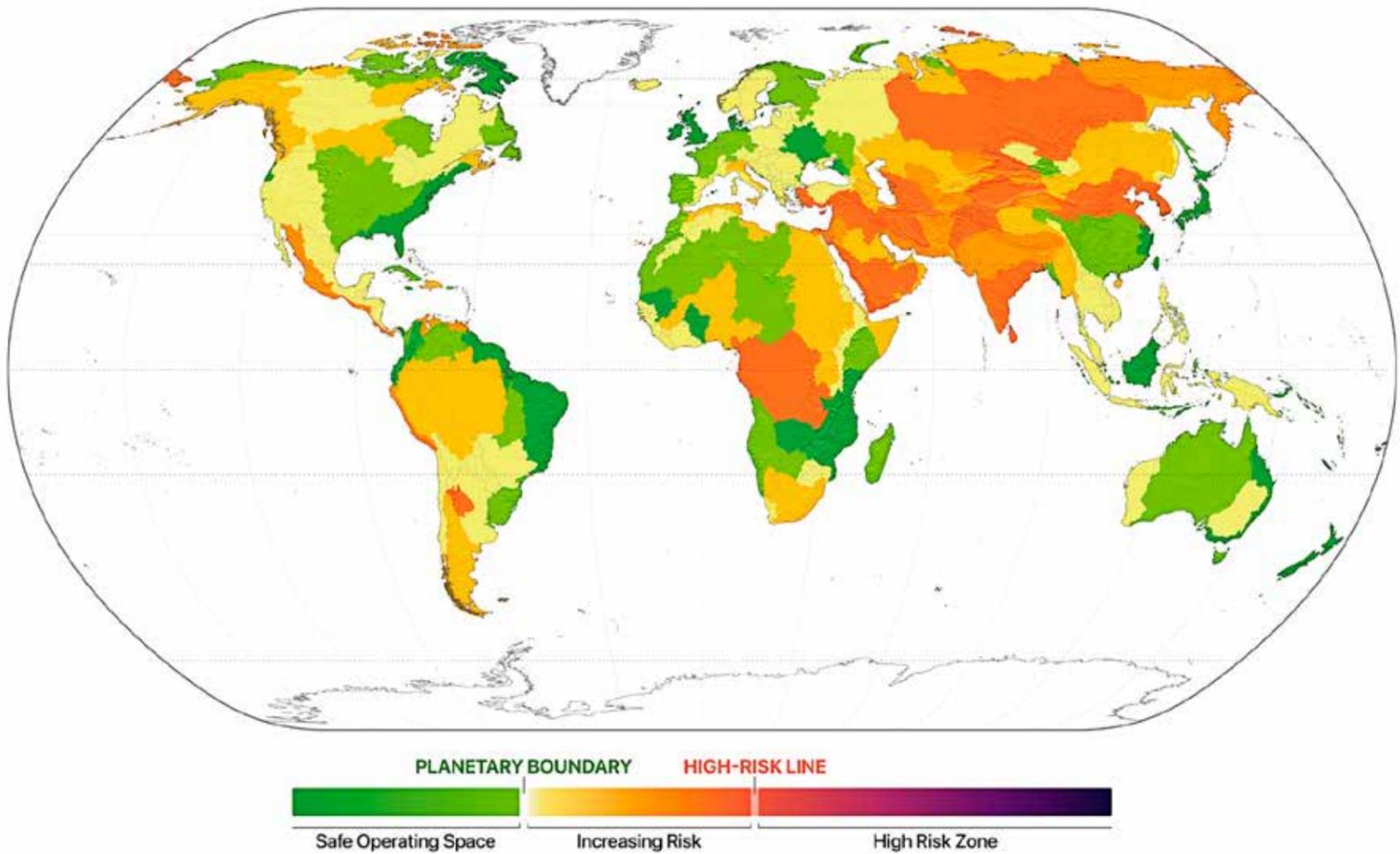
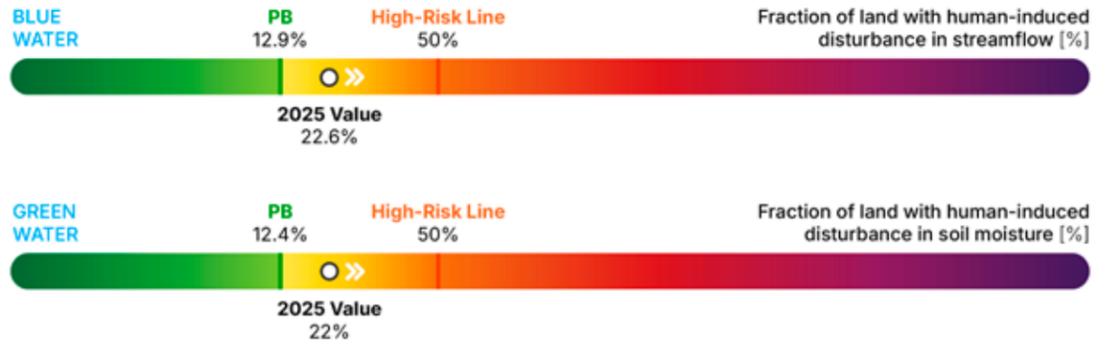
Global risk map for the transgression of the Modification of Biogeochemical Flows boundary – Nitrogen cycle. Nitrogen use in agriculture has exceeded safe ecological limits in several regions of the world, particularly in parts of Asia and Europe, indicating significant environmental risks.

