



Study supporting the assessment of EU Missions and the review of mission areas

Mission A Soil Deal for Europe
assessment report

**Independent
Expert
Report**

Study supporting the assessment of EU Missions and the review of mission areas EU Mission A Soil Deal for Europe assessment report

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Study supporting the assessment of EU Missions and the review of mission areas

Mission A Soil Deal for Europe assessment report

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KEY DEFINITIONS, ACRONYMS AND GLOSSARY

Abbreviation/Acronym	Definition
AI4Soilhealth	Horizon Europe project 2022-2026
BonaRes	Funding initiative of the German Federal Ministry for Education and Research
CAP	Common Agricultural Policy
CO2	carbon dioxide
COP27	The 2022 United Nations Climate Change Conference
DG	Directorate-General
DG AGRI	Directorate-General for Agriculture and Rural Development
DG CLIMA	Directorate-General for Climate Action
DG ENER	Directorate-General for Energy
DG ENV	Directorate-General for the Environment
DG GROW	Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs
DK	Denmark
DG MARE	Directorate-General for Maritime Affairs and Fisheries
DG MOVE	Directorate-General for Mobility and Transport
DG RTD	Directorate-General for Research and Innovation
DG SANTE	Directorate-General for Health and Food Safety
EAFRD	European Agricultural Fund for Rural Development
EC	European Commission

Abbreviation/Acronym	Definition
EEA	European Environment Agency
EIP AGRI	European Innovation Partnership on Agricultural Productivity and Sustainability
EJP SOIL	European Joint Programme on Agricultural Soil Management
EP	European Parliament
EIB	European Investment Bank
ERDF	European Regional Development Fund
ERRIN	European Regions Research and Innovation Network
EU	European Union
EUSO	The DG JRC's EU Soil Observatory
FAO	the UN Food and Agriculture Organisation
HE	Horizon Europe
HuMUS	Healthy Municipal Soils'
IE	Ireland
IenW	Ministry of Infrastructure & Water Management
JRC	Join Research centre
LHs	Lighthouses
LIFE	Financial instrument for the environment
LL	Living Lab
LNv	Ministry of Agriculture, Nature and Food Quality
MS	Member States

Abbreviation/Acronym	Definition
NCP	National Contact Points
NL	Netherlands
PREPSOIL	Preparing for the "Soil Deal for Europe" Mission
R&D	research and development
R&I	Research and Innovation
SDGs	Sustainable Development Goals
SME	Small and medium-sized enterprises
SOLO	Soils for Europe project
SPC	Strategic configuration of the Horizon Europe Programme Committee
TRAMI	Transnational cooperation on the Missions approach (EU-funded project)
UNFCCC	United Nations Framework Convention on Climate Change
WP	Work Programme

ABSTRACT

The Mission 'A Soil Deal for Europe' (hereafter also referred to as the Mission Soil) addresses alarming developments in soil health degradation and the ensuing detrimental consequences for various essential ecosystem services. The mission relies on an elaborated and coherent strategy rooted in yet going well beyond what could be achieved through Horizon Europe's research and innovation (R&I) actions alone. The focus on local testing grounds (the 100 living labs and lighthouses), monitoring, training and engagement activities represents a promising way of engaging stakeholders, facilitating experimentation and diffusing learning. Moreover, the R&I actions provide the fundamentals for a range of complementary non-R&I actions of both public and private actors. Particularly salient is the development of harmonised indicators, which is a precondition for the implementation of potentially game-changing legislation and incentive schemes.

While some possibilities for improvement were identified, the governance arrangements, policy instruments and budgets that have been selected appear to offer a feasible pathway to achieving the implementation plan. Rolling out that plan is progressing well, both in launching Horizon Europe calls and in exploiting synergies with other EU policies like several Green Deal strategies and the CAP. Moving forward, enhanced multi-level governance (involving national, regional and local stakeholders) remains a medium to long term need in order to optimise the mission's impact.

RÉSUMÉ

Le pacte pour des sols sains en Europe (la Mission Sols) aborde les évolutions alarmantes de la dégradation de la santé des sols et les conséquences néfastes qui en découlent pour divers services essentiels d'écosystémiques. La mission repose sur une stratégie cohérente et élaborée, ancrée mais allant bien au-delà de ce qui pourrait être réalisé grâce aux seules actions de recherche et d'innovation (R&I) d'Horizon Europe. L'accent mis sur les terrains d'essai locaux (les 100 laboratoires vivants (living labs) et les projets-phares (lighthouses), ainsi que sur les activités de surveillance, de formation et d'engagement représente une manière prometteuse d'impliquer les parties prenantes, de faciliter l'expérimentation et de diffuser horizontalement les apprentissages. De plus, les actions de R&I fournissent les bases d'une série d'actions complémentaires hors R&I d'acteurs publics et privés. L'élaboration d'indicateurs harmonisés est particulièrement importante, une condition préalable à la mise en œuvre d'une législation et de programmes d'incitation susceptibles de changer la donne.

Bien que certaines possibilités d'amélioration aient été identifiées, les dispositifs de gouvernance, instruments politiques et budgets choisis semblent offrir une voie plausible pour réaliser le plan de mise en œuvre. Le déploiement de ce plan progresse bien, à la fois dans le lancement des appels Horizon Europe et dans l'exploitation des synergies avec d'autres politiques de l'UE comme le Green Deal et la PAC. À l'avenir, une gouvernance multi-niveaux renforcée (impliquant des acteurs nationaux, régionaux et locaux) reste un besoin à moyen et long terme afin d'optimiser l'impact de la mission.

EXECUTIVE SUMMARY

The Mission 'A Soil Deal for Europe' (hereafter Mission Soil) aims to set up 100 living labs (LLs) and lighthouses (LHs) by 2030 as a means to move from the current 30%-40% of healthy soils to 100% by 2050. This goal is set by the European Union's Soil Strategy and the Commission's proposal for a Soil Monitoring Directive, to which the mission seeks to contribute. The use of the term 'soil deal' in the mission's long-form title was a deliberate nod to the European Green Deal and implicitly references at least 12 of the key strategies and actions covered by this landmark initiative, including the Farm to Fork Strategy; the EU Biodiversity Strategy for 2030; the Climate Adaptation Strategy; the Zero Pollution Action Plan for air, water and soil; the Forest Strategy; the Long-term Vision for Rural Areas; the Organic Action Plan, and the Communication on sustainable carbon cycles.

MISSION SOIL: FROM LAUNCH TO FIRST DEPLOYMENT STAGE

The mission's goal is substantiated by eight specific objectives linked to existing EU policy targets on soil degradation, soil sealing, pollution and erosion, the protection and restoration of soil ecosystems and soil biodiversity, and soil carbon sequestration and protection. The mission strives to reduce the EU's global soil footprint and to increase "soil literacy" – awareness of the importance of soil in wider land-management and environmental policy and action.

To meet these objectives, the mission implementation plan proposed to carry out R&I activities in a joined-up manner together with local testing grounds, monitoring, training and engagement activities. The mission's initial funding is provided via Horizon Europe (HE) with a key set of actions set out in the work programmes.

In addition to addressing knowledge gaps and developing innovative new practices, the mission works towards enhancing the adoption of more sustainable soil management practices, e.g. by supporting monitoring, experimentation, demonstration, training, business model exploration, and adaptation of diverse European and national policy schemes.

ASSESSMENT OF THE SELECTION PROCESS AND SCOPE

The Mission Soil is off to a good start, with a clearly defined vision and goal and relevant objectives to address major soil health challenges. Interviewees and survey respondents regard the mission as bold, inspirational and with the necessary ambition and scope.

For many years there has been insufficient progress in this field, at least at the EU level, but soil health is now increasingly being recognised as a pressing and transversal topic, interlinking vital yet threatened soil functions such as food production, water storage/purification/regulation, preserving biodiversity, nutrient cycling, contamination reduction, climate regulation (e.g. via carbon capture), and cultural services. The ambitious mission thus offers a much-needed platform for initiating, mobilising and aligning existing as well as envisaged EU and national/regional policy efforts for pursuing healthy soils in Europe.

A clear strength of the mission design is that it does more than enhancing the societal impact of R&I by only requiring a link with the focal topic of soil health. Instead, there is a coherent strategy that addresses a broad range of logically connected efforts. Together, these interlinked efforts create the conditions required for meeting the mission's overall goal. While some actions are knowledge-oriented and support research and innovation on soil management practices, significant attention goes to improving the stakeholders' familiarity

with such practices as well as their motivations for adopting them (e.g. by changing rewards and legislation).

The focus on LLs and LHs represents an original approach to experimenting with new and existing soil management practices, while still being sensitive to place-specific variation in soils, soil uses (e.g. food, forest, urban), economic structures and especially institutional landscapes in which key stakeholders like landowners and land managers operate. Another added value is emerging from the mission's traction vis-à-vis the private sector and international partners.

ASSESSMENT OF GOVERNANCE STRUCTURES AND MANAGEMENT ARRANGEMENTS

The governance arrangements offer a suitable basis for achieving better coordination among a broad range of policy actors. Initially, coordination consisted of collecting insights on which policies could help to improve conditions for enhancing soil health, and how the mission could contribute.

After the mission and its implementation plan had been developed, the attention shifted to promoting the mission, the ambitions it stands for, and (through the portfolio of actions) its potential for feeding into EU and national policies, e.g. by generating awareness about soil health issues, or via more substantial inputs like a harmonised monitoring infrastructure essential for enforcing legislation.

