PEOPLE AND NATURE

Sustainability is a doughnut, but a complex one!

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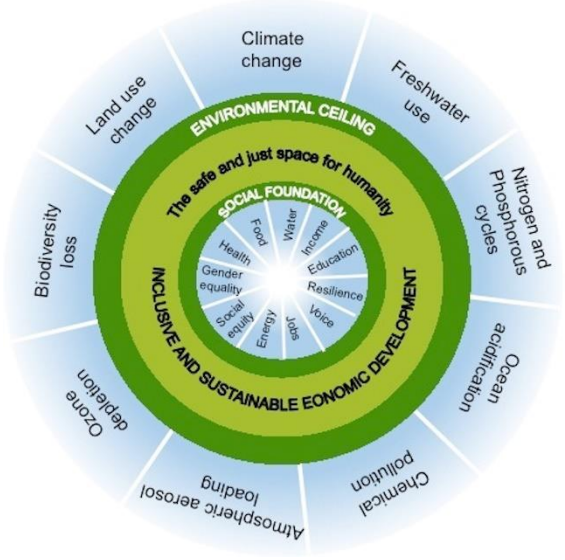
When we refer to sustainability, it is quite common to represent it as a doughnut with two types of components: planetary boundaries (outer part of the doughnut) and social foundations (inner part of the doughnut). Planetary boundaries represent aspects of our natural world that cannot be pushed beyond certain thresholds because then the planet may not be able to sustain life in its current form. Some examples of planetary boundaries are biodiversity and climate change. If either changes too much, it could lead to irreversible global transformations. Social foundations are the human needs we ought to satisfy to guarantee good living conditions for everyone. Some examples are health and income. In this paper, we develop a model that allows us to identify and investigate relationships between and within planetary boundaries and social foundations, which is critical to develop sustainability policies. Using data from countries across a broad development spectrum, we studied seven planetary boundaries (biodiversity loss, climate change, ocean acidification, land use, nitrogen and phosphorus cycles, atmospheric aerosol loading, and freshwater use) and eleven social foundations (energy, income, health, education, food, water, gender equality, resilience, jobs, voice, and social equity). We find more than 35 relationships between and within these boundaries and foundations (some positive, some negative, some strong, some weak) highlighting the interconnected and multivariate nature of the natural and social aspects of sustainability. For example, we observe that we are threatening species (planetary boundary of biodiversity loss) both because of how much land and water we use (planetary boundaries of land use and freshwater use). As another example, we find that carbon dioxide emissions (planetary boundary of climate change) is high in countries with large agricultural lands (planetary boundary of land use) and high income (social foundation of income); however, these carbon dioxide emissions can be mitigated by the social foundation of energy (e.g., if renewable energy is used). We provide a new way of looking and measuring these relationships between the planetary boundaries and social foundations of sustainability to identify synergies and trade-offs. Our results suggest that the way we make policies — typically through segregated institutions that deal with planetary boundaries and social foundations disjointedly— might not comprehensively tackle sustainability. We propose there should be a major shift on the way we develop sustainability policies: institutions need to work together in an interdisciplinary fashion to achieve better social and ecological outcomes.



"Doughnut" for the Anthropocene sustainability framework. Redrawn from Raworth 2012.

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