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ESD Ideas: Positive Tipping points towards global regenerative systems

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Abstract:

Coping with the threats posed by multiple negative Earth tipping points calls for large coordinated actions conducive to creating long-lasting positive synergies between human and biophysical systems. Boundary concepts, engaging narratives and aspirational visions play a crucial role in coordinating the kinds of deliberate transformations needed to address global existential challenges. The regenerative sustainability paradigm offers an enabling cognitive and discursive capacity to integrate the insights from social and natural sciences so net-positive tipping points towards a safe and just space for humanity can better be operationalised, coordinated and enacted within and across multiple kinds of social-ecological systems.

1. Introduction

Our world is a world of systems of systems. Energy systems, agri-food systems, financial systems, urban mobility systems, information systems, educational systems, religious systems and many others; they all operate with their bounded rationalities, organisations and normative rules that justify their existence in different ways. Each system also has its effects on other systems, which can be detrimental or beneficial to the goals and development of these other systems. Given such complexity and heterogeneity social scientists conceptualise each system change using different approaches and metrics than natural scientists do. So when transdisciplinary teams meet together to try to find transformative pathways and solutions to cope with large and existential risks, like those posed by Earth tipping points, not only might different individuals look at different systems, but they might also look at a same system in different ways.

Hence, robust knowledge and actions aimed at dealing with the increasing threats of negative Earth tipping points does not only require reflexive spaces conducive to mutual learning among such diversity of perspectives. But also, of higher-order concepts, engaging narratives and visions able to provide actionable sense of the complexity entailed in understanding such threats. In this contribution, I argue that the regenerative sustainability paradigm offers such cognitive and discursive collective capacity to integrate the insights from diverse social and natural sciences in a way that *net-positive tipping points* can better be operationalised, coordinated and enacted within and across multiple kinds of social-ecological systems and actions.

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2. From less harm to net-positive tipping points

A tipping point can be defined as the moment at which an additional force of change makes a given system adopt a fundamentally different configuration and long-term dynamics, either by getting onto a new development trajectory or by evolving around a new system's attractor. In the case of positive tipping points that happen in social-ecological systems (Tàbara 2018, Lenton 2020; Otto et al. 2020) we assume that the new dynamics contribute to improve the quality of life, long-term human sustainability and thus can help avoid existential risks derived from negative global environmental change.

Nevertheless, a major difficulty in conceptualising positive tipping points has to do with agreeing on what positive means. A dominant view in mainstream economics tends to assume and communicate to the large publics that an increase in GNP is positive, while a reduction is negative. Such narrow, *short-termist* and exemptionalist (Dunlap, 1980) understanding of socio-economic development, however, tends to disregard the negative cumulative effects of past social-ecological interactions on the quality and quantity of life-support systems. Greenhouse emissions, biodiversity loss or the accumulation of persistent pollutants (not registered in corporate and national accounts as collective losses) also affect negatively future options and conditions for development. Hence, it is clear that a more nuanced and coupled understanding of wealth and development, that take into account all the interactions and feedbacks -both positive and negative- with the natural world, is needed.

Alternatively, and using a whole-life systems perspective, it can simply be argued that positive is what contributes to the maintenance, improvement and self-regeneration of social-ecological conditions that make human societies flourish and remain in the long term on earth; whilst negative simply constitutes the opposite, what destroys life support systems and degrades such sustainability conditions. A lot of the public discourses on sustainability, however, have focused on products and services that only contribute to generating 'less harm' (<0), or to policy commitments that aim at 'neutral targets' (=0); rather than actually improving social-ecological systems in net positive terms (>0). In this regard, *relative positive tipping points,* or those that focus on partial gains, may be associated to sectorial socio-technical transitions; while net-positive or *absolute positive tipping points* can be associated to those achieved by full-systems transformations, that entail changes in social practices, relationships and worldviews, and that eventually enhance the conditions for the self-regeneration of life-support systems on Earth (Tàbara 2023).

3. Positive synergies between social and biophysical systems

Positive tipping points can occur in many social systems, for instance, when access to education, health services or effective political participation and rights are granted to marginalised populations. But also in biophysical systems, as happens when a previously degraded ecosystem eventually regains its properties and conditions for self-regeneration. Although social and natural scientists tend to focus on one or the other, a regenerative perspective of sustainable development means that positive synergies between both are required (see also Buckton et al., 2023). In a world moving towards possibly 10 billion people by 2050, coping with global risks will depend not only on the health of the ecosystems -the safe planetary boundaries (Rockstrom et al. 2021,) but most importantly, on the possibility to improve the social conditions and institutions that ensure equity, social cohesion, mutual support, and effective and trusted governance of the common good (Gupta et al. 2023).