The mounting policy interest – both at the level of the EU and in Member States – is reflected in the integration of the Mission Soil in more than a dozen of Green Deal strategies as well as in 18 out of 28 Common Agricultural Policy (CAP) strategic plans.

ASSESSMENT OF INTERVENTION LOGIC

Now one and a half years into the mission, there are questions about the intervention logic, given an observed lack of wider awareness among policymakers at the national and sub-national level; especially officials outside the domain of research policy are not yet fully aware of the mission.

Several initiatives have been launched to address this critical challenge. These include support for national contact points to help spread the mission to a broader audience as well as directly interacting with Member States' representatives in, for example, the agricultural or environmental domain. Nevertheless, increased engagement and commitment from the national/regional level will be needed to leverage the well-targeted outputs of the mission's HE work programme-based policy actions.

ASSESSMENT OF THE PORTFOLIO OF INSTRUMENTS AND FUNDING

The portfolio of policy instruments is extensive yet coherent, with many reinforcing linkages across them. Developing, validating and harmonising a soil health indicator infrastructure is, for instance, a basis for evidence-based experimentation with soil health management practices; for implementing and enforcing Commission's proposed Directive for Soil Monitoring; and for (re-)designing reward schemes like the CAP.

The Mission, the EU soil strategy for 2030, Commission's proposal for a Soil Monitoring Directive, the communication on sustainable carbon cycles and the CAP are closely interlinked. Together with the Green Deal policy framework and the EU Soil Observatory, the

mission is part of a comprehensive framework for soil protection and restoration in the EU. The Mission is thereby acting as a catalyser for enhancing the success of various soil health policies. At the same time, for reaching its goals the Mission itself will benefit from having a solid policy framework that is conducive to sustainable soil management.

Overall, ultimate success is still very much in the hands of Member States' national and regional policymakers who are in the position, but currently not yet sufficiently compelled, to implement laws, funding and reward schemes that improve the playing field for achieving and maintaining healthy soils. Levelling that playing field could also benefit from strategies to enhance the markets' valuation of healthy soils. Several recently launched projects (e.g. on business models and carbon sequestration) address this, but many questions on socio-economic issues remain to be answered.

In terms of the implementation of actions, progress is proceeding according to plan. The interest for the calls is high, and the substantial amount of available funding allows for broadening the community of researchers and other actors involved in the activities.

ASSESSMENT OF PROGRESS TOWARDS MEETING THE MISSION'S GOAL

A general observation can be made about the need to further develop and safeguard multi- and trans-disciplinary activities in the far-reaching soil domain. This should inform action lines pursued while creating and managing the LLs and LHs in which researchers, landowners, land managers and other stakeholders will participate in practice-oriented research activities.

Potential additional policy actions often depend on the outcomes of HE projects, most of which have just begun (e.g. on mission promotion, business models, investing), making it hard to predict how the design, implementation and success of those policy efforts will unfold.

This report concludes by offering various suggestions for the future development of the mission, notably in relation to improving traction at the (sub)national level as well as ensuring that pursuing healthy soils is economically feasible.

1. Introduction

1.1. Scope and aim of the assessment

In November 2022, the Directorate-General for Research and Innovation (DG RTD) commissioned a study supporting an assessment of the EU Missions, the review of mission areas and the analysis of the missions' portfolio of instruments and actions. The study was coordinated by EFIS Centre in co-operation with experts from the University of Utrecht, KMU Forschung Austria, Visionary Analytics and Claire Nauwelaers.

The five EU missions are:

1. Adaptation to Climate Change: Support at least 150 European regions and communities to become climate resilient by 2030.
2. Cancer: Improving the lives of more than 3 million people by 2030 through prevention, cure and for those affected by cancer including their families, to live longer and better.
3. Restore our Ocean and Waters by 2030.
4. 100 Climate-Neutral and Smart Cities by 2030.
5. A Soil Deal for Europe: 100 living labs and lighthouses to lead the transition towards healthy soils by 2030.

This assessment report assesses four key dimensions for each mission:

1. The selection process, the governance structure and functioning arrangements.
2. EU missions' policy focus, progress towards the fulfilment of each mission's objectives, including policy objectives, and contribution to the goals of Horizon Europe.
3. EU missions' funding arrangements and their evolution over time, including budget appropriations on EU missions allocated through Horizon Europe, other EU funding programmes, national, regional and private funding.
4. An analysis of the intervention logic and portfolio of instruments and policy actions foreseen by each mission implementation plan, within Horizon Europe and beyond.

Following this introduction and a short summary of the methodology, the second chapter of the report provides a factual background to the mission (design and implementation, goal and objectives and governance).

The third chapter presents the assessment findings including the mission selection process, governance structures and management arrangements, the budget and funding for the mission's implementation and progress towards meeting the mission's goals. It also includes an assessment of the intervention logic and portfolio of instruments and actions mobilised. A final chapter provides a set of overall conclusions and future policy options for the mission.

1.2. Overview of the methodology for the assessment

The assessment process (Figure 1) was based on applying of a set of primary and secondary research methods to address the four dimensions mentioned above.



Figure 1. Simplified overview of the methodological framework for the mission assessment

Source: own elaboration

In terms of secondary research, the study team has drawn on:

- Insights derived from a literature review of academic articles carried out for the five missions. The full literature review is annexed to the final study report.
- Evidence from desk research covering technical (e.g. economic, research and innovation, environmental) studies, policy reports and grey literature.
- Relevant data on funding (Horizon Europe, other EU level programmes, national or regional programmes, where available).

In terms of primary research, the following methods were applied to collect the views and opinions of a broad group of Mission Soil stakeholders:

- 12 interviews with 14 interviewees in total were conducted (not including EC mission secretariat) and 13 interviews with 16 interviewees (counting EC mission secretariat) see Annex 5.1. List of interviewees and the final study report for a synthesis of interview results).
- 60 responses for the Mission Soil to a survey conducted by the study team (see Annex 5.3. Survey tables and the final study report for a synthesis of the survey results).
- An online policy workshop on Mission Soil, held on 12 April 2023, with the participation of 32 stakeholders (see the final study report for a detailed description of the workshop and synthesis of workshop results).

The quantitative and qualitative data and evidence collected has been triangulated¹ (for instance opinions of interviewees, survey participants reply to open questions, or workshop participants are linked, wherever possible, to the studied academic literature, grey literature and/or relevant statistical data or other quantitative evidence) to provide as strong and robust an evidence base as possible for the review.

A fuller explanation of the methodology for the entire study and relevant annexes (such as the literature review, survey results, etc.) is available in the overall final study report.

2. Background and scope of the mission

2.1. Timeline of mission selection, design and implementation

Like all other EU Missions, the Mission 'A Soil Deal for Europe' (henceforth: Mission Soil²) evolved out of the mission areas proposed by the European Commission (EC) in the autumn of 2018. Out of a list of several dozens of candidates, 'soil health and food' was nominated as one of the five priority mission areas that should receive special attention in, notably, the EU's R&I framework programme Horizon Europe (2021-2027).

To formulate a concrete mission, comprising a measurable goal and a vision on how to achieve it, a multidisciplinary and cross-sectoral mission board of 15 independent experts was installed in August 2019. In the subsequent months the mission board engaged in various analytical, communication and engagement events, leading to the publication of their 'Caring for soil is caring for life' report in September 2020 (EC, 2020). The report proposed to focus the mission on soil health as a transversal concept that regards soil as a key resource for many more ecosystem services rather than only providing a basis to produce safe and nutritious food. As proposed, the mission addresses relevant vital soil functions like water storage/purification/regulation, preserving biodiversity, nutrient cycling, contamination reduction, climate regulation (e.g. via carbon capturing), and cultural services. In addition, by expanding the focus to soil health, the mission targets soil management in all types of land use in both rural (agriculture, forests and natural zones) and urban areas. The mission board considered this to be a main novelty. Across such areas, soils can provide many interlinked ecosystem services, but those soils are threatened because of human activities like unsustainable land management practices, urbanisation and the effects of climate change. Resulting problems relate to, for instance, soil sealing, nitrogen surplus, and water erosion. The mission was presented as an opportunity to reverse soil degradation.

In parallel to the work of the mission board, the EC developed the European Green Deal, its flagship strategic framework for making the EU climate neutral by 2050. The European Parliament (EP) voted to support the deal in January 2020. Recognising how important healthy soils are for climate neutrality and other major policy objectives relating to sustainable food systems, promoting biodiversity or zero pollution, the EC incorporated the mission board's recommendations to develop the implementation plan for Mission Soil, as a main contribution to the Green Deal and to the sustainable development goals (SDGs). In fact, more than a dozen of the EU Green Deal strategies have identified the mission as a tool to deliver on their policy ambitions. Particularly close links exist between the EU soil strategy

¹ Methodological triangulation involves using more than one kind of method to study a research question or hypothesis. It has been found to be beneficial in providing confirmation of qualitative and quantitative findings, increased validity and enhanced understanding of studied questions.

² Mission Soil website : https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/soil-health-and-food_en

for 2030, Commission’s proposal for a Soil Monitoring Directive³, the communication on sustainable carbon cycles and the Mission Soil. Together with the Green Deal policy framework and the EU Soil Observatory, the mission is part of a comprehensive framework for soil protection and restoration in the EU.

