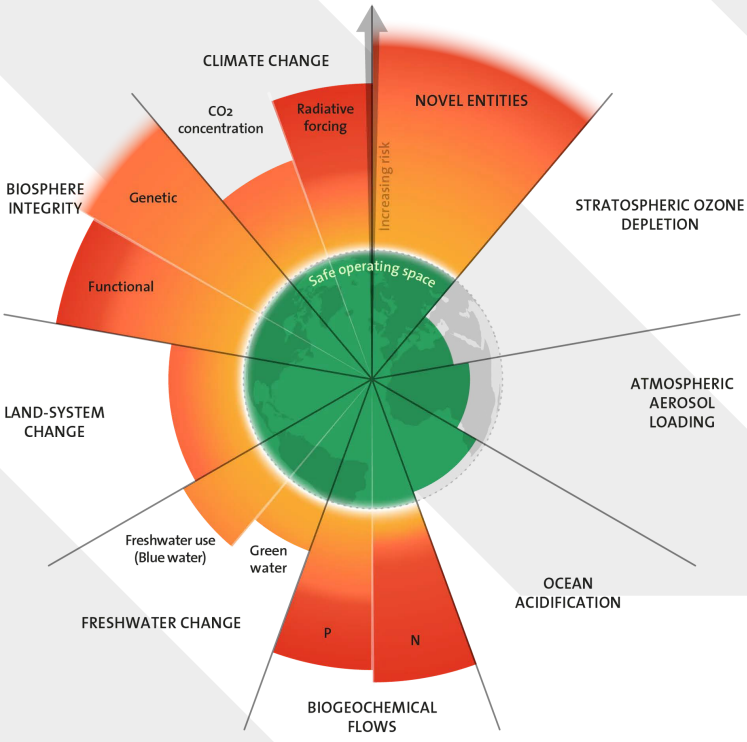
BITS ON SUSTAINABILITY

The 9 planetary boundaries

The 9 limits of the planet: what they represent

The “planetary boundaries” drawn by the Stockholm Resilience Centre in 2009 define the environmental limits within which humanity can safely operate, not harming the Earth’s ecosystem. Exceeding would turn the Earth into an unwelcoming place.

The picture below depicts how the different control variables for the 9 planetary boundaries have changed since 1950 (source: Steffen et al. 2015). Green means safe operating space: keeping within the boundaries means a safe place for us and for the Earth as a whole.



Bits on sustainability are written by Fedrigoni’s Sustainability Team and are part of the Group commitment to spread the culture of sustainability.

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Below boundary
(safe)

In zone of uncertainty
(increasing risk)

Beyond zone of
uncertainty (high risk)

BOUNDARY	STATUS
Climate change The current situation with more than 417 ppm (parts per million) carbon dioxide (CO_2) in the atmosphere has already transgressed the planetary boundary and is approaching several Earth system thresholds. The effects of climate change are irreversible (loss of summer polar sea ice and permafrost, rising sea levels) and intensified by the ongoing destruction of the world's rainforests (which in turn accelerate global warming and intensify climate disruption). Yet and urgent question is how long we can keep beyond this boundary before irreversible climate change takes hold.	
Chemical pollution and novel entities Emissions of synthetic organic pollutants, heavy metal compounds and radioactive materials can have potentially irreversible effects on living organisms and on the physical/ natural environment by affecting atmospheric processes and climate, and impairing reproduction and development in mammals.	
Stratospheric ozone depletion The stratospheric ozone layer in the atmosphere filters out ultraviolet (UV) radiation from the sun. The more the layer decreases, the more UV radiation will reach ground level, with higher incidence of skin cancer in humans and damage to terrestrial and marine biological systems. Montreal Protocol is helping us to stay within this boundary.	
Atmospheric aerosol loading Atmospheric aerosol interacting with water vapour, play a critically important role in the hydrological cycle affecting patterns of atmospheric circulation, such as the monsoon systems in tropical regions. Human's activities change the aerosol loading by emitting atmospheric pollution; the land-use change also increases the release of dust and smoke into the air.	
Ocean acidification About a quarter of the carbon dioxide emitted into the atmosphere is ultimately dissolved in the oceans, forming carbonic acid, and, in turn, decreasing the pH of the surface water. Compared to pre-industrial times, surface ocean acidity has already increased by 30 percent, making it hard for corals, some shellfish and plankton, and fishery stocks to survive.	

Below boundary (safe)

In zone of uncertainty (increasing risk)

Beyond zone of uncertainty (high risk)

BOUNDARY	STATUS
Nitrogen and phosphorus flows to the biosphere and oceans Nitrogen and phosphorus are such of essentials for plants and water life growth, yet their cycles have been utterly changed by industrial and agricultural processes. Human activities creates new nitrogen and phosphorus, emitted to the atmosphere rather than taken up by crops. When it is rained out, these reaches waterways and coastal zones or accumulates in the terrestrial biosphere.	
Freshwater consumption and the global hydrological cycle The freshwater cycle is affected by climate changes and human modification; such shifts in the hydrological system can be abrupt and irreversible. Furthermore, water is becoming increasingly scarce: by 2050 about half a billion people are likely to be subject to water-stress, increasing increasing social and political pressure.	
Land system change Forests, grasslands, wetlands and other vegetation types have primarily been converted to agricultural land. This land-use change has been severely reducing biodiversity, with strong impacts on water flows and on the biogeochemical cycling of carbon, nitrogen and phosphorus.	
Loss of biosphere integrity (biodiversity loss and extinctions) Changes to ecosystems due to human activities were more rapid in the past 50 years than at any time in human history. The main drivers of change are the sharp demand for food, water, and natural resources, resulting in a severe biodiversity loss and leading to irreversible changes in ecosystem services.	

Sources:

Group Code of Ethics

Group Sustainability Policy

Group Sustainability Report

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Fedrigoni new commitment "People and Nature Commitment: making business work for people and nature" is aimed at raising awareness of planetary boundaries not to exceed them.