Extended abstract. Presentation at the SETAC Europe 25th Annual Meeting in Barcelona 3-7 May 2015.

Ethical perspectives on planetary boundaries and LCIA

Bo P. Weidema[1] and Miguel Brandão[2]

[1]Aalborg University, Aalborg, Denmark
[2]Bioenergy Task 38, International Energy Agency, Barcelona, Spain
E-mail contact: bweidema@plan.aau.dk

1. Introduction

The concept of planetary boundaries has resurfaced the discussion on carrying capacity and target setting for overall environmental impacts. Some authors see the concept as complementary to and compatible with the concept of sustainability [1]. We argue here that the concept of planetary boundaries has a different ethical basis than the concept of sustainability, and that this is parallel to the incompatibility between Distance-To-Target and Damage approaches in life cycle impact assessment (LCIA). The main relevance of the notion of planetary boundaries is that it raises the issue of tipping points. We argue that it is possible to include the concern for a tipping point in the utilitarian damage approach, without the need to introduce targets, and we discuss this with the global warming metric as an example.

2. Utilitarian and rule-based ethics as policy basis

The concept of sustainable development (i.e. ensuring present and future equitable fulfilment of needs) implies trade-offs between different needs (and impacts) aiming at optimising production and consumption systems in order to maximise utility (i.e. fulfilment of needs) within existing constraints, and therefore is firmly grounded in utilitarian ethics. The concept of planetary boundaries, on the other hand, implies the setting of targets not to be exceeded, and thus shifts the focus from relative trade-offs to absolute constraints, and can therefore be seen as an expression of a rule-based ethic (since the target expresses an absolute value, and not a relative importance, it cannot be used for trade-offs of utility).

The ethical incompatibility between sustainable development and planetary boundaries is mirrored in the two basic approaches to weighting in LCIA, namely:

- Distance-To-Target methods that weight impacts by the ratio of the current level of each impact and a (political) target level for the same impact, thus giving importance to the distance to the target level (the rule is that the larger the distance, the more important an impact is) rather than to the impact itself, and therefore cannot be used to maximise utility.
- Damage methods that weight impacts according to the relative damage they cause, often expressed in monetary terms with the premise that the preferences of individuals (e.g. expressed by their willingness to pay) can be used to determine efficient trade-offs and thereby maximise utility. In parallel, so-called "panel methods", or more generally Multi-Criteria-Decision-Analysis (MCDA) methods, determine non-monetary weights that express the importance of a damage. The main difference between these methods and monetary valuation is that the preferences expressed in panel and MCDA methods are not those of the general public, but rather of specific individuals (panels of experts or laymen, or politicians) that are implicitly assumed to better represent the interests of the decision makers and/or stakeholders.

3. Critique of the planetary boundaries as policy disguised as science

The choice of weighting methods in LCIA, and the choice between sustainable development and planetary boundaries, is fundamentally an ethical and political choice, and should not be disguised as science.

As noted by some opinion leaders, the planetary boundaries concept "aligns all too neatly with top-down approaches that ignore these politics, and instead seek regulatory, planning, technical or market 'fixes'. The non-negotiability, urgency and control in planetary boundaries ideas leads all too easily to new forms of environmental authoritarianism. These can undermine people's rights and livelihoods, contributing to injustice in resource access, wellbeing and voice. The discourse of planetary boundaries can also (…) prioritise single solutions over the diverse pathways needed to suit diverse people and places, and build resilience." (Melissa Leach [2]); "The framing of planetary boundaries as being scientifically derived non-negotiable limits, obscures the inherent normativity of deciding how to react to environmental change. Presenting human values as facts of nature is an effective political strategy to shut down debate." (Steve Rayner [3]).

4. Tipping points and climate metrics

The main relevance of the notion of planetary boundaries is that it raises the issue of tipping points. However, out of the 10 environmental mechanisms for which Rockström et al. [1] have suggested planetary boundaries, the systematic review by Nordhaus et al. [4] could only establish global tipping points for two, namely global warming and the related ocean acidification. Hence the setting of boundaries for these eight other mechanisms remains an arbitrary exercise. On a more fundamental level, one can also question if it is logically consistent to talk of more than one boundary to be constraining at any given time. Thus, it appears that we can limit the debate on tipping points to that of global warming.

Although tipping-point related impacts of global warming are largely dismissed in the IPCC 5th assessment report ([5], Chapter 12.5.5), it is possible to include the concern for a tipping point in the utilitarian damage approach by adding this concern as a separate impact category with its own metric and damage function. The most appropriate metric for assessing the peak temperature impact of the short-lived gases appears to be the Global Temperature Potential with a time horizon of 20 years (GTP20), since this impact is crucially dependent on the temporal distance to peak temperature and the global temperature would increase for a period of approximately 20 years even if CO_2 emissions were completely halted now [6]. However, it can be argued that until the point where the CO_2 emissions are actually halted and the timing of the peak temperature therefore can be predicted, the only relevant gases to account for are the long-lived gases, notably CO_2. This could be an argument for using the GTP100 as the most relevant metric for now, since this metric gives most weight to the long-lived gases. The differences to Global Warming Potential with a time horizon of 100 years (GWP100) are in practice not very large, except for methane, which has a much lower GTP value. The role of the short-lived gases only becomes important in influencing the height of the peak once the timing of the peak temperature can be predicted, at which point in time, the metric should be shifted. Finally, it should be noted that these deliberations do not cover the most important impact of global warming, namely that on biodiversity, the relevant environmental mechanism for which is rather the climate-change velocity, i.e. the speed of change in habitat conditions, compared to the ability of different species to migrate. Since this impact is instantaneous to the time of emission, it eliminates the importance of the lifetime of the substances. The corresponding relevant metric for the biodiversity impacts is thus the direct (not cumulative) radiative forcing of the substances (equivalent to a GWP1).

5. Conclusions

We find that the concept of planetary boundaries is incompatible with the concept of sustainable development when applied to policy support, and that the concern for tipping points can be appropriately addressed within the utilitarian ethical framework compatible with the damage approach to impact assessment.

6. References

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