The mission implementation plan defines the goal of the mission, which is to set up 100 living labs (LLs) and lighthouses (LHs) by 2030 as a means to move from currently 30%-40% healthy soils to 100% by 2050, as envisaged by the soil strategy and the future Commission’s proposal for a Soil Monitoring Directive⁴. The overall goal is substantiated with eight specific objectives that contribute to the achievement existing EU policy targets related to: soil degradation, soil sealing, pollution and erosion, the protection and restoration of soil ecosystems and soil biodiversity and soil carbon sequestration and protection. To meet these objectives, the mission implementation plan proposes to carry out R&I activities in a joined-up manner together with local testing grounds, monitoring, training and engagement activities. As missions are primarily rooted in Horizon Europe, a key set of actions are embedded in the R&I work programmes (WP) on EU Missions. The first was adopted in 2021, with new WP published in May 2022 and the WP calls for 2023 open since January (application deadline in September 2023)⁵. More detail on WP contents and budgets are found in section 3.3.

The figure below summarises the main events and publications that mark the creation and implementation of the soil deal mission until 2024.

Timetable	Actions
July 2017	Publication of Lamy Report on missions as new cornerstone for EU R&I policy (Horizon Europe, 2021-2027)
Autumn 2018	EC proposes five broad Mission Areas, including ‘Soil health and food’
August 2019	First Mission Board is installed
September 2019	Mission Board starts analysis, communication and engagement events
December 2019	EC announced the Green Deal
January 2020	EP expressed support for the Green Deal
September 2020	Mission Board publishes “Caring for soil is caring for life” vision on Soil Health mission

³ See : https://environment.ec.europa.eu/publications/proposal-directive-soil-monitoring-and-resilience_en

⁴ As reflected in the title of the Mission Board’s proposal, the board suggested to aim for a quantitative performance goal of 75% healthy soils by 2030. This goal has been withdrawn as improving soil health may take a substantial number of years even if the ‘right’ soil management practices are being applied.

⁵ https://research-and-innovation.ec.europa.eu/document/download/70bfefda-fb4b-4a7a-934a-e80d627e3d5e_en

Timetable	Actions
September 2021	“A Soil deal for Europe” implementation plan is published along with the communication on missions
October 2021	Foresight report on mission area Soil Health and Food is published
2021	R&I work programme (WP) development; publication WP 2021
November 2021	Publication Soil Strategy
May 2022	Publication WP 2022
Summer 2022	Start of actions to identify regional “soil needs”, create an interactive map of existing Living Labs and enhance access to soil information in Member States
September 2022	New Mission Board established
November 2022	Presentation of the Mission Soil at the UN Climate Change Conference (COP 27)
December 2022	Publication of WP 2023 including first call for Living Labs
January 2023	Set up of the Mission Implementation Platform
April 2023	Launch of the Mission Soil Manifesto by EC and the European Regions Research and Innovation Network followed by a second launch event with the Committee of the Regions in Finland
May 2023	Mission Soil breakout session at the AIM for Climate summit meeting with experts and ministers from NL, DK, IE, showing Member States support to the Mission
November 2023	First Mission Soil Fair organised in Madrid under the Spanish Presidency of the Council
2024	Start of a first wave of about 20–25 LLs, corresponding to at least 100 local sites across Europe

Figure 2. Timeline of the mission

Source: documentary evidence reviewed by authors

2.2. Mission goal and objectives

As noted above, the mission’s goal is to set up 100 LLs and LHs by 2030 to promote sustainable land and soil management in urban and rural areas and achieving the EU’s policy objectives of having all soils healthy by 2050. The notion of ‘soil deal’ does not refer to a governance arrangement based on an agreement between stakeholders but stresses the inherent link between the mission and the Green Deal strategy.

The mission’s goal is substantiated by eight specific objectives that contribute to the achievement of existing EU policy targets related to: soil degradation, soil sealing, pollution and erosion, the protection and restoration of soil ecosystems and soil biodiversity, and soil carbon sequestration and protection. The mission also aims at reducing the EU’s global soil footprint and at increasing “soil literacy”.

Each of the eight specific objectives is backed by a baseline, one or more policy targets and measurable indicators. The eight objectives are depicted in the intervention logic shown in Figure 15 below. Table 1 in the implementation plan presents the baseline levels for the associated policy targets. Measuring progress on specific objectives and their targets is enabled by eight ‘soil health indicator’ categories⁶ based on physical, chemical, biological and management/landscape parameters. One target can relate to one or multiple of those indicator categories. To meet these objectives, the mission implementation plan proposes to carry out R&I activities in a joined-up manner together with local testing grounds, monitoring, training and engagement activities.

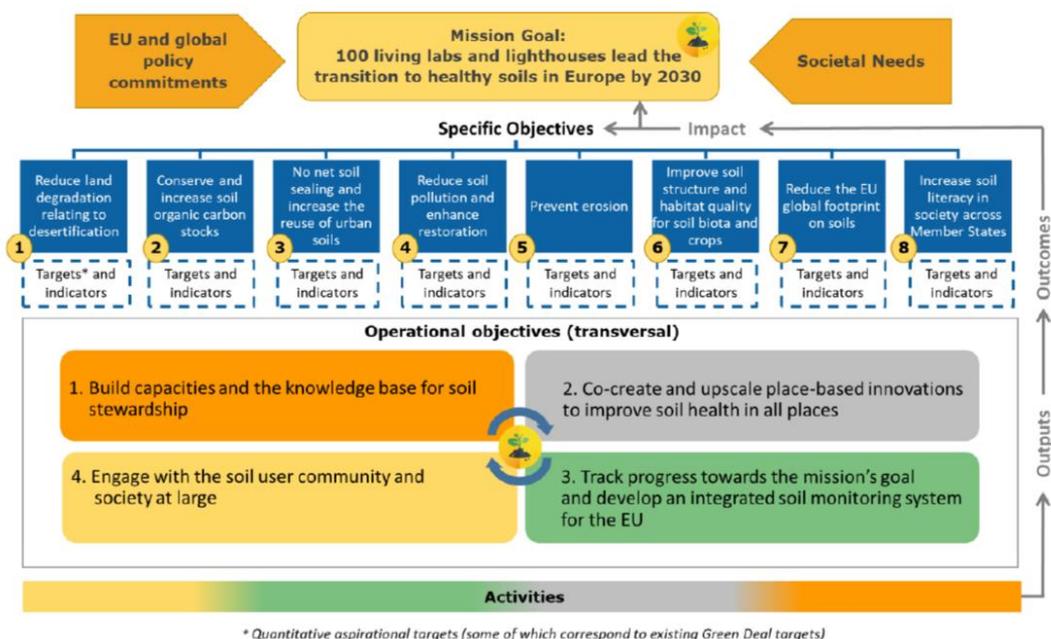


Figure 3. Schematic view of the mission’s overall intervention logic

Source: Implementation Plan, p.18

⁶ The notion of category reflects that the indicators are not always already captured by specific variables. The development and validation of those variables is still ongoing and is in fact one of the mission’s building blocks.

The potential for achieving significant improvements in soil health (more specifically on the proposed soil health indicators and specific objectives) was tested through an exercise gathering more than 300 replies from the scientific community. Responses confirmed that the mission's goal, objectives and policy-based targets are grounded on realistic assumptions, recognising that rapid change and combined efforts at a large scale are needed for the 2030 timeline to be met. The evidence – mostly coming from the area of agriculture - illustrates that a range of practices exist that can significantly protect and improve soil health, particularly if their uptake was more widespread and applied over a larger scale.

2.3. Governance structures

The governance framework for the Mission Soil is common to those of other missions. DG AGRI provides the mission manager, and the deputy mission manager comes from DG R&I. The mission secretariat, tasked with mission coordination, is provided by a DG AGRI team as well. The mission owners' group for inter-service coordination of mission programming includes representatives of the DGs CLIMA, ENV, JRC, MARE, SANTE, ENER and MOVE among others, with different levels of involvement. Through an administrative agreement, the JRC oversees the mission's building block on soil monitoring.

The figure below shows the other elements of the governance structure, as presented in the implementation plan. A new mission board was established in September 2022. Another source of information and views on the mission's implementation is the programme committee and its working groups. The 'Strategic configuration of the Horizon Europe Programme Committee' (SPC) is a structure which allows Member States and associated countries to contribute to and approve the Horizon Europe work programmes. Member States, of course, also play a role via their involvement in accepting and adopting other EU policies, like the common agricultural policy (CAP), and participating in relevant international networks, e.g. via the European Innovation Partnership on Agricultural Productivity and Sustainability (EIP AGRI). Finally, they provide the data that is used for soil monitoring activities as conducted as part of the JRC's EU Soil Observatory (EUSO).

As a novelty, a number of Member States have set up cross-sectoral mirror groups for Mission Soil, these generally representing various ministries and stakeholders. Efforts are underway to strengthen the links between mirror groups and national hubs created by the European Joint Programme EJP Soil.

On the implementation side of the governance structure, an additional range of groups, institutes and networks helps to develop actions. An update with respect to the governance structure initially foreseen in the implementation plan is that there is no stakeholder innovation group, but other support structures have been created (e.g. an implementation platform and national mirror groups). One governance element to highlight is that the EC is mobilising and initiating various networks that prepare countries for establishing the LLs (and later LHs) that feature so prominently in the Mission Soil's implementation plan.

