Allocating planetary boundaries to large economies: implications of different perspectives on distributive fairness and comparisons with current environmental footprints

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The planetary boundaries (PB) framework proposes global quantitative precautionary limits for human perturbation of nine critical Earth system processes, together defining a global safe operating space for human development. As decisions regarding environmental management and resource use are not made at the global scale, translating the global PBs to lower geographical scales is needed to increase their policy relevance. For climate change, many proposals for fair and equitable sharing of global emission reduction obligations (allocation approaches) have been presented and discussed in the literature. For other PBs, however, the discussion on allocation of global pressures or budgets is less developed. In this paper, we discuss national resource budgets for the PBs on climate change, land-system change, changes in biogeochemical flows (nitrogen and phosphorus) and biosphere integrity, for four large economies (EU , USA, China and India), using different allocation approaches. Furthermore, the allocated PBs are compared to current national environmental pressures and impacts from a consumption (footprint) perspective, using a multi-regional input-output (MRIO) model. Overall, except for the land-system change boundary, and the biodiversity loss boundary for India, current environmental pressures are above the allocated planetary boundaries in the four economies. While related reductions in environmental pressures or resource use are above the global average for the EU and the US, for China and India they are below the global average. The proposed methodology and results can help defining national policy targets in line with the global SDG ambition, building on the experiences and insights from climate change negotiations and the literature.