

Annex 2. EJP SOIL call topics

Topic: Harmonizing soil information (DATA)

SE2/INDICATORS 1 Modelling soil functions and soil threats for mapping soil functions and ecosystem services

Rationale/Specific challenge: Modern agriculture is in many cases contributing to continued soil degradation. The effects are severe depletion of soil organic matter (SOM) content, accelerated erosion, reduced soil water holding capacity, loss of soil biodiversity, salinization, soil pollution and increased GHG emissions (FAO and ITPS, 2015¹; EEA, 2015; 2019²). These ongoing degradation processes impede agricultural soils to fully contribute to the provision of ecosystem services such as food and fibre production, climate change mitigation, disaster management (floods and droughts) and biodiversity-based control regulations (IPBES, 2018; 2019; IPCC, 2019; ECA, 2018³). In addition, there is an increasing need to be able to assess and predict the ability of soils to perform given functions for implementing climate-smart sustainable management options. Recently, several EU projects have concerned the reporting on soil degradation processes and the assessment of soil contribution to the provision of ecosystem services. Different concepts (e.g. soil quality, soil health) and indicators have been implemented across countries. Some indicators have been used in decision support tools to assess the multi-functionality of soils. However, indicators based on soil properties still need to be improved, tested on a variety of pedo-climatic conditions and shared with end-users (farmers). Also, common reference and/or threshold values have to be set, covering the diversity of soil types, climatic conditions and agricultural production systems at the European scale.

Scope: The EJP SOIL funded a first project to take stock on existing indicator systems for assessing soil quality and ecosystem services, including reference values for agricultural soils, as currently used by Member States associated in the EJP SOIL and beyond. However, the validity of these indicators and reference values remains to be tested to be able to produce detailed map of soil functions at the EU scale. Therefore, the main aim of the project is to use, test and improve the robustness and sensitivity of existing indicators and their interpretation values (e.g. reference and/or threshold values) to model and map soil functions and related ecosystem services, focusing especially on climate change adaptation and mitigation.

Interpretation/reference values should be evaluated and, or, developed for different combinations of soil types and agricultural land uses (cropland, grassland, agroforestry). Such values should ideally be defined in collaboration with the JRC/ESDAC and DG ENV. The project should consider region-specific challenges since soil threats differ among EU regions. Modelling and mapping issues should particularly concern the temporal dynamics of soil degradation and soil functions as

¹ FAO and ITPS, 2015. Status of the World's Soil Resources (SWSR) – Main Report. . Food and Agriculture Organization of the United Nations and Intergovernmental Technical Panel on Soils, Rome, Italy.

² EEA, 2015. The European environment — state and outlook 2015: an integrated assessment of the European Environment. - EEA, 2017. Climate change, impacts and vulnerability in Europe 2016 An indicator-based report.

³ Scholes , R., Montanarella, L., 2018. Thematic assessment of land degradation and restoration. IPBES Report - IPCC, 2019. Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems. IPCC Special report.

related to climate change and changing agricultural practices and land-use (cropland, grassland, agroforestry). The project will release a geodatabase on soil degradation and soil functions based on tested indicators at the EU scale. The relevance and incurred cost of using these indicators will be analysed from a policy perspective. Participatory approaches involving end-users and farmers are encouraged, in order to share knowledge on the multi-functionality of soils, to test and improve soil indicators and decision-support tools in real local conditions and to demonstrate the benefits of climate-smart sustainable soil management.

Expected outcomes:

- Improving decision-support systems for farmers adapted to different EU agricultural systems and soil conditions and helping to evaluate and design best management options.
- Improving availability of models and geodatabase allowing to assess the effect of ongoing/possible soil threats and/or of agricultural soil management options on the provision of soil functions and ecosystem services.
- Knowledge allowing for a better harmonization of systems and references for evaluating soil functions and ecosystem services across Europe.

Expected impacts:

- EJP SOIL EI1: Fostering understanding of soil management and its influence on climate mitigation and adaptation, sustainable agricultural production and environment.
- EJP SOIL EI4: Supporting harmonized European soil information, including for international reporting.
- EJP SOIL EI5: Fostering the uptake of soil management practices which are conducive to climate change adaptation and mitigation.

Project Type: Large size research project (up to 5M€).