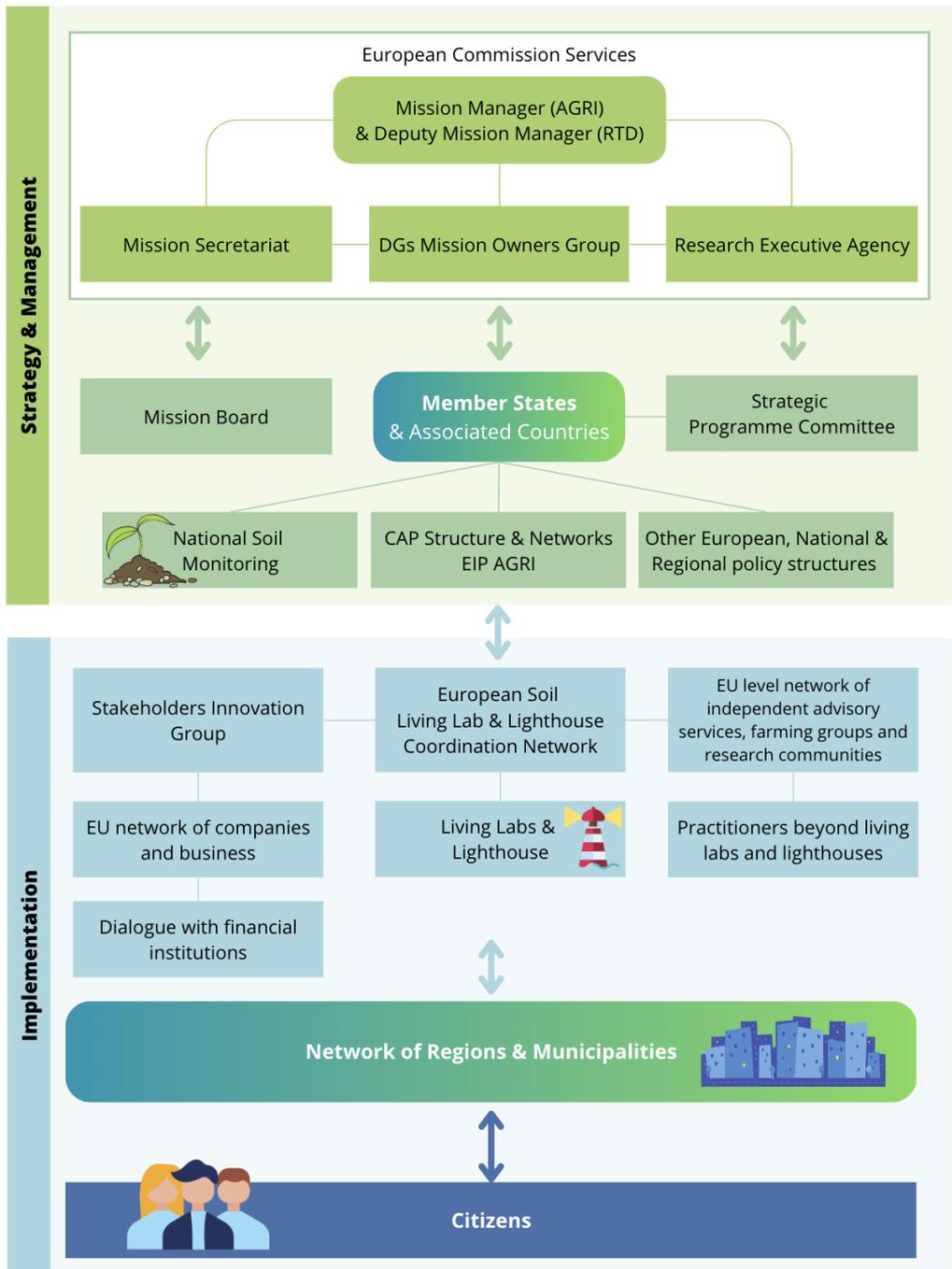


Figure 4. Governance structures for strategy/programming and implementation

Source: Study team

3. Assessment of findings

3.1. Assessment of mission selection process

Possibilities for stakeholder consultation during the mission formulation were hampered due to the COVID19 situation limiting possibilities to bring actors together physically from spring 2020 onwards. Nevertheless, over 300 events were organised or attended in the period 2019-2023, many of which took place on-site. This included the 'R&I Days' in September 2019, at which 150 stakeholders engaged in identifying important challenges in relation to the mission area and discussing the expected impact of the mission. Other relevant events for discussing soil health problems and solutions, that took place in November and December 2019, were, for example, the 'Outlook Conference' in Brussels and the International Green Week in Berlin, the Salon D' Agriculture in Paris, Moët Hennessy event on soil health or a mission event at the global AIM for Climate summit in Washington DC. Moreover, there were also external communication and engagement initiatives of a digital nature, including the release of three videos⁷, several articles and peer reviewed publications⁸, the EIP-AGRI newsletter, a survey of 7000 contacts (with over 2000 stakeholders expressing their views on the mission area and needs to be tackled under the Mission) and social media activities (e.g. via Twitter) around the World Soil Day and other major events.⁹

For the purpose of this review, a survey of stakeholders, familiar with the mission selection process (see section 1.2). The first two tables of survey results in annex 5.3 show the background of the survey respondents. About half of the 60 respondents consists of representatives of national government institutions / public agencies or of higher education institutions. An additional 15% were member of the mission board, with the remainder of respondents belonging to a wide variety of organisational types.

The respondents state that there has been sufficient transparency and that relevant stakeholders were consulted. The responses are roughly similar to the results found for the other missions. The figure below shows that most respondents think that in terms of how it is programmed, the mission is encouraging broad engagement and active participation of stakeholders and citizens. More detail on communication and co-creation activities in the implementation of the mission can be found in sections 2.3 and 2.5.

⁷ Life on earth depends on soil. https://www.youtube.com/watch?v=oJF_GTmrJGI&feature=youtu.be

⁸ See e.g.: Soil priorities in the European Union - ScienceDirect; Activity update of the Mission Board of European Union on soil health and food - ScienceDirect; SOIL - Transforming living labs into lighthouses: a promising policy to achieve land-related sustainable development (copernicus.org)

⁹ Presentation Mission Board Soil Health and Food (February 2020).

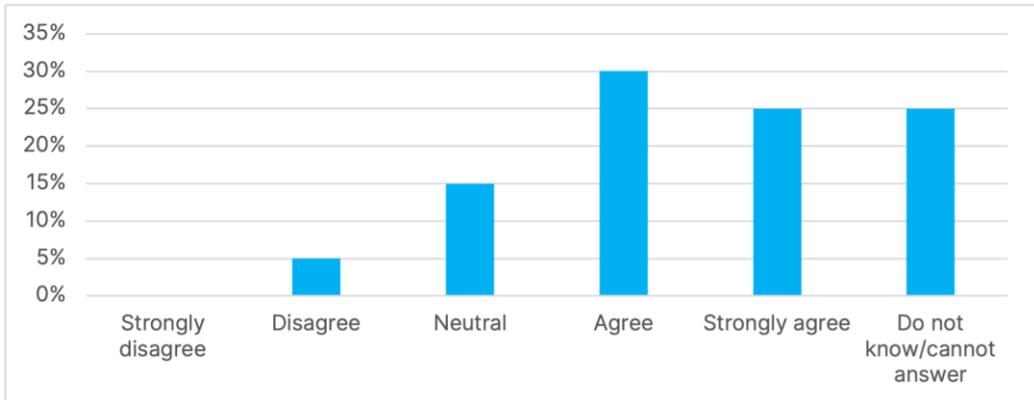


Figure 5. The mission has been selected in a transparent manner (N=60)

Source: online survey conducted by the study team

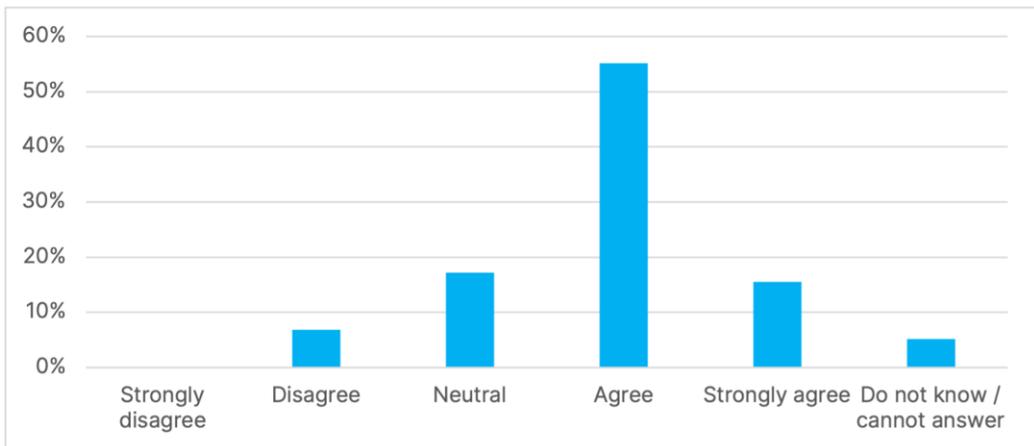


Figure 6. The mission encourages broad engagement and active participation of stakeholders and citizens (N = 58)

Source: online survey conducted by the study team

Regarding the scope of the mission, interviewees unequivocally praise the resulting mission for being ambitious, original, and well-grounded in terms of underlying analyses and foreseen actions for completing it. Part of this analysis is included in section 8 of the implementation plan, which reviews the evidence base on soil health conditions, proposes soil health indicators, and discusses evidence on ‘management practices and outcomes in relation to mission objectives. This last point suggests that technically the overall mission goals are realistic, based on the availability of well-tested management practices related to e.g. efficient (re)use of natural resources; reduced use of control chemicals’ soil structure protection; and improved soil cover.¹⁰ The challenge remains to enhance the actual application of such practices, which therefore receives prominent attention in the building blocks of the implementation plans. There is no ex-ante evidence on how the LLs approach will work out.

