Summary of the panel discussion on the future of soil sustainability in Luxembourg

3 December 2021

The speakers provided their personal and/or professional perspective on the future of soil sustainability in Luxembourg and the challenges faced. Statements within each numbered point represent the thoughts of individual panel members and are not neccessary representative of the thoughts or experiences of the entire panel. Nonetheless, it was agreed that even though there is no one single issue concerning soil sustainability, bringing the soil sustainability to the centre of all relevant activities is the most important way forward.

1. **Soil as a source and sink of carbon** – It is important to put soil sustainability in the larger context of issues such as climate change, since climate change mitigation will require changes to the agriculture sector, such as a global reduction in meat production, and soil sustainability measures should be developed with these changes in mind. Therefore, it is important to look at soil as a source and sink of greenhouse gas emissions. As a holistic approach, it was suggested to allocate resources to improve soil sustainability in the context of reducing carbon emissions.

2. **Economic aspects of the soil degradations -** Soil degradations, such as artificialization, pollution, soil organic carbon loss, biodiversity loss, acidification, erosion or compaction, can lead to onsite and offsite costs for the plot owner and also for the society. For Luxembourg these costs are still not known yet but they may be significant with a cost of several million euros each year. As a comparison the cost of soil degradation in England and Wales amounted to 1.2 billion GBP per year, with 20% of total costs related to loss of agricultural production, and 80% of costs related to the loss of the regulating or ecosystem services of soil.

3. **Soil structure is critical for soil function** – Soil structure maintains many services. Currently, it can suffer from bad practices, such as use of heavy machinery under inadequate soil conditions, which may cause soil compaction. There is little nationwide or EU data on soil structure. Moreover, there is a lack of strategic objective to improve soil structure and soil microorganisms. It was noted that the connection of subsoil with topsoil must be considered because compaction may restrict this connection, and flow of water, nutrients, and organisms between topsoil and subsoil is essential for a healthy soil. A healthy soil structure is important to mitigate the impacts of climate change, support plant growth and resilience to droughts. A healthy soil structure helps with the infiltration of water and hinders the erosion of the soil.

4. **We face challenges to achieve soil sustainability** – It was noted that there are several challenges facing soil sustainability such as urbanisation, industrial zoning, the infrastructure, and soil sealing. The most important threat to the soil is the issue of land take in Luxembourg. A large portion of soil is used for construction in Luxembourg, especially in the centre and south of the country. Land take leads to higher pressure on other types of soil that in turn could result in various environmental issues. The best soils are disappearing, because of several reasons such as urban development that are historically done on the best soils. Moreover, agriculture and development compete for more convenient and fertile flat areas.

5. **Climate change will exacerbate soil erosion** – Soil erosion is a natural process and at the origin of our landscape. But it is in the interest of everybody that erosion on agricultural land stays at a minimum level. 50 % of agricultural land in LU is covered by permanent grassland, the land use with the best protection against erosion. On arable land, current agricultural land and soil management practices, climate change and heavier rainfalls are increasing the risk of erosion. Some soils,

such as silty soils, are prone to erosion, however, soil degradation promotes erosion in all soils. We need to be aware of the complications in the coming years and identify actions that can improve the soil resilience in Luxembourg. Ministry of Agriculture is aware of the increased risk in the coming years and has proposed measures on the most sensitive soils in the next Common Agricultural Policy (CAP).

6. **Think long term to protect the soil for future generations** – The modern society often takes short term decisions whereas it is the time to think long term regarding our land use practices. Currently, long term political objectives to protect the soil are missing in Luxembourg. It is our collective responsibility towards the next generation to protect the land for them, the same way the previous generation left the land for us.

7. **Agriculture must adapt and integrate more the sustainability in daily practices** – Sustainable agriculture leads us to think fundamentally about agricultural practices, yet progress is slowed by practical considerations. For example, the machinery used in the agricultural sector is a cause of soil compaction, yet the machines for sustainable practices to reduce such negative impacts on soil are not always available to farmers. Farmers take daily measures to adapt to the soil condition but there is a limit to how much they can do. We must think and adapt the ways we exploit the soil in the future. For that we need more than just farmers, we need the manufacturers in this sector on board to integrate sustainable practices in production of agricultural equipment.

