



## Planetary Boundaries

*"Planetary Boundaries define a safe operating space for humanity. This picture and [this link](#) shows that 6 of the 9 Planetary Boundaries have now been crossed."*

The 9 x Planetary Boundaries were defined by a consortium of 18 experts led by Professor Johan Rockström of the [Stockholm Resilience Centre](#).

Launched at Davos in 2015, the Boundaries are:

1. Climate change
2. Change in biosphere integrity (biodiversity loss and species extinction)
3. Stratospheric ozone depletion
4. Ocean acidification
5. Biogeochemical flows (phosphorus and nitrogen cycles)
6. Land-system change (for example deforestation)
7. Freshwater use
8. Atmospheric aerosol loading (microscopic particles in the atmosphere that affect climate and living organisms)
9. Introduction of novel entities (e.g. organic pollutants, radioactive materials, nanomaterials, and micro-plastics).

In 2015, Rockström announced that 4 of the 9 boundaries had been crossed: 1. Climate change; 2. Change in biosphere integrity; 6. Land-system change; 5. Biogeochemical cycles (phosphorus and nitrogen). In a paper to be published later this year, he will announce that 7 of the 9 boundaries have been crossed.

In 2015, Rockström wrote: "It may seem that this paper puts forward a gloomy message. However, the authors also emphasise the other side: this knowledge provides us with a great opportunity to turn things around. In the last four years we have worked closely with policymakers, industry and organisations to explore how the planetary boundaries approach can be used as a framework for sectors of societies to reduce risk while developing sustainably. With the right ambition, this could create the conditions for long-term human prosperity within planetary boundaries."