Nitrogen inputs to agriculture. The steady increase in nitrogen inputs over time is a result of both cropland expansion and higher nitrogen use rates, reflecting the growing demand for agricultural productivity.



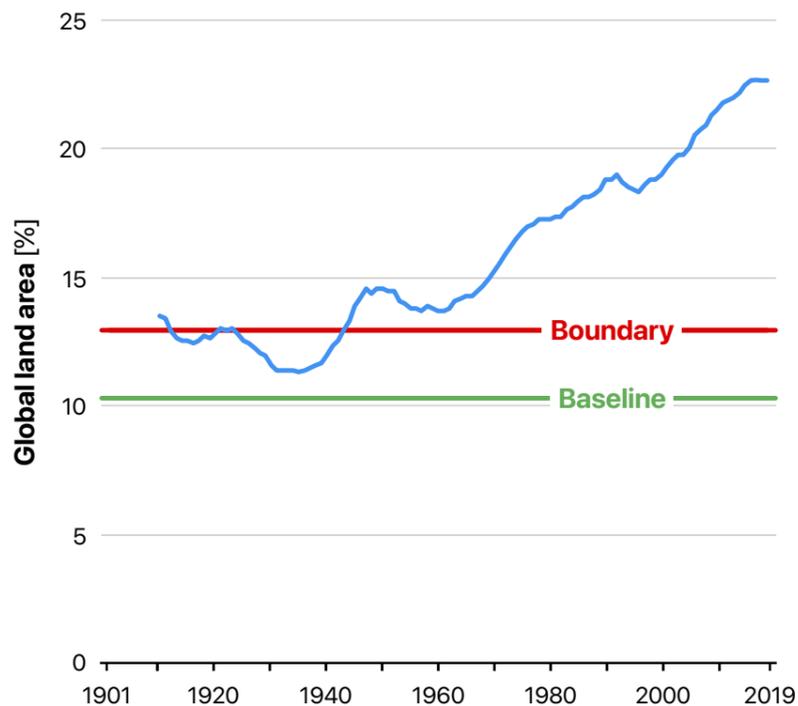
Freshwater

The amount of water available in rivers, lakes and soils to support life has been reduced by human activities.