¹⁰ See section 8C in the implementation plan: “Summary of evidence submitted by the scientific community on management practices and outcomes in relation to mission objectives”

Nevertheless, as can be seen below, most survey respondents regard the mission as bold, inspirational and with the necessary scope.

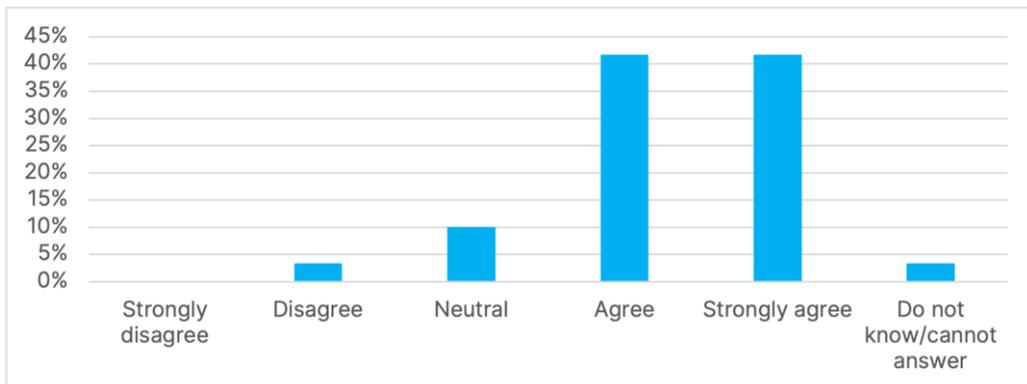


Figure 7. The mission is bold, inspirational and has the necessary scope (N=60)

Source: online survey conducted by the study team

One recurring observation is that the scientific discipline of studying soil health (or closely related concepts) has been around for decades, but that it has mainly focused on agricultural soils and food production. Broadening it up to other soil types and usages is a novelty, in itself. Moreover, by making it such a prominent element of one of the five EU Missions, it is likely that it will rapidly gain more attention and deliver impact on the ground. This could already have a positive effect, as more awareness of soil health issues is a precondition for taking action. According to interviewees, there has been little policy progress at EU level in this field in the past decades, indicating that the mission can be of substantial added value. This would particularly concern the potential of the mission to tie together fragmented frameworks, policies, networks, etc. that all cover a specific part of soil health without making connections between topics like experimenting, monitoring, changing incentives, and adapting regulations for soil management practices that affect different ecosystem services and soil health indicators. As the term soil health is gaining momentum also at global level and in the private sector, the mission is also considered to be pioneering efforts to put this concept into practice. This is evidenced for example by the large interest shown and the number of initiatives emerging on soil and land management, carbon sequestration or regenerative agriculture and carbon farming driven by international public and private partners (e.g. Aim for Climate, Coalition 4SoilHealth, Coalition for a Soil Health Law also representing a large number of food and beverage industries, philanthropic institutions such as the Bill and Melinda Gates Foundation).

The vision and implementation plan for the mission are in line with the imperatives proposed by Mariana Mazzucato's work on mission-oriented innovation policy, in general (Mazzucato, M. 2018) and EU mission-oriented R&I policy, more specifically (European Commission, Mazzucato. 2018). This notably concerns the philosophy of calling for multi- or even transdisciplinary research targeted at overcoming implementation and diffusion challenges. Co-producing and spreading knowledge are at the core of Mission Soil. This is evidenced by for instance the focus on LLs and LHs as environments in which diverse stakeholders can experiment and exchange lessons regarding the physical/chemical as well as business and

legitimacy aspects of innovative soil management practices.¹¹ Most interviewees welcome the focus on LL as a means to achieve impact beyond more traditional R&I funding. Some interviewees expressed a doubt about the extent to which it would be useful to set up LLs beyond the agricultural setting. One interviewee remarked that agriculture and livestock husbandry are responsible for most of the environmental damage. On the other hand, evidence suggest that it is critical to address soil health in forests and urban lands, the more so as it has been neglected in research and practice in the past. As pointed out during the policy workshop, agricultural actors are perceived as better organised and better positioned to respond to the LL calls. The mission is therefore clearly facing (and already addressing) a major need to test the living lab approach beyond agriculture and seek for improvements in soil health across all land uses.

A perceived strength of the focus on LLs and LHs is that it still allows for plenty of variation in how actors like farmers, foresters, landowners, public authorities and citizens will experiment, interact and learn. This makes it robust for the high level of variation in soils, soil usage and institutional landscapes in regions across Europe. At the same time there is a notable demand for more clarity on what models and funding constructions might be used to establish / manage LL and keep them running after the kick-start support of HE calls ends.

Moreover, the focus on soil literacy and citizen science (e.g. citizens contributing to LL activities around experiment design and data gathering) testify of a scope that aims to do more than conducting ground-breaking research. It also considers socio-economic factors that determine the uptake of innovations. Crucial in this respect is the work on influencing and adapting related EU and national/regional policies, which will be discussed in more depth in the subsequent sections.

Finally, in addition to the eight specific objectives, the mission also aims to contribute to reducing the global soil footprint. This is an example of a broad societal concern (inspired by the EU's commitment to the SDG's) for which allegedly only few policy instruments exist. Reducing the negative impacts of soil use requires robust indicators, as these are a basis for policy development as well as for engaging stakeholders. By investing in activities for aligning measurements as well as interests and instruments, the Mission Soil seems to make good use of the potential of missions (as a policy tool for coordination) to bridge possible divides between countries and policy domains.

3.2. Assessment of governance structures and management arrangements

Amongst interviewees there is appreciation for the constellation in which the abovementioned DGs work together and are responsible for implementing the main EU research and policy actions under the mission, while a mission board with diverse experts provides advice and direction. Some relatively minor concerns were expressed related to the second generation of the mission board. As the mission and the supporting vision already have been formulated, the advice role of the mission board has de facto become less prominent. It now is seen as a collection of 'ambassadors' rather than as a governance structure that has a strong mandate for safeguarding the implementation of the vision. For instance, the mission board (previous and current) has little to say about the criteria of HE calls or about evaluating proposals. This is not their role, but it has given rise to questions on maintaining consistency.

¹¹ "Living labs are collaborative initiatives to co-create knowledge and innovations while lighthouses are places for demonstration of solutions and exemplary achievements." Implementation plan soil health mission (2020, p. 28).

Potentially these questions can be answered by articulating more explicitly the mechanisms that ensure that the original vision does not get lost when translating it into policy actions.

Moreover, the survey respondents are generally positive about the suitability of the governance setup for steering and implementing the mission, see Figure 8 below. In as far as more critical comments have been expressed, these concern the demand for better clarification of roles and responsibilities of the various elements in the governance structure; intensified support for Member State (MS) representatives in organising initiatives (beyond HE calls); more communication on e.g. how the opinions and comments of MS representatives are handled; and a more visible and accessible mission board (chair). Collaboration with the mission secretariat is qualified as effective and clear.

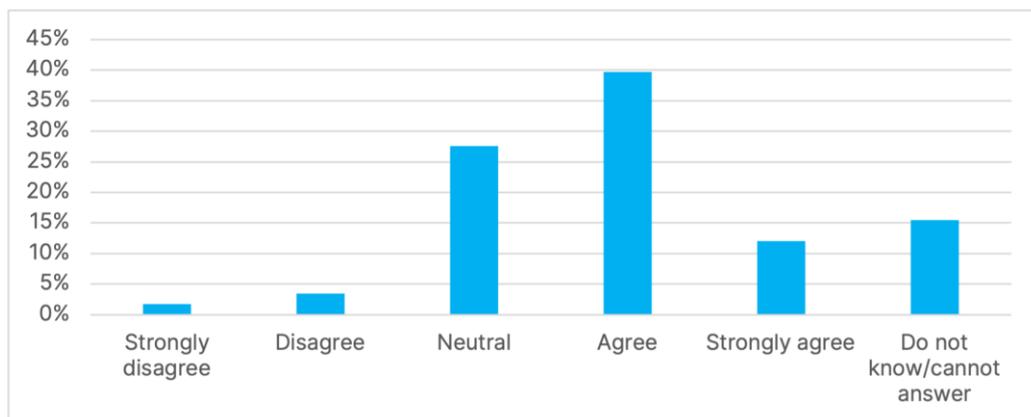


Figure 8. The governance setup of the mission is suitable for steering and implementation (N=58)

Source: online survey conducted by the study team

Figure 9 displays the respondents' answers regarding their top-3 most important barriers to effective mission governance, these include 'challenges in aligning resources across different governance levels', 'lack of clarity of responsibilities among the mission governance bodies', and 'divergence in the interests of different governance bodies'. While interviewees have not pointed to clear cases of contestation or misalignment, they occasionally stress that it is not clear what exactly is expected from national and regional policy actors (thus hindering alignment). One proposed suggestion is to better involve practitioners and reimburse them for the time they spend on participating in governance processes and/or engaging stakeholders in their own areas. Low involvement of non-governmental stakeholders is not regarded as a major barrier. However, some survey respondents and interviewees have advocated for a stronger involvement of financial stakeholders (investors) as well as public or private advisory organisations and extension services that support farmers in discovering the benefits of adopting soil management practices.

