Planetary Health Check 2026

Prelims: *Current events of national and international importance | Reports & indices*

Why in News?

The Potsdam Institute for Climate Impact Research (PIK), Germany, released the Planetary Health Check 2026 confirmed that 7 of the 9 planetary boundaries have crossed their safe operating space.

Planetary Boundaries Framework

- **Origin -** First proposed in 2009 by **Johan Rockstrom** (PIK) and Will Steffen.
- The framework defines 9 interconnected Earth-system processes that set environmental limits within which humanity can safely develop and flourish.
- For the last ~11,700 years (the Holocene epoch), Earth systems remained within these safe limits.
- Post-1950s pressures ("The Great Acceleration") pushed multiple systems beyond their thresholds.
- **Quantification Metrics-** Assessed across **13 control variables** divided into 3 distinct risk zones
    - **Safe Operating Space** (Green).
    - **Zone of Increasing Risk** (Yellow).
    - **High-Risk Zone** (Red).

Status of the Nine Planetary Boundaries (2026 Update)

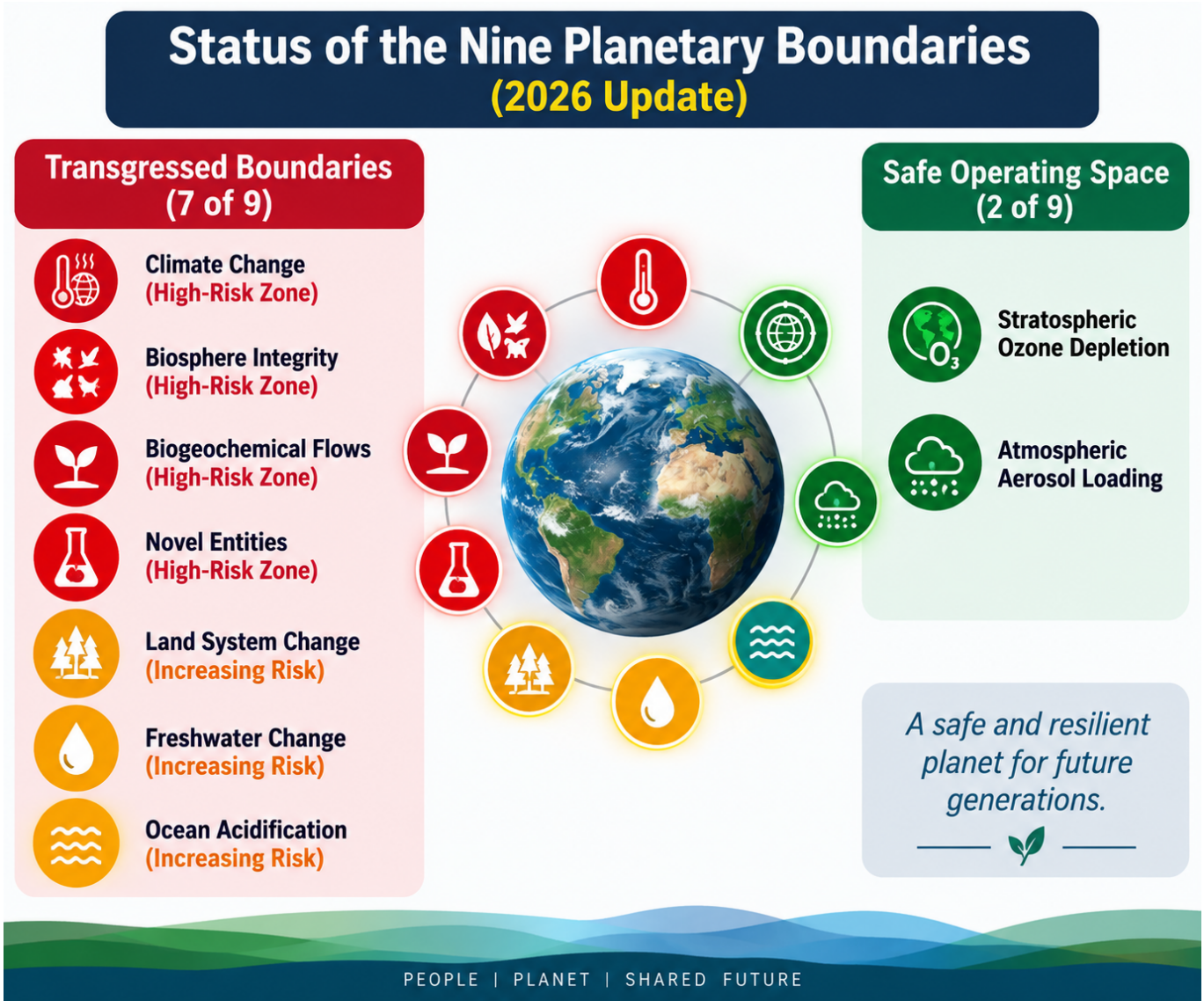
Transgressed Boundaries (7 of 9)

1. **Climate Change (High-Risk Zone) -** Measured by atmospheric CO_2concentration (safe: *350* ppm; current: *>420* ppm) and radiative forcing.
2. **Change in Biosphere Integrity (High-Risk Zone) -** Assessed via genetic diversity (extinction rates) and functional diversity (Human Appropriation of Net Primary Production / HANPP).
3. **Modification of Biogeochemical Flows (High-Risk Zone) -** Excessive disruption of global **Nitrogen (N)** and **Phosphorus (P)** cycles from agricultural runoff and synthetic fertilizers.
4. **Introduction of Novel Entities (High-Risk Zone)-** Mass accumulation of synthetic chemicals, microplastics, pharmaceuticals, and radioactive materials.
5. **Land System Change (Zone of Increasing Risk) -** Global Forest loss, severe land degradation, and agricultural expansion.
6. **Freshwater Change (Zone of Increasing Risk)-** Split into two variables
    a. **Blue Water** (surface/groundwater run-off) and
    b. **Green Water** (moisture available to plants and soils).
7. **Ocean Acidification (Zone of Increasing Risk — *Latest Transgression*) -** Officially crossed into the transgressed zone due to rising surface ocean pCO_2levels and falling

aragonite saturation states, directly threatening marine calcifying organisms and coral reefs.

Safe Operating Space (2 of 9)

8. **Stratospheric Ozone Depletion -** Remains within safe limits thanks to the global phase-out of ozone-depleting substances under the **Montreal Protocol** (1987), though recovery rates have recently slowed.
9. **Atmospheric Aerosol Loading-** Remains within safe limits globally, though severe **regional transgressions** persist (notably across South Asia due to anthropogenic particulate matter PM*2.5*and PM*10*).



Reference

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