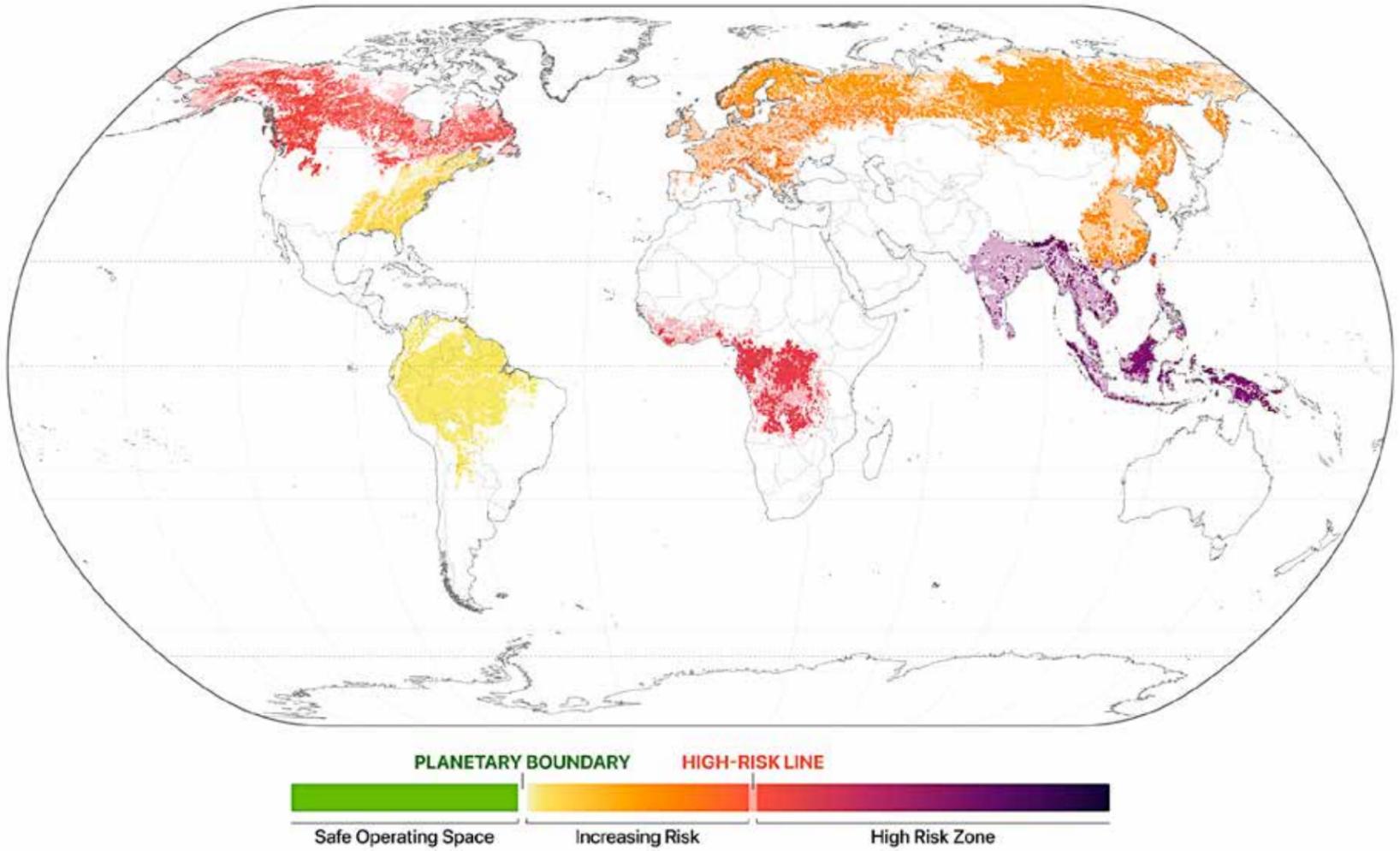
Global risk map of Earth's freshwater systems - Blue water. The increase in both wet and dry streamflow deviations across large parts of the world suggests increasing variability and instability in global freshwater systems.

Disturbance of Earth's freshwater systems - Blue water. Local streamflow deviations have significantly increased since the early 20th century, surpassing the Planetary Boundary around 1940 and continuing since then.