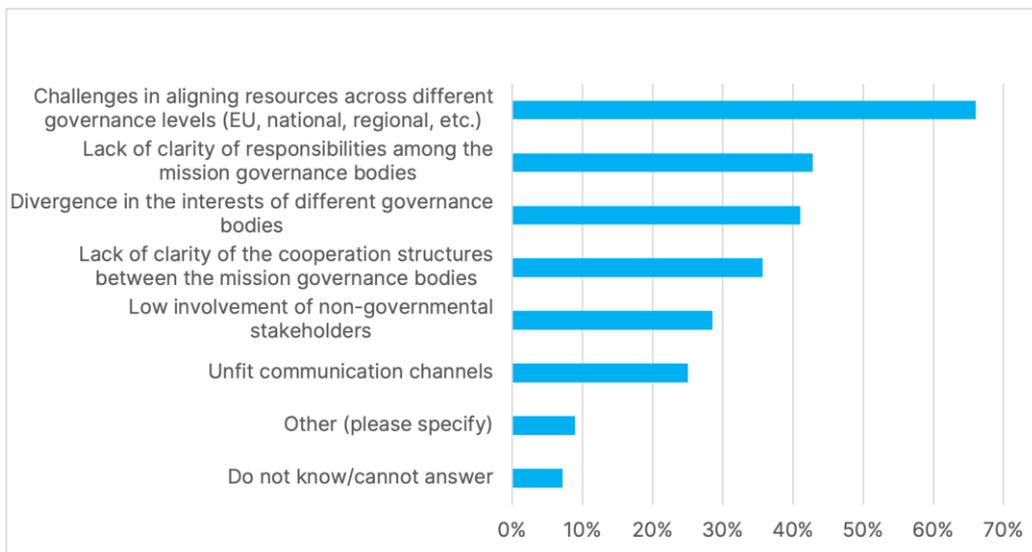


Figure 9. Importance of barriers to effective mission governance (N=56)

Source: online survey conducted by the study team

HORIZONTAL COORDINATION AT THE EU LEVEL

Through the governance structures discussed above, the mission is lending support to or is supported by a number of related policies at the EU level. The implementation plan (2021) lists 12 Green Deal strategies (including Farm to Fork, the European Biodiversity Strategy, the Climate Adaptation Strategy and the new EU Forest Strategy, Communication on Sustainable Carbon Cycles, EU Soil Strategy); the CAP; and EU policies concerning the Digital Age (for instance via collaboration with Digital Innovation Hubs) as well as other topics (e.g. the Water Framework Directive, the Habitats Directive, the Marine Strategy Framework Directive, the Bioeconomy Strategy, and the Circular Economy Action Plan). InvestEU also has the potential to contribute to the mission.

It is still early to judge how effective the governance arrangements and policy linkages are. On paper, the mission is relevant for many policies, and for many it has been identified what this relevance consists of and how it can be addressed, but interviewees so far find it difficult to appraise the meaning of the linkages that at least on paper look convincing. Several interviewees note that, probably because of how it historically emerged, DG AGRI, DG RTD and the JRC showed a particularly strong interest in the Mission. There is also significant buy-in from DG ENV, in particular as the Mission Soil is crucial for the success of the soil strategy and the Commission's proposal for a Soil Monitoring Directive. Apart from providing essential indicators, the mission leverages resources and networks for goals DG ENV is pursuing as well. Similarly, DG CLIMA has welcomed the mission as a tool for strengthening its activities on counteracting climate change (as done via e.g. the LIFE programme¹²). The mission contributes for instance to the creation of a framework for the monitoring, verification and reporting on carbon removal, which complements the LIFE Carbon Farming Scheme¹³. Moreover, one of many highlighted synergies is that directorates-general like DG ENV and DG CLIMA can propose support schemes and laws, but that they have only limited means to

¹² https://cinea.ec.europa.eu/programmes/life_en

¹³ https://climate.ec.europa.eu/eu-action/sustainable-carbon-cycles/carbon-farming_en

engage in stakeholder interactions that contribute to societal acceptance and participation. Hence, a particularly interesting feature of the mission is that it offers possibilities for organising outreach, demonstration, co-creation and adoption.

Other DGs engage as well, but according to interviewees they could be more involved in driving the mission, but also to benefit from its contribution to specific policies. Interviewees repeatedly expressed the opinion that Members of the European Parliament should become more familiar with the missions and express more support to the Missions. Possibly the still relatively early stage of the missions plays a role here, but it does appear to merit more attention.

VERTICAL COORDINATION AT THE GLOBAL-EU-NATIONAL-REGIONAL LEVELS

The EC, and in particular the mission secretariat, has invested in a broad range of partnerships that contribute to getting soil health high on political and policy agendas around the world. An example is the EC support for the UN Food and Agriculture Organisation (FAO) in establishing its Global Soil Partnership. Other examples include the EC's efforts to promote the mission at the UNFCCC COP27, the Japan Moonshot Programme event on agrifood science and technology, the World Soil Day 2022 event and during the International Forum for Food and Agriculture at the Green Week 2023 in Berlin. In turn, the mission benefits from the fact that soil health is receiving more attention and has achieved a prominent place in policy debates and events that traditionally would not highlight soil health as such. The Mission Soil has become a major flagship for the EU's international cooperation such as under the Agriculture Innovation Mission for Climate and the global Coalition of Action for Soil Health.

Asked what key (coordination) elements would help the Mission Soil be of increased added value, survey respondents mostly point at 'effective coordination between EU, national, regional, and local levels'. Apparently, this is more of a concern than cross-policy coordination at the EU level itself. Interestingly, this holds for all missions, and thus is not a specific issue for the Mission Soil.

An additional survey question reveals that the mission's objectives are perceived to be influencing the R&I policy agenda in particular at the supranational level, and to a lesser extent at the national level. Influence at the regional or local policy level is less clear, despite the mission's focus on LLs and LHs being targeted mainly at that level. This is probably since major R&I programmes are mostly run by national and not regional institutions. An exception are the operational groups funded under the CAP which provide for R&I and demonstration of solutions at local level and are instrumental to replicate solutions developed under the mission. This is a unique resource providing complementary funding and allowing to boost implementation of the Mission at local levels.

A second survey question on this topic suggests that missions are still much less on the agenda on the local level. Interestingly, survey respondents do not ascribe this primarily to insufficient coordination between the EU and national policymakers, but rather to insufficient coordination between policymakers within a country. Accordingly, the most reported key enabling factor for mission implementation is ensuring that also national policy plans/strategies include a focus on one or more missions. For a brief case study on how this is working out in The Netherlands, see Box 1 in section 3.3.3.

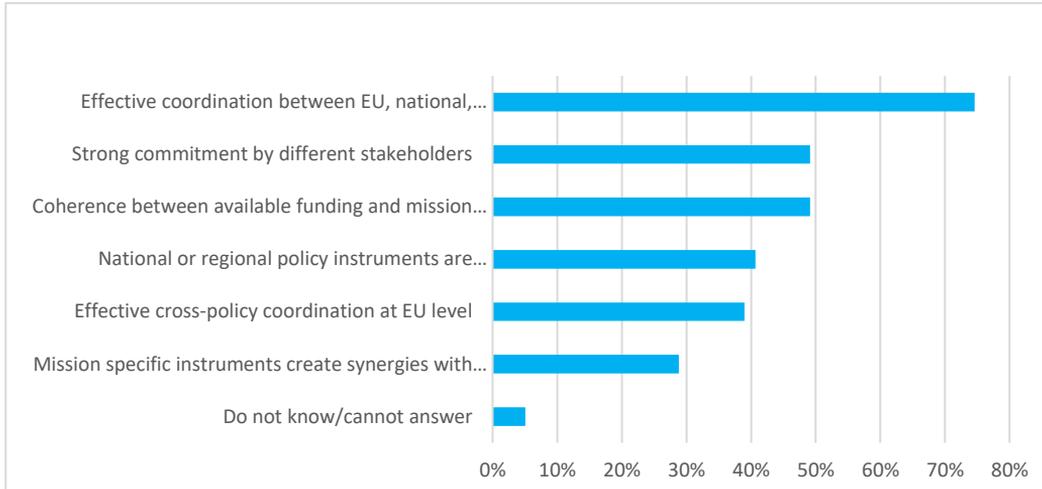


Figure 10. Key elements that should help the mission to create added value (N=59)

Source: online survey conducted by the study team



Figure 11. Influence of mission objectives on the R&I policy agenda (N=57)

Source: online survey conducted by the study team

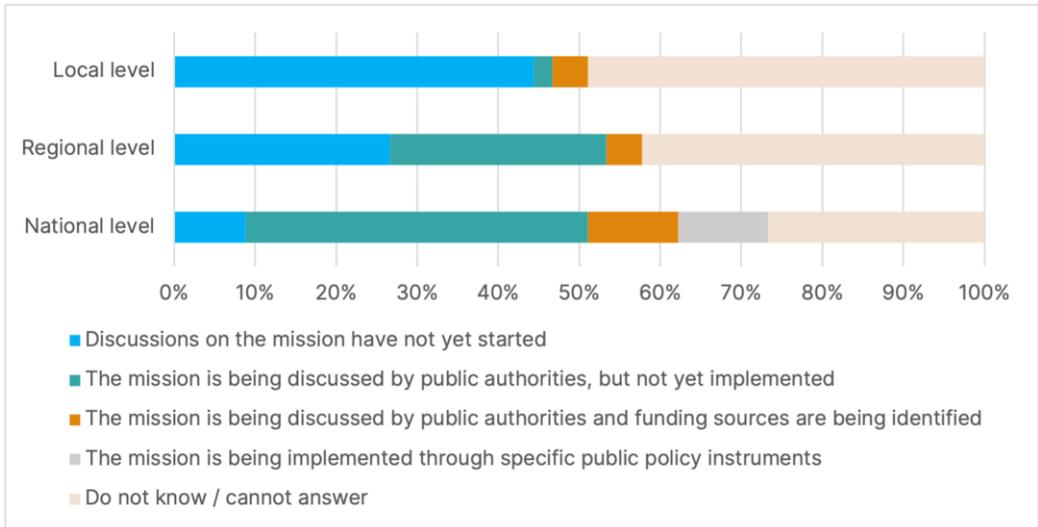


Figure 12. Mission development and implementation at national, regional and local level (N=45)