Finding explicit, operational and visual means able to identify the requirements needed to move present global development trajectory away from a degenerative attractor to a regenerative one is urgently required. This is represented in Figure 1, based on the SEIC conceptual model (Tàbara 2023) in which all social-ecological systems and societies and individuals' interactions are seen to be inevitably conditioned by four kinds of subsystems: structures and rules (S), energy and natural resource use (E), information and knowledge systems (I), and cumulative or depletive environmental change (C). In this way, the model also helps to identify the places to intervene in the overall social-ecological system, as improving social systems on the one side is therefore mostly a function of the S and I subsystems, whilst improving biophysical systems depends on to the extend interactions,

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feedback and cumulative/depletive processes occurring in E and C subsystems can be harnessed and reoriented towards a regenerative trajectory.

Thus, the two lower axes of Figure 1 mean on the one hand, variations in social system conditions (or capitals) and equity, that make social cohesion, good governance and agents' cooperation and collaboration possible as to take collective action; while the other axis represents changes in the quality and quantities of the biophysical stocks necessary for the long-term functioning of life-support systems. Achieving partial gains -or relative tipping points- that only improve equity and social conditions but in a way that eventually leads to the depletion or degradation of biophysical conditions - ecological capitals or stocks- will eventually lead to overall negative system tipping points (Q2). Similarly, gains in environmental protection, Earth systems safety, or the improvement in the quality of ecosystems that are being made at the cost of social equity and participation eventually are also likely to be rejected or undermined and result in a negative tipping point (Q3). Contexts or societies lacking fair and competent governance structures, as is the case of countries with rampant corruption or inequality, are also likely to derive to further ecosystems degradation and thus the whole social-ecological dynamics will descent and propagate into a full-systems negative tipping point (Q4). It is only by creating self-propelling virtuous circles that improve *at the same time* the just and safety conditions in multiple kinds of systems that net-positive absolute tipping points may be achieved at the global level (Q1). In this quadrant Q1, the 'ecospace' (Gupta et al. 2023) or the just and safe space for humanity would expand (represented with the growing green dot), contrary to what would occur in Q4 (represented with the shrinking red dot). Nevertheless, such net-positive global outcome may only be realised by processes of sustainability learning in which a key question to be addressed for science would not be only 'what is the problem?', but namely 'who is part of the solution?' and how these agents can be empowered (Tàbara, Jäger et al. 2018) as to create positive synergistic interactions with the natural world:

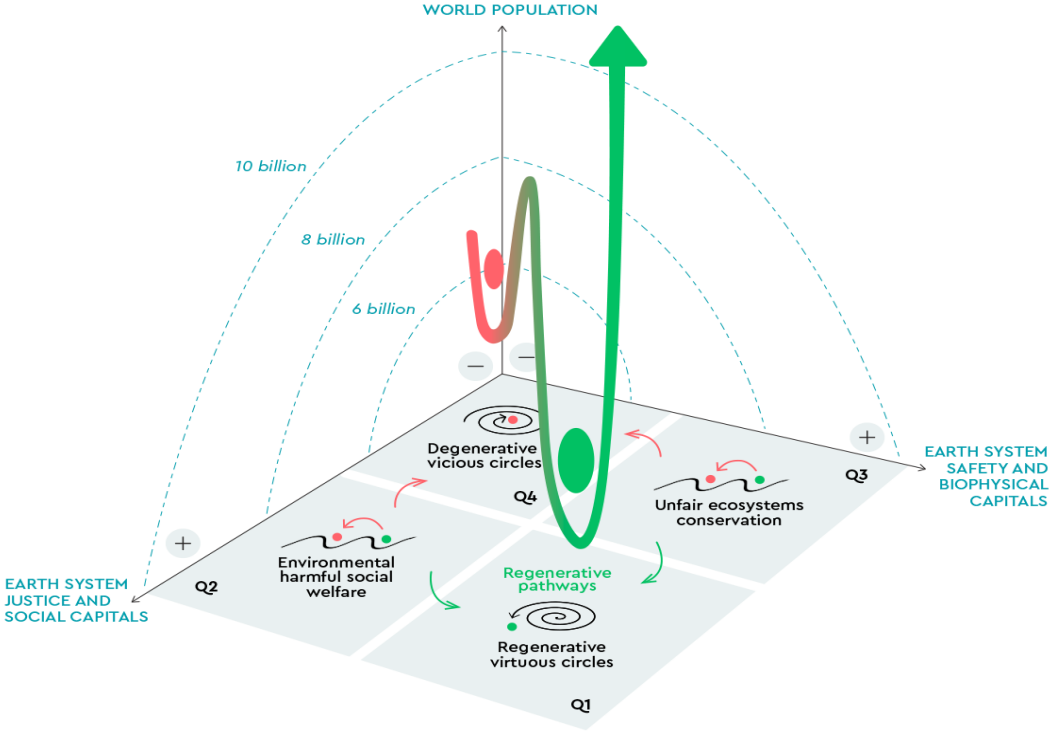

Figure 1: Achieving a global net-positive tipping point towards a regenerative attractor that increases the safe and just operating space for humanity in a world moving towards 10 billion people requires synergising fast improvements in global social conditions (or capitals) and biophysical conditions. (Based on Tàbara, 2023**).**

