

Jury report of the WUR student challenge "Make all soils healthy again!"

The jury was truly impressed with the quality of the seven submitted reports. That is why we pay attention to all reports in this final challenge session. Realizing that activities really got started in January and that halfway through in mid-March corona caused a major eruption, we pay our respect to the perseverance, genuine commitment and enthusiasm of the seven teams that delivered their reports by the deadline of June 26.

We are pleased to see that all reports consider soils in a wide scientific, environmental, societal, and political context. All teams quote the UN Sustainable Development Goals as a guiding principle in various contexts. Also, land-related policy issues are covered by several teams, including a thorough analysis of the Common Agricultural policy of the EU by the Soil Seekers. The traditionally rather self-centred soil silo turns out to have wide-open doors and windows! That is really good news.

Our first question as to how soil health is defined and measured yielded a wide range of reactions. Most teams followed versions of the definition proposed by us in January, following the discussions of the EU Mission Board of Soil Health and Food: *the capacity of a specific kind of soil to function, contributing to the UN-SDGs*. Thorough literature reviews of the soil health concept in relation to land use were presented by the Soil Seekers, the Soil Toubibs and the TERRApists. The Soil Seekers quote the SMAF(Soil Management Assessment Framework) that presents 81 indicators and the Cornell Manual with more than 20. A key question raised by several teams is whether or not soil health is an intrinsic rather than an extrinsic property. The TERRApists report five solid principles for soil health, among them the need to have a single number allowing comparisons among soils at different locations. But in their iSQUAD matrix they combine soil quality and perception, to obtain an expression for soil health, yielding, in their own words, *a descriptive, not quantitative system* that has as yet not been tested. While the Soil Seekers admit that: *'an in-depth analysis of soil health indicators is beyond the scope of the present project'*. The Soil Toubibs conclude that: *"no precise set of indicators is possible"*. Well, this presents a problem. We cannot afford a repeat of the soil quality failure where decades of research did not produce an operational measurement procedure. The Soil Toubibs mention, however, without further comment, Italian work applying a systems analysis of the soil-water-atmosphere-plant system that yields a number for soil health while also allowing exploration of future climate-change effects. A way to follow? KPI's (Key Performance Indicators) are used elsewhere but have not been mentioned in the reports, except in passing by the TERRApists. Finally, the Soil Hub magazine travels another route by quoting farmer Anne: *A healthy soil is a soil that I can work on and that provides a good productivity for now, but also for my grandchildren*. Certainly, covers the economic and social aspects of sustainable development but less so the environmental ones. In any case: still some work to do on developing an operational procedure to measure soil health!

Our second question as to how the soil health concept could be useful to improve actual land management is positively addressed by a wide array of stakeholders, presented as farmer surveys by the Soil Seekers, by farmer interviews by Digging Consciousness and by the Soil Hub Magazine that distributed 260 questionnaires to a variety of interested individuals.. Awareness about the crucial importance of soils is universal, but farmers, as reported in the Soil Hub magazine, would like more specific information from the research arena and are strong advocates of on-farm research. They complain about the large distance to the policy arena: *let's talk with each rather than to each other'*. In-depth interviews with five farmers and politicians, among them Jeroen Dijsselbloem , the former chair of the EU finance ministers, and current chair of the supervisory council of WUR, and with five *"scientists on the rocks"* all show on the one hand the enormous quantity of available information and on the other a lack of effective communication that seems to apply to interactions among all partners involved.. Groups showed how better interaction could change land management for soil health- (through financial interactions, subsidies, where a couple of the teams advocated more outcome-based solutions). Again, still some work to do.

Our third question about communication to the public at large has produced nice examples: The Soil Toubibs present a soil version of the successful "climate collage "in France making climate information more accessible to the public. Digging Consciousness proposes a traveling soil museum, creating an emotional bond with soils from their own region or backyard. The topsoil team presents a detailed scheme to educate people. In general the teams propose that good examples of successful enterprises in terms of healthy soils contributing effectively to ecosystem services, to be documented by measurements, are most suitable to convince citizens at large that soils play a key role in environmental

processes. In addition to enterprises, farms and the countryside, teams saw a challenge in communicating healthy soils in an urban context most of us live in, linked to sealing and household waste.

And how about innovation? The team Topsoil presented a comprehensive and interesting review of Rain Gardens within cities, contributing to city greenery but also to water management. As more than 70% of world citizens will live in megacities in future such examples are quite relevant. The team Soils under pressure present a convincing literature review proposing use of compost to improve soil fertility and organic matter contents of soils as an excellent example of circular agriculture. They present interesting interviews with Jane Gilbert, vice president of the International solid waste association and Alexandru Tudose of the Institute of Permaculture in Rumania. Quality control is still a problem but linking food waste to soil health by composting does not offer a new but still quite attractive future perspective.

A final word on creative presentation. All reports are well illustrated with pictures, graphs and tables. The Topsoil team prepared a nice brochure where a shrew (spitsmuis) guides the reader. The Soil Seekers present twelve videos in their report nicely emphasizing the broader context in which soil has to be considered. The Soil Toubibs show seven cards to be used in their soil game and the Soil Hub team present a real layout of a magazine with information and in-depth interviews in a journalistic manner that clearly focuses on drawing the attention of the general reader.

So.. all we have to say is: read the seven reports! Time well spent! The reports will be posted on the challenge website.

And now, the moment of truth we have nervously been waiting for. Believe me, it was very difficult for the jury to make a choice. But we agreed that the report that eloquently compared the creation of sustainable development with the tragedy of the commons where individual and common interests collide, that emphasized and illustrated that storylines are effective means to communicate, that healthy soils should be robust, resilient and multifunctional and that they should not depend too much on external inputs, or "crutches". Finally, this report introduced a card game, developed jointly with the Rietveld academy in Amsterdam, based on the highly successful French : " Climate Collage" game focused on climate change, emphasizing the need to create awareness as a basis for later action. Yes, you guessed it: the 5000 € award will go to the Soil Toubibs! I now invite the team on the podium and prof. Veerman to present the award.

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