Source: online survey conducted by the study team

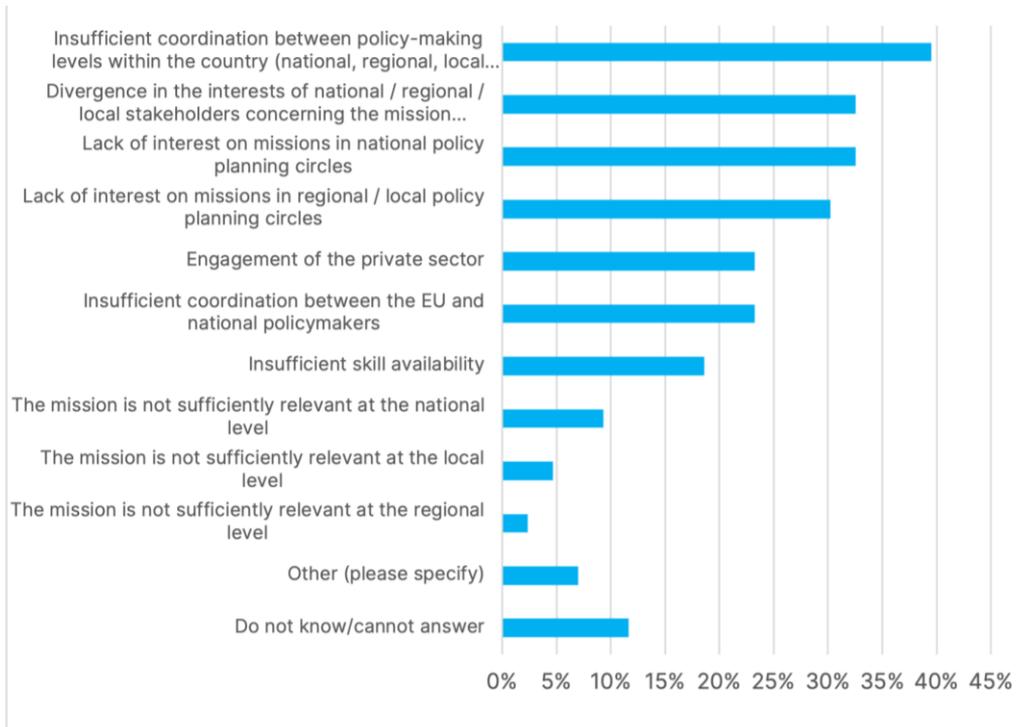


Figure 13. Factors limiting the implementation of the mission (N=43)

Source: online survey conducted by the study team

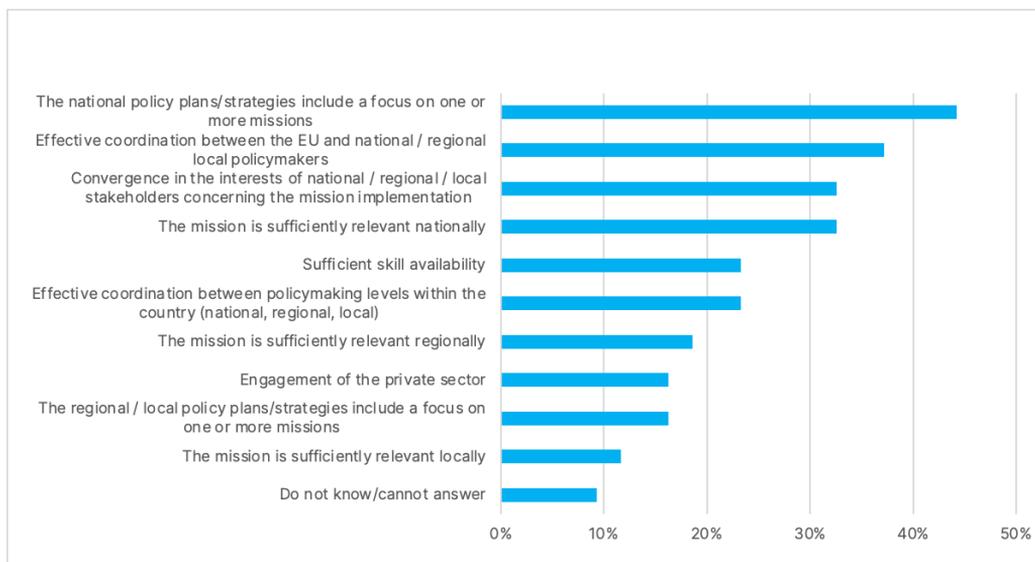


Figure 14. Factors enabling the implementation of the mission (N=43)

Source: online survey conducted by the study team

3.3. Assessment of the mission's implementation to date

3.3.1. Intervention logic and theory of change

The implementation plan provides the evidence base that demonstrates the alarming condition of European soils. Besides stressing why intervention is justified, it also contains the overall intervention logic that stresses where and what intervention is needed (shown above in Figure 3) as well as an elaboration of that intervention logic per operational objective. These logical frameworks sketch which actions are undertaken per operational objective, and how this relates to the eight specific objectives.

To understand how the mission is driving change, it is helpful to construct **a theory of change** that expresses how policy actions relate to the changes in behaviours, frameworks, policies etc. that are essential for achieving the mission goal. Such an exercise serves to create an understanding of the mechanisms through which the mission aims to complete its goal, and to address possible lacunas in the causal chain from actions to envisaged impacts.

Figure 15 presents a simplified¹⁴ theory of change for the Mission Soil that was constructed as part of this assessment.

¹⁴ A more detailed ToC was developed by the study team and can be found in annex. The simplified version provides a summary of the key blocks but does not show all the detailed links.

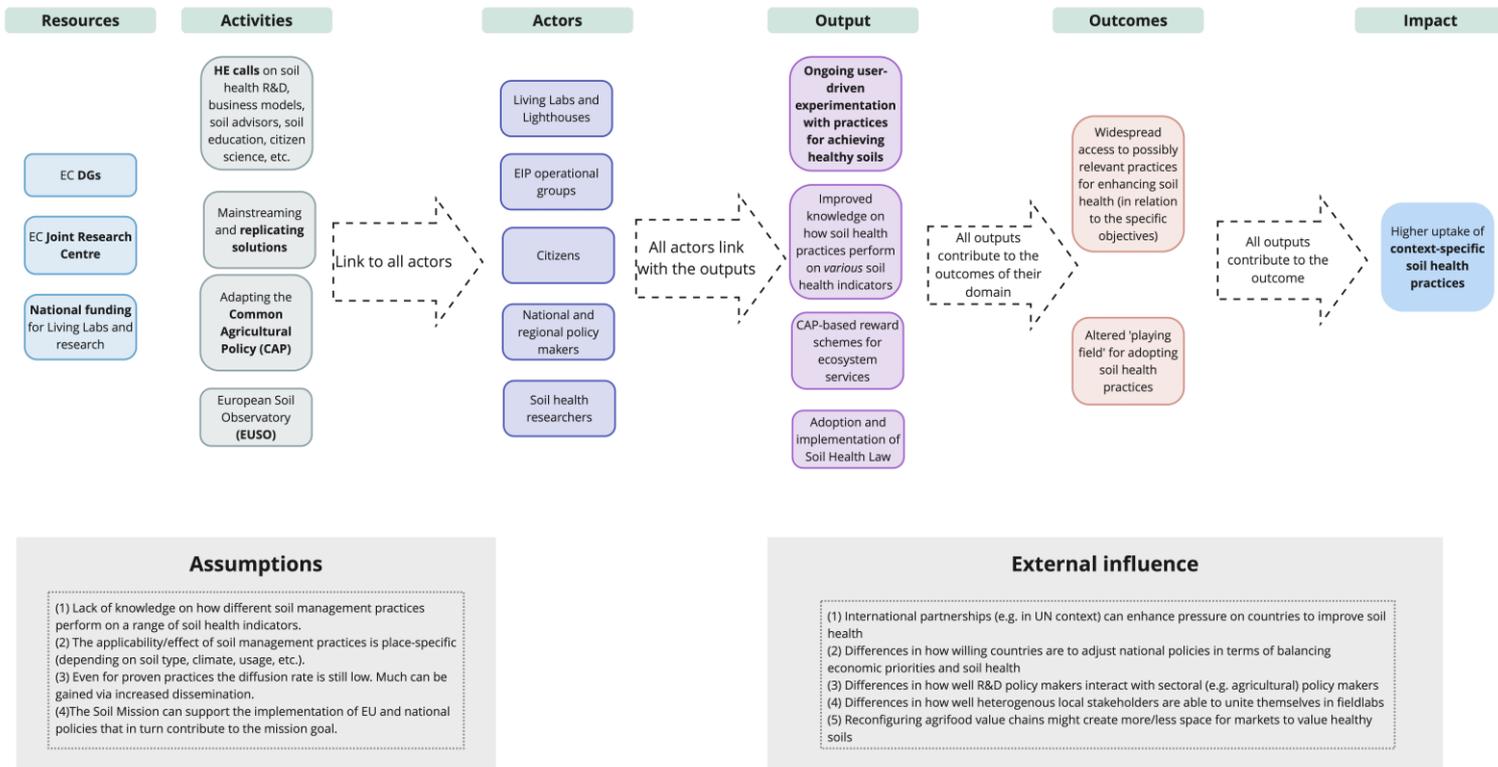


Figure 15. A Mission theory of change

Source: Study team own elaboration

Since it is impossible to capture all actions that are in some way related to the mission, the figure identifies the main change mechanisms (and their interrelations) rather than seeking to be comprehensive. The main change mechanisms can be discerned by reading from right (outcomes and impact) to left (underlying resources/activities, targeted actors and outputs).

