Federal Ministry of Food and Agriculture

IASS POTSDAM Global Soil Forum
Institute for Advanced Sustainability Studies e.V.

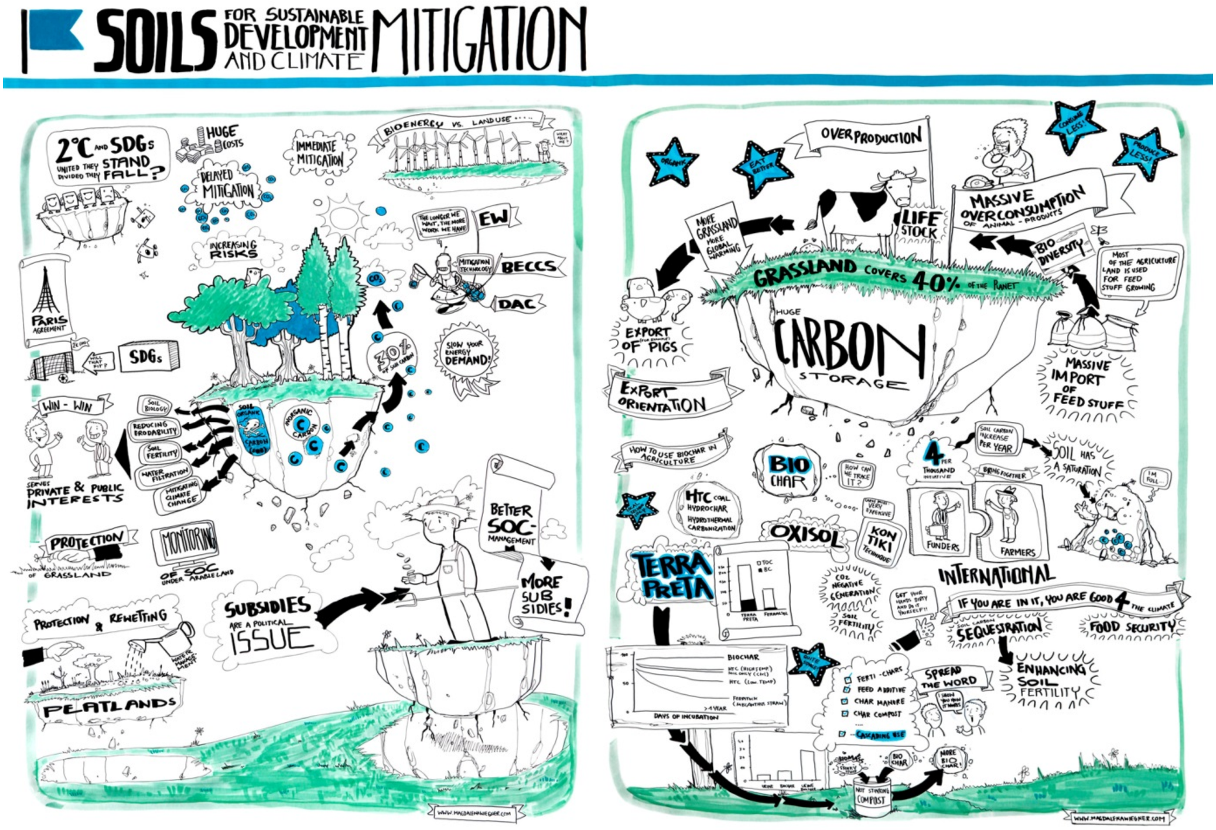

Figure 1: Graphic recording by Magdalena Wiegner

DIALOGUE FORUM IV | Summary

Great Expectations: Soils for Sustainable Development and Climate Mitigation

RAPPORTEURS

Tim Beringer, IASS

HOSTS

Institute for Advanced Sustainability Studies (IASS)
Institute for Sustainable Development and International Relations (IDDRI)

SUMMARY

Land may play in important role in future efforts to mitigate climate change because bioenergy production, afforestation and other large-scale land management strategies could remove and store substantial amounts of atmospheric CO_2 or reduce greenhouse gas emissions by substituting fossil fuels. However, climate mitigation is only one element of sustainable development and large-scale land use strategies can increase competition for fertile lands and negatively impact other SDGs. Against this background, the dialogue forum “Great Expectations – Soils for Sustainable Development and Climate Mitigation” discussed opportunities and challenges of utilizing ecosystems for climate mitigation and sustainable development objectives.

Christoph von Stechow (Mercator Research Institute on Global Commons and Climate Change, MCC; Potsdam Institute for Climate Impact Research, PIK) presented research on synergies and trade-offs of alternative mitigation pathways to achieve the 2°C target and the SDGs. Recent integrated assessment models (IAMs) require negative emission technologies, in particular bioenergy with CCS (BECCS), for ambitious mitigation pathways. Modelling results show that limited availability of key mitigation technologies (e.g. bioenergy production constraints) yields some co-benefits and decreases risks specific to these technologies (e.g. competition for land from bioenergy expansion) but greatly increases many others. The best way to reduce overall trade-offs is to work on down-scaling global energy demands and increasing utilization efficiency. Isolated climate policies run the risks of creating negative side effects on other SD objectives and miss possible synergies across different SDGs.

