

## Appendix A

Table A.1. Workshop reports of the EC Transformations Working Group. In these workshops the Earth Commission’s Earth system justice framework was developed with focus on just (no significant harm) boundaries, minimum access and just transformations.

Title	Topic	Outcome
Workshop 1 10/11/2020	What does justice mean for safe corridors?	<p>“First, despite the difficulties in defining what justice is, we can build on the justice framework developed by the Earth System Governance research community - which looks at justice in terms of access and allocation.”</p> <p>“Second, the adoption of the global consensus in Agenda 2030 – among many other substantive arguments – clearly shows that justice is relevant for defining bio-physical and ecological corridors.”</p> <p>“Third, to address the question of how justice can be translated into goals, targets, indicators and metrics, we can use Agenda 2030 to determine key social goals.”</p>
Workshop 2 04/03/2021	Just variables, targets, and criteria	<p>“- we should be explicit about our ontological position, its limitations, and what falls outside the scope of our work; we could choose to see nature and humans as co-constitutive of each other; even though any statements on justice are normative, value-laden, and are in the eye of the beholder, we may legitimately provide some degree of guidance on what planetary justice might entail by building on existing scholarship and supporting our claims with evidence;</p> <p>- we should pay attention to how the issue of heterogeneity can be meaningfully acknowledged in our global discussion;</p> <p>- we can move beyond a doughnut towards a starfish conceptualization of planetary justice by (1) operationalizing planetary justice in terms of access (justice as a goal) and risk/harm (justice as a constraint); and, accordingly (2) assessing the safety implications of just targets and the justice implications of safe targets (see Tables 5 and 4 of Background Report); and</p> <p>- we should pay as much attention to issues of overconsumption, excess, and inequality as to those of insufficiency. This last point was extensively discussed, and opinions differed on whether this issue should fall under our work on targets (e.g. add a fifth access level that serves as a cap on consumption – sufficiency) or our work on levers of transformation (e.g. redistribution is a means that we can use if existing inequalities threaten people’s survival and/or our ability to live within planetary boundaries.)”</p>

Title	Topic	Outcome
Workshop 3 31/04/2021	Advancing just targets	<p>“In relation to the conceptualization, there was broad based agreement but with the warning that we must ensure that inequality and inequity is properly incorporated into the work. Yet some members expressed hesitation regarding this approach, suggesting instead to (a) improve the conceptualization of harm and access by noting that the opposite of harm is benefit and the opposite of access is exclusion; (b) identify, at different scales, 5-6 main activities that affect both the planetary boundaries and human needs; and note alternative ways to carry out these activities (e.g. organic vs. fossil fuel-intensive agriculture); and (c) create conventional and transformative scenarios of justice”</p>
Workshop 4 24/05/2021	Actors and levers of transformation	<p>“Workshop discussions highlighted the following key challenges to the ability of actors and levers to enable safe and just transformations: (a) histories of (neo)colonialism and hegemonic narratives; (b) dying democracies; (c) skepticism of science and the politics of knowledge production; (d) maladaptation; (e) the prevalence of market mechanisms; (f) the limits of command-and-control levers; (g) lack of accountability, the limits of voluntary action and the danger of greenwashing; (h) the limits of consumer action; (i) inconsistency in the behaviour of actors within the same actor group; etc.</p> <p>Proposed solutions to these challenges included: (a) adopting a multi-level planetary justice perspective, with emphasis on labour rights and fair shares; (b) developing new narratives (e.g. post growth) and new norms (e.g. decolonizing education); (c) taking into account ecologies of actors and policy mixes; (d) ensuring that levers and actors are sticky but not stuck; (e) linking action at the local-global scales; (f) exnovation; (g) promoting both incremental and radical change; (h) promoting accountability for net zero commitments; (i) global constitutionalism; etc.”</p>
Workshop 5 14/09/2021	Quantifying Just Targets	<p>“In one of our first meetings, we discussed justice and defined it as substantive and procedural justice. Substantive justice is also corrective (no harm), minimal (access), and distributive justice. The harm part is very important for corrective justice. That’s where the issue of compensation rises. It’s where the issue of injunctive relief takes place – you do not cause more harm to others. It’s a very important part of justice. If you leave out the harm story line it is a mistake from a corrective justice perspective. The access storyline is in line with the minimal justice approach. When we get to the governance story we need to move towards both procedural justice and distributive justice.</p> <p>We accept that working on just access and just harm is difficult and subject to many caveats. We need to keep it simple and not too complicated. We need to have a clear narrative supported by a solid literature review in terms of access and harm for all our nine domains. The problem with the literature review is that authors use different assumptions and methods. This is why we are trying to see if we use a coherent method, can we come up with coherent numbers?”</p>

Title	Topic	Outcome
Workshop 6 07/10/2021	Key messages on transformations	<p>“proposed components of a just transformation:</p> <p>For our 9 biophysical domains</p> <ul style="list-style-type: none"> <li>● Changing the development narrative</li> <li>● Changing allocation mechanisms: highlight the problems if only markets allocate etc. <ul style="list-style-type: none"> <li>○ Resources (minimal, maximal, and distributive justice)</li> <li>○ Rights (recognition justice)</li> <li>○ Risks/harm (corrective justice)</li> </ul> </li> <li>● Changing investment patterns</li> <li>● Changing production and consumption patterns</li> <li>● Using justice criteria for determining which technologies, algorithms and infrastructures make sense</li> <li>● Procedural justice</li> <li>● Role of social movements, labor movements, courts as agents of change”</li> </ul>

Table A.2. Background reports of EC Transformations Working Group on harm conceptualization.