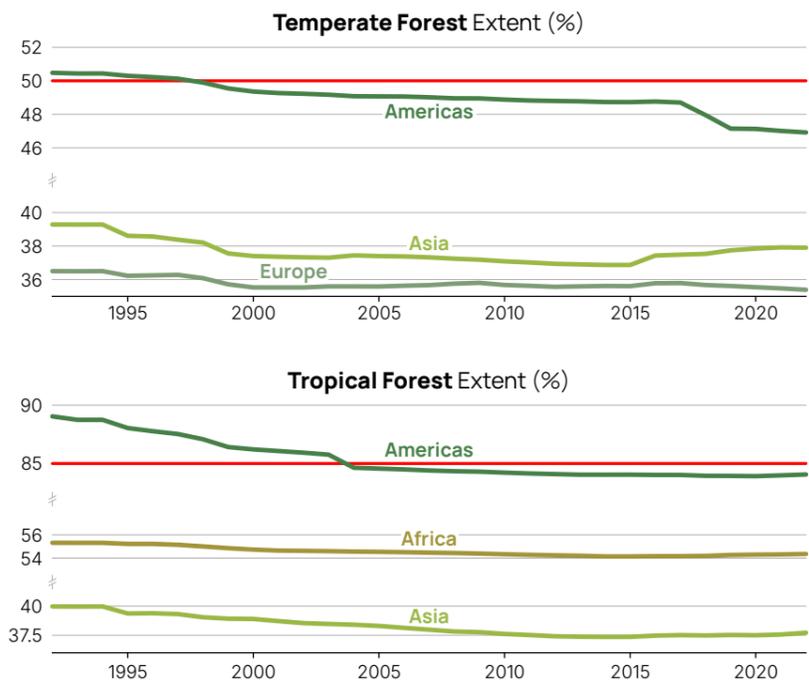
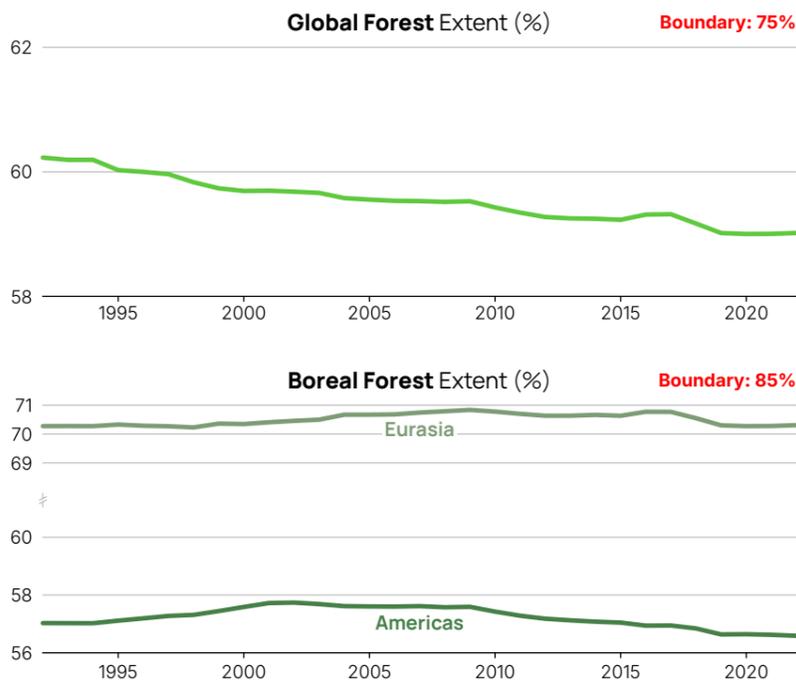


Land system

Forests and other natural ecosystems are removed to create farmland, cities, roads and industry, impacting nature and the climate.



Global risk map of the Land System Change boundary transgression - Forest area. The large continuous forest biomes of the Earth have all transgressed the Planetary Boundary, although with varying degrees of transgression.



Global recent forest decline. As a result of land use and, increasingly, by climate change, global and regional forests have been steadily declining over the last few decades across all major forest biomes. Most regions are already significantly below their biome-scale boundaries, while some areas, such as temperate and tropical Americas, have just recently surpassed them.