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4. Conclusion:

Coping with the large systemic risks posed by negative Earth tipping points needs the coordination of multiple kinds of systems in a way that all can contribute to the just improvement and restoration of the conditions that make human life possible on Earth in the long term. Visions and narratives towards regenerative futures can play this role because they are necessarily inclusive and engaging -as after all, the challenge of sustainability is a large-scale global engaging challenge. This is also so because moving towards a global regenerative trajectory or regenerative global systems' attractor (and contrary to Malthusian positions) needs of everybody's capacities and sources of transformative imagination (Galafassi, 2018) to expand and improve a social-ecological space in which everyone in a world of 10 billion people can potentially be better-off. The regenerative sustainability vision and paradigm can contribute to coordinate the many kinds of transformations needed to achieve a global net-positive tipping point at global scale. However, much transdisciplinary and integrated research is yet lacking and still required to understand, operationalise and foster the potential synergies between improvements in global social-ecological conditions and biophysical capitals regeneration so as to guarantee a safe and just space for humanity.

References:

Buckton S.J., Fazey I., Sharpe B., Om S., Doherty B., Denby K., Lait R., Bridle S., Bryant M., Collins L., Kluczkovski A., Nixon N., Yap C., Ball P., Cain M., Carmen E., Connolly A., Fletcher B., Frankowska A., Gardner G., James A., Kendrick I., Mair S., Morris B., Sinclair M. The Regenerative Lens: A conceptual framework for regenerative socialecological systems. One Earth. https://doi.org/10.1016/j.oneear.2023.06.006, 2023.

Dunlap, R. E. Paradigmatic Change in Social Science: From Human Exemptionalism to an Ecological Paradigm. *American Behavioral Scientist* 24:5-14. https://doi.org/10.1177/000276428002400102, 1980.

Galafassi, D. The Transformative Imagination: Re-Imagining the World Towards Sustainability. Doctoral dissertation, Stockholm Resilience Centre, Stockholm University. DiVA, id: diva2:1178816, 2018.

Gupta, J., Liverman D., Prodani K., Aldunce P., Bai X., Broadgate W., Ciobanu D., Gifford L., Gordon C., Hurlbert M. , Inoue C.Y.A., Jacobson L., Kanie N., Lade S., Lenton T., Obura D., Okereke C., Otto I.M., Pereira L., Rockström J., Scholtens J., Rocha J., Stewart-Koster B., Tàbara J. D., Rammelt C., Verburg P.. Earth System Justice needed to identify and live within Earth System Boundaries. Nature - Sustainability. https://doi.org/10.1038/s41893-023-01064-1, 2023

Lenton TM. Tipping positive change. Philosophical Transactions Royal Society, B., 375: 20190123. https://doi.org/10.1098/rstb.2019.0123, 2020.

Otto I.M., Donges J.F., Cremades R., Bhowmik A., Hewitt R.J., Lucht W., Rockström J., Allerberger F., McCaffrey M., Doe SSP., Lenferna A., Morán N., van Vuuren D.P., Schellnhuber H.J. 2020. Social tipping dynamics for stabilizing Earth's climate by 2050. Proceedings of the National Academy of Sciences of the United States of America,117(5), 2354–2365. https://doi.org/10.1073/pnas.1900577117

Rockström, J., Gupta, J., Lenton, T.M., Qin, D., Lade, S.J., Abrams, J.F., Jacobson, L., Rocha, J.C., Zimm, C., Bai, X., Bala, G., Bringezu, S., Broadgate, W., Bunn, S.E., DeClerck, F., Ebi, K.L., Gong, P., Gordon, C., Kanie, N., Liverman, D.N., Nakicenovic, N., Obura, D., Ramanathan, V., Verburg, P.H., van Vuuren, D.P., Winkelmann R. Identifying a safe and just corridor for people and the planet. Earths Future 9, e2020EF001866, 2021.

Tàbara, J. D. Regenerative sustainability. Towards a relational model of possibilities for the emergence of positive tipping points. *Environmental Sociology*. https://doi.org/10.1080/23251042.2023.2239538, 2023

Tàbara J.D., Frantzeskaki, N., Hölscher, K., Pedde, S. Lamperti, F. Kok, K., Christensen, J.H., Jäger, J., and Berry, P. Positive tipping points in a rapidly warming world. Current Opinion in Environmental Sustainability, 31: 120-129. https://doi.org/10.1016/j.cosust.2018.01.012, 2018

Tàbara, J.D., Jäger, J., Mangalagiu D. & Grasso, M.. Defining Transformative Climate Science in the context of high-end climate change. *Regional Environmental Change*, 19(3):807-818. https://doi.org/10.1007/s10113-018-1288-8, 2018

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Competing interests

The author has declared no competing interests

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