Title	Topic	Outcome
<p>Background report 1 Date Unknown</p>	<p>Literature review on SH.</p>	<p>Documents analysed included:</p> <ul style="list-style-type: none"> <li>-Claringbould, D., Koch, M., &amp; Owen, P. (2019). Sustainable finance: the European Union’s approach to increasing sustainable investments and growth – opportunities and challenges. <i>Vierteljahrshefte Zur Wirtschaftsforschung</i>, 88(2), 11–27. <a href="https://doi.org/10.3790/vjh.88.2.11">https://doi.org/10.3790/vjh.88.2.11</a></li> <li>-EU Taxonomy - Article 17 of Regulation (EU) 2020/852. (L 198/35 – Official Journal of the European Union) European Commission. (2021a). ‘Do no significant harm’ Technical Guidance by the Commission.</li> <li>-European Commission. (2021b). Technical guidance on the application of “do no significant harm” under Recovery and Resilience Facility Regulation.</li> <li>-European Parliament and the Council. (2020). Regulation (EU) 2020/852 of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088. <i>Official Journal of the European Union</i>, 2019(March 2019), 13–43.</li> <li>-Mayer, B. (2016). The relevance of the no-harm principle to climate change law and politics. <i>Asia Pacific Journal of Environmental Law</i>, 19(1), 79-104.</li> <li>-Rieu-Clarke, A., Moynihan, R., &amp; Magsig, B. O. (2012). UN Watercourses Convention: user's guide. IHP-HELP Centre for Water Law, Policy and Science (under the auspices of UNESCO).</li> <li>-United Nations General Assembly Convention on the Law of the Non-navigational Uses of International Watercourses, May 21, 1997</li> </ul>
<p>Background report 2 09/02/2022</p>	<p>Elaborating on the 5Is of Justice</p>	<p>NSH criteria for the Is are defined.</p> <p>Intergenerational:</p> <ol style="list-style-type: none"> <li>1. Equity between present and future generations</li> <li>2. Sustainable use of natural resources</li> </ol> <p>Intragenerational:</p> <ol style="list-style-type: none"> <li>1. Equity among present generations</li> <li>2. Equitable access to natural resources</li> <li>3. Responsibility and accountability in terms of mitigation</li> </ol> <p>Interspecies:</p> <ol style="list-style-type: none"> <li>1. Equity between human and non-human species</li> <li>2. Transitioning from an exploitative relationship to one of symbiotic coexistence</li> <li>3. Intrinsic value of nature and its ecosystem services are given judicial recognition</li> </ol>

<b>Title</b>	<b>Topic</b>	<b>Outcome</b>
Background report 3 15/02/2022	Overview of harm from environmental degradation and non-function of Earth system domains	Types of harm are identified by Earth System domain.
Background report 4 17/02/2022	Correlating harm by domain to the 5Is framework	Harm identified for all domains according to the 5Is criteria. Interspecies was left blank.
Background report 5 01/04/2022	Defining significant harm and just NSH boundaries	Definition of significant harm according to the Is criteria, based on literature review. In this report, it was suggested to eliminate Interspecies from the framework, acknowledging the necessity to present it as an “anthropocentric assessment of harm”.
Background report 6 07/04/2022	Aligning the harm sections of Lancet with the 6Is of justice	Evaluation of the safe boundaries based on the 6Is criteria. Interspecies was left blank.
Background report 7 07/04/2022	Proposed rewrite of harm sections for the Lancet report in order to align them with the 6Is framework	Evaluation of the safe boundaries based on the 6Is criteria. Earth System Stability is added to the Interspecies Justice criteria, and the text states that it is met by the safe boundaries.
Background report 8 13/04/2022	Supplementary Material on Significant Harm	<p>Overview document on the work conducted regarding SH, including definitions, literature review, and relevance of the concept in the papers submitted to Nature and The Lancet.</p> <p>Regarding interspecies justice, they state: “It is worth noting that, in this iteration, interspecies justice has been defined as relating to the preservation of Earth system stability; interspecies justice concerns are, therefore, by definition taken into account by the safe boundaries.”</p>

See also discussion on applying the concept of NSH to the ESBs (Rockström et al., 2023, SI: 42-49).

## References

Rockström, J., Gupta, J., Qin, D., Lade, S.J., Abrams, J.F., Andersen, L.S., Armstrong McKay, D.I., Bai, X., Bala, G., Bunn, S.E., Ciobanu, D., DeClerck, F., Ebi, K., Gifford, L., Gordon, C., Hasan, S., Kanie, N., Lenton, T.M., Loriani, S., Liverman, D.M., Mohamed, A., Nakicenovic, N., Obura, D., Ospina, D., Prodani, K., Rammelt, C., Sakschewski, B., Scholtens, J., Stewart-Koster, B., Tharammal, T., van Vuuren, D., Verburg, P.H., Winkelmann, R., Zimm, C., Bennett, E.M., Bringezu, S., Broadgate, W., Green, P.A., Huang, L., Jacobson, L., Ndehedehe, C., Pedde, S., Rocha, J., Scheffer, M., Schulte-Uebbing, L., de Vries, W., Xiao, C., Xu, C., Xu, X., Zafra-Calvo, N., Zhang, X., 2023. Safe and just Earth system boundaries. *Nature* 619, 102–111.  
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