



EGUsphere, author comment AC4
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Reply on RC1

Johan Bouma

Author comment on "Transforming living labs into lighthouses: a promising policy to achieve land-related sustainable development" by Johan Bouma, EGU Sphere, <https://doi.org/10.5194/egusphere-2022-307-AC4>, 2022

This contribution by dr. Van Looy is particularly valuable as it illustrates the need to better explain some basic concepts involved. The: "Soil Deal for Europe" puts major emphasis on establishing at least 100 Living Labs and Lighthouses, resulting in healthy soils by 2030. Soil health is defined by : *"the continued capacity of soils to support ecosystem services"* to meet global commitments such as the SDGs. A key message: *soil health supports...* . The SDGs, not only defining seventeen goals but also targets and indicators, have been welcome in 2015 as they specified the until that time nebulous concept of sustainable development. Note that the SDGs have three dimensions: economic, social and environmental. We only deal with the environmental aspects in terms of providing ecosystem services and the ultimate judgement about the SGSs needs to consider the other two dimensions as well.

Certainly, not only agricultural land use has to be considered but other uses as well, such as city greens, industrial soils and forests.(see first comment by Linda Maring) We focused on agriculture for a start as farmers constitute the largest group of land users. Individual farms can form Living Labs and a series of Labs can be established for a given soil type in a given region to express results of different forms of management. Reacting to the question by dr. Van Looy, some of these farms may, for example, already have achieved successful carbon capture and sharing their management schemes may inspire other farmers in the same region to innovate their management. We don't have to wait 20 years! Van Looy worries that defining indicators and thresholds for LL's will take too much time. But much data are already available to define the most important ecosystem services: producing sufficient quantities of healthy food (SDG2&3); protecting water quality (SDG6), reducing greenhouse gas emission and enhancing carbon capture (SDG13) and preserving biodiversity and combatting land degradation (SDG15). Defining thresholds, that should have a regional character for particular soil types, still needs some research, particularly for biodiversity (see Bouma et al, 2022). Note that the ecosystem approach covers the entire farming system, way beyond the impact of soil. What, then, are the contributions by soils to achieve these ecosystem services? In this context, indicators for soil health have been defined by the Mission Board of Soil Health and Food (Veerman et al, 2020). Note that the term "soil ecosystem services" is confusing as many scientific disciplines support ecosystem services. Also soils support...Again, many data are available in literature to show contributions by soil to the soil-water-plant-atmosphere system allowing determination of these indicators, while thresholds, again, will need more research. (see Bouma et al, 2022). We have advocated a "one-out, all-out" principle when

deciding whether or not ecosystem services or soil health indicators have met their thresholds. This is clear for ecosystem services as an "average service" would be meaningless. For soils it avoids complicated procedures to define an average soil health value and clearly states that a soil is healthy or not. This procedure needs particular attention because soil health values have to be documented by 2030. And: "The healthier the soil the higher the contribution to ecosystem services". The Soil Deal for Europe defines eight objectives that largely correspond with the soil indicators. The desertification objective is different but results in unhealthy soils and Living Labs in the same region on similar soils can hopefully show the way to innovative management combatting desertification, thereby resulting in a Lighthouse. Finally, Dr van Looy is correct in assuming that a "soil Lighthouse" can be established based on positive thresholds for soil health while the thresholds for ecosystem services for the complete farming system are not reached (see the example by Bouma et al, 2022).

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