8. **Microorganisms can help to monitor the soil** – The information obtained from microorganisms can help immensely on how to monitor the state of soil, inform our sustainability efforts, and improve the agricultural practices. The data is lacking in this area and that is probably a pressing issue that needs to be addressed.

9. **Grow our knowledge of various types of soil** – Agricultural soils are well studied. However, the challenge is our lack of knowledge and understanding of all other types of soil in Luxembourg and in the EU. For instance, we know very little about the urban soil and its state, yet we know that the urbanisation puts a pressure on other types of soil.

10. **Study the physical and biological properties of the soil** – For many years we have focused mostly studying the chemical properties of the soil. On one hand, studying the chemical properties has been useful for agricultural management, and on the other hand studying the physical and biological properties of the soil is very challenging. In moving forward, it is critical to shift our focus to studying physical and biological properties of soil. It is important to remember that soil is a living organism. A better understanding of its properties will also inform safeguarding the soil structure.

11. **A network to monitor soil, its state and health** – From policy perspective, in order to achieve the soil sustainability, we need to improve data and monitoring on soil. There is a lack of data availability or access on numerous areas related to soil including but not limited to soil compaction, soil structure, soil biodiversity, soil chemical and biological properties etc. It was proposed to launch a new monitoring system and tap into indirect ways of monitoring soil, such as using infrared analysis.

12. **What is lost today will be hard to gain tomorrow** – If the organic carbon content of soil is reduced in Luxembourg, for instance due to land use change, we should be conscious that it can be very difficult to reverse this trend in the future and regain the same level of soil organic carbon.

Some of the questions that were raised during the panel discussion included (but not limited) to the following:

- How can the soil structure be identified and quantified? Do we need to improve our ways of studying the soil structure, such as developing new protocols?
- The environmental support schemes: how much will they allow soil protection, and how can they be integrated into soil activities?
- Are the current methodologies the best way to measure the soil organic carbon given that the carbon cycling functions of the living organisms are removed in the process?
- To study soil biodiversity in Luxembourg, are there certain organisms or approaches that are considered to be the most urgent and/or strategic to investigate?

The panel discussion was concluded with the following key messages:

- **Do not lose the overall sense of urgency. We need to protect soil to reduce soil greenhouse gas contributions to global warming** – The carbon footprint of Luxembourg is high and needs to be reduced by 90% to meet the Paris agreement. It is important that we remember that we need to do everything possible across all sectors, including the agriculture sector, to mitigate climate change. While we should take stock of a detailed perspective on soil, we must not lose sight of big picture that is taking much more extreme actions and efforts to reach soil sustainability and eventually climate neutrality.
- **There is a growing interest in soil protection and soil sustainability in Luxembourg** – The number of people who participated in the workshop shows a considerable interest in this topic. It was proposed to repeat this workshop on an annual or biannual basis. This workshop demonstrated that it is important for the stakeholders and actors in Luxembourg to come together and exchange ideas and propose action on soil protection. It was also proposed to consider launching a soil society of Luxembourg. All participants were invited to reflect on the propositions.

The panel was composed of:

- **Simone Marx**, Chargée d'études dirigeante, Service de pédologie, Administration des services techniques de l'agriculture (ASTA)
- **Dr Gaëtan Fourvel,** chargé de projets Sols et Valorisations Terres Excavées, Unité Stratégies et Concepts Administration de l'environnement
- **Guy Feyder,** Président, Chambre d'Agriculture
- **Dr Claudia Hitaj**, R&T Associate, Luxembourg Institute of Science and Technology (LIST)
- **Dr Carlos Wetzel,** Senior R&T Associate, Luxembourg Institute of Science and Technology (LIST)
- **Dr Thorsten Ruf,** Soil Scientist, Institut fir Biologesch Landwirtschaft an Agrarkultur Luxemburg (IBLA)
- Panel moderated by **Dr Christophe Hissler**, Senior R&T Associate, Luxembourg Institute of Science and Technology (LIST)