



EGUsphere, referee comment RC1
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Comment on egusphere-2022-307

Kris Van Looy (Referee)

Referee comment on "Transforming living labs into lighthouses: a promising policy to achieve land-related sustainable development" by Johan Bouma, EGU Sphere,
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The manuscript presents a framework for organizing the "Living labs" from the Mission "A Soil Deal for Europe". In this framework LLs are transdisciplinary playgrounds to solve the wicked problems in current land use for reaching the healthy soils - determined in specific thresholds. These LLs can then become "Lighthouses" when those thresholds are met. Thresholds are based on SDG, which are translated to measurable ecosystem services.

If the paper really ambitions to propose the framing and draw the lines on how LLs and lighthouses under the Soil Mission should function, then I see a framework that is a bit narrow in my opinion, and a structure that will make them not deliver on promise or in time.

Overall, three elements in the manuscript seem problematic or too restrictive in my view:

- Firstly, the general target of establishing LLs is presented here as investigating and demonstrating the achievement of the prior established targets; I would think that for instance also the identification of specific targets in specific conditions could be subject for a LL. Should these not be laboratories to solve a broader question to what 'sustainable soil management' should look like, either from a technical view, or from a more social view, in a transdisciplinary way and through close collaboration of scientists with practitioners and society;
- The manuscript focusses the transition from LL to Lighthouse; but in view of their different goals in the context of the Soil Deal for Europe targets, I would not like to wait for the 100LLs to reach the good soil health condition before first seeing them starting to work as lighthouses. We all know that for many soils restoring carbon stocks to target can take decades. I suggest we need lighthouses right away, and I believe they need a specific approach/construction for being successful – clearly distinct from the targets of a LL. Obviously it would not be beneficiary to end up with showcases that actually are not reaching the targets, but the ambition for defining lighthouses is to

demonstrate 'solutions' that have proven their success in improving soil health; so, even if they do not reach the target by 100%, significantly improving a condition is also important to show, and perhaps more needed than a LL case of a high complexity that is only applicable under very specific conditions for instance.

- The measurement of soil health targets is suggested to be in ecosystem services; but this is also a problematic aspect, since apart from crop yield not one soil ecosystem service is well quantified at this moment (or at least not in the sense that it can be applied at different scales (and at field level and over soil types), so it would take another twenty years to establish an evaluation framework for the soil deal and soil health law. Discussions and research on soil health indicators are taken up strongly at the moment, and of course the SDG and a translation in ecosystem services offers a framing, but should not be limiting that exercise (discussions on quantification of certain ecosystem services would lead us nowhere). This is also the weak part of the presented example; only the Yw is presented as quantitative indicator, and for the others we can go on for years. So, I would not follow the Ecosystem service framework for evaluation, since this is too far from the specific context of the soil health law.

In conclusion, I definitely concur with the paper's intentions of providing some framing to the construction of LLs and Lighthouses for their transdisciplinary character, and with the other comments on the need for a specific social orientation and co-creation approach. My additional plea would be for a wider scope in targets for LLs – here restricted to farmland – with also LLs to investigate healthy urban soils, regenerative or circular land use forms, nature-based solutions for diffuse polluted soils, etc.