Knut Ehlers (German Environment Agency, UBA) described the importance of soil organic carbon (SOC, second largest active carbon pool in earth's system after oceans) for a number of ecosystems to function beyond climate mitigation: soil biodiversity, fertility, and prevention of erosion; immobilization and degradation of pollutants; water filtration, etc. Increasing SOC is thus a classic win-win situation. It is a public good and changes in land use policies and subsidies are needed to stimulate SOC-increasing land management. He described three policy options for Germany and the EU: (1) protection of grasslands to prevent further expansion of cropland into grasslands; (2) improved monitoring of SOC under arable land, and; (3) the protection and restoration of peatlands especially from arable land use. Slight modification of already existing mechanisms within the Common Agricultural Policy (CAP) on national and European levels could contribute to policy options without necessitating additional funds.

Tobias Reichert (Germanwatch) focused on the role of grasslands for livestock and food production. Many of the world's best agricultural soils with high SOC-content are former grazing lands, e.g. black soils in the Ukraine or Pampa soils in Argentina. Sustainable grazing management is thus a possible strategy to increase SOC on grasslands, however, trends in ruminant management are not sustainable. Widespread overgrazing leads to loss of plant cover, soil erosion, and the shift towards land-less livestock production based on corn-soy diets for animals which is driving the conversion of grasslands into croplands for feed cultivation. Today the livestock sector in Germany consumes about 50% of all crops produced domestically and increasingly requires additional imports of soy especially from South America. Moving towards more balanced diets by reducing meat consumption would therefore address multiple SDGs related to climate, nature conservation and health simultaneously.

Claudia Kammann (Geisenheim University) spoke about the production of biochar and its use in agriculture. Recent studies indicate that it may be used as a mitigation tool as its production yields energy and creates a recalcitrant form of SOC that remains in soils for a long time though not forever. It has also been shown that under certain conditions biochar amendment to soils can reduce N_2O and CH_4 emissions. Its effects on yields, however, is smaller than previously thought, where maximum increases without application of additional fertilizers reach 10-15% yet in most cases yield levels did not change. Notwithstanding, nutrient charging of biochar is essential and results from afforestation sites indicate that its application has positive effects on survival of some species of plants. The biggest challenge now is providing adequate incentives for a wide adoption of biochar agricultural practices including financial and yield increases. Furthermore, there is a lack of funding for research and development in animal husbandry where biochar can contribute to a reduction in N_20 and NH_3 emissions.

Sébastien Treyer (Institute for Sustainable Development and International Relations, IDDRI) presented France's 4p1000 initiative which aims to elevate carbon storage in soils worldwide to a rate of 0.4% per year, equivalent to the annual increase in atmospheric carbon content. If successful, this initiative could neutralize current CO_2 emissions. While many questions around a worldwide implementation of 4p1000 persist, the initiative has managed to put soils on the political agenda and may serve as an opportunity to transform agriculture. Challenges for governance include changes in agricultural policies to foster agricultural practices that create SOC sequestration, adequate funding and support for farmers, and the establishment of monitoring capacities. All 4p1000 projects will need to comply with the Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forest (VGGTs) to ensure that they serve the wider sustainability agenda. 4p1000 is also supported by a large scientific research program to improve understandings of soil carbon stability, linkages between carbon and phosphorous cycles, and other relevant knowledge necessary for improving agricultural practices.

CONCLUSIONS

Challenges for natural resources governance are manifold. For example, increasing soil carbon may require 20–40 years until a new equilibrium is reached, but the additional carbon stored needs to be conserved in the long term. Different policies and mechanisms for SOC sequestration and storage need to be developed and implemented, and it is important to ensure that countries of the global North do not abuse “cheap” carbon sinks in productive ecosystems in the South as substitutes for own mitigation measures. Monitoring soil carbon at high spatial and temporal resolutions is difficult if not impossible. Measuring the effectiveness of soil carbon sequestration is thus a mandatory challenge Substituting direct measurements with educated estimates may also provide a solution.

Top-down estimates of land-based climate mitigation potentials build on the assumption that emerging technologies targeting generating negative emissions will become technically and economical viable in the coming decades. Shall policy-makers design their strategies based on these expectations, they risk that a failure in technological development may result in a failure of the entire mitigation strategy. Research and development should therefore also consider learning from old practices (grazing regimes, biochar amendment) that may yield more practicable mitigation tactics than large-scale, high-tech solutions that require upscaling of experimental technologies. The question is whether a widespread implementation of small-scale solutions could also contribute to global sustainability targets or if there are no alternatives to large-scale ones that involve higher risks and negative side-effects? Mapping required technologies and policies and translating future development pathways that reconcile the 2° target and wider SDG framework for policy makers and civil society should therefore become a priority in sustainability sciences. Policy options for an improved soil carbon management are available and await implementation.

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