- One very visible change mechanism draws on the various activities that serve to **experiment with and disseminate soil health management practices**. This mechanism supports operational objectives 1, 2 and 4. It involves the cornerstone element of the LLs and LHs as environments in which variegated stakeholders can explore and showcase existing as well as innovative ways of improving soil health. The LLs and LHs are supported via actions relying on Horizon Europe (HE) calls; see section 3.3.2 for more detail. Those calls fund research that can take place in the context of those LLs/LHs, e.g. on soil health management practices, business models, soil education, citizen science. Other calls fund support structures for the LLs/LHs, for instance via specific grant agreements (SGAs). Lessons obtained from applied research are to be disseminated via relevant networks like the EIP AGRI (which itself also provides an experimentation environment for soil health).
- Another prominent change mechanism involves **improving our knowledge of the status and evolution of soil health** across Europe. This relates to operational objective 3, on developing an integrated soil monitoring system, and is funded via HE calls (and coordinated by the JRC) and actions undertaken in Member States. Here it concerns calls for projects focusing on the development and harmonization of indicators as well as advancing methods and technologies for soil monitoring (including artificial intelligence).

Additionally, the change mechanism on monitoring also forms a basis for two critical change mechanisms not covered by the mission's operational objectives and associated intervention logics. Both concern policy changes that alter the 'playing field' and (thus) actors' motivations for adopting the outputs of operational objectives 1-4.

- First, there is a change mechanism that can increase legal pressures demanding soil health improvement, i.e. via norms and regulations. A notable development is the Commission's proposal for a Soil Monitoring Directive that is now being prepared by the Commission.¹⁵ About 15 years ago there was an attempt to introduce such a law, analogous to EU laws on clean air and waters. The attempt failed as some Member States considered it not to be an EU competence. This time the European Parliament requested the directive¹⁶, which was then announced as part of the EU Soil Strategy for 2030.¹⁷

With the growing attention on soil health, partially driven by the mission, there is a window of opportunity for getting the proposed directive not only accepted, but also serving as a basis for ambitious plans by the Member States. The envisaged directive would oblige countries to transpose it into national legislation so that taking good care of soil health becomes mandatory. This can be a potential game-changer for the mission, as it would drastically increase the demand for innovative soil management practices.

¹⁵ Soil health – protecting, sustainably managing and restoring EU soils. https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13350-Soil-health-protecting-sustainably-managing-and-restoring-EU-soils_en

¹⁶ Petition No 0474/2021 concerning the proposal for a directive establishing a framework for the protection of soil: https://www.europarl.europa.eu/doceo/document/PETI-CM-719688_EN.pdf

¹⁷ EU Soil Strategy for 2030 - Reaping the benefits of healthy soils for people, food, nature and climate. COM/2021/699 final

To make this happen, it is important that Member States are confident that ambitious legislation can be enforced. Crucial in this respect is the availability of a harmonised monitoring infrastructure that allows for objective assessments on how a certain region is performing. Developing such an infrastructure is one of the four building blocks of the mission. This is a signal that the mission is targeting issues that demand urgent attention; one interviewee even states that (for the Commission's proposal for a Soil Monitoring Directive to work) it is no less than crucial that the mission delivers on its promise of providing a solid monitoring infrastructure. At the same time, some interviewees expressed concerns over the timelines of the indicator development/validation/harmonisation and the Commission's proposal for a Soil Monitoring Directive not being entirely aligned. This is understandable, as the two complementary policy developments have different backgrounds, and the Commission's proposal for a Soil Monitoring Directive is one of many new policies the mission is trying to support. Still, for some interviewees this begs the question as to whether it would not be better to be more cautious and take more time for the Commission's proposal for a Soil Monitoring Directive. National ministerial representatives are reported to still be uncomfortable about the monitoring issue, as they fear problems in achieving a wide acceptance of harmonised indicators and fair methods for setting a reference on which the Commission's proposal for a Soil Monitoring Directive implementation can draw.

Aiming to harvest the outstanding opportunity that is emerging for the acceptance and effective use of the proposed directive, the EC is undertaking various activities to enhance Member States awareness' of the feasibility of making it work (once all monitoring elements are in place). Given how crucial the proposed directive can be for driving change, multiple interviewees stress the need to intensify interactions with Member States representatives concerned with the Commission's proposal for a Soil Monitoring Directive. They also point out that while a EU-level directive does not yet exist, countries do have all sorts of laws that touch upon soil health issues. This is allegedly something that could be studied in more depth, in order to also support more harmonisation on that account.

- Second, behaviour of actors such as landowners and land managers is also likely to change when **policy schemes and market mechanisms provide rewards for pursuing healthy soils.**

Looking at policy schemes, a policy framework of major importance here (albeit only for the part of soil health that concerns agriculture) is the CAP. With the CAP's 2021-2027 reform, individual Member States obtained more freedom in deciding how they use the financially very significant funds (see section 3.3.3 for details). Moreover, MS are required to spend a minimum of 30% of the European Agricultural Fund for Rural Development (EAFRD) budget on interventions directly targeted at environment and climate change (Meredith, S., Hart, K. 2019). According to recent figures provided by DG AGRI, 18 out of 28 CAP strategic plans make explicit links to the Mission Soil, thereby linking innovations in soil health management, farming practises and the allocation of CAP funds. For example: solutions developed under the mission can now be deployed and replicated with CAP funding, e.g. in more than 1000 additional testing sites (EIP-AGRI operational groups as part of the CAP network). A country-specific example comes from Slovakia, where the CAP will support soil monitoring, upskilling of advisors and dissemination of solutions developed under the Mission Soil.

One way to create positive incentives would be the use of carbon-removal certification, which would be a basis for rewarding enhanced carbon sequestration in the soil; relevant projects are being funded as part of the Mission Soil portfolio. Similarly, also other ecosystem services could be rewarded, as an alternative to allocating funds based on production hectares. One interviewee remarked that ideally CAP adjustments would not

reward the use of certain management practices, but rather what is being achieved with it. Then again, other interviewees remark that the CAP is a massive and rigid policy framework that is hard to change. While in theory it could direct more resources to interventions that improve soil health, there is scepticism whether the MS will genuinely use it that way (e.g. given the powerful lobby of business in the agricultural sector). They point out that it might be more realistic to demonstrate how agricultural firms can run an environmentally and economically sustainable business by saving costs on e.g. fertiliser and tillage and by anticipating soil related challenges as a consequence of climate change. Creating more attention for underutilised practices like permanent coverage is one of the things the mission tries to do via, for instance, the LLs and soil advisory/education actions. More familiarity with what can be achieved this way might be a powerful way to convince firms to operate differently (especially when they see other local firms doing it successfully). This might in turn create more opportunities for also aligning the CAP funding allocation, thereby reinforcing the attractiveness of adopting soil health improving practices.

While the willingness for using CAP funds for directly rewarding ecosystem services and (thus) soil health may be growing, supported by the momentum generated by the Mission Soil, again it requires the availability of a robust and trustworthy monitoring system. Another similarity with the change mechanism discussed above, on regulation, is that some interviewees ask for more efforts to make the mission relevant for national CAP strategies. Doing so would entail a shift from 'pushing' the mission to taking a 'demand perspective' and help policy stakeholders with understanding where they might benefit from the mission. Several interviewees praised the work that is already being conducted in this respect and encourage continuation or even intensification of this line of actions. Strengthening synergies between the CAP and the mission appears to be a powerful way of promoting the actual uptake of sustainable management practices.

Besides policy incentives, market mechanisms can be adjusted to better reward healthy soils. For this reason, the mission undertakes investments in developing business models for soil health and in establishing dialogues with private sector parties like major food, beverage, retail, banking and insurance companies. Through the HE WPs for 2022 and 2023, the Mission Soil is channelling about EUR 30m to practices and LLs on carbon farming as well as to the development of methodologies for the monitoring, reporting and verification of carbon removals. This is crucial in view of harmonising approaches and creating a playing level field for carbon markets. The mission offers a highly visible platform for exploring how public and private actors can collaborate in aligning their interests. Recently this line of activities resulted in the launch of the Mission Soil manifesto, which allows private actors (but also regional and local policy makers, NGO's, philanthropic organisations, education institutions, etc.) to publicly state their support for soil health protection and restoration. This development illustrates how the mission is aiming to connect different stakeholders, who together can exert more pressure (on policy makers as well as on critical value chain actors) than alone.

3.3.2. Portfolio of instruments and actions mobilised

The table below presents the EU level funding sources that can be used for building a mission portfolio – i.e. a combination of actions (and ensuing projects, initiatives, investments, etc.) that together help to drive change according to the mechanisms expressed in the intervention logic. One cornerstone is obviously the Horizon Europe Mission budget; information on this has been retrieved from the EC’s funding and grants webpage.¹⁸ Additionally there is a range of other policy instruments that have a possible but not an earmarked link to the topic of improving soil health. This means that on top of the EUR 301m dedicated HE budget (for 2021-2023), there is the possibility to mobilise substantial funding streams via a host of other sources. As the table shows, many of the other HE and non-HE instruments are smaller and broader: they also cover many other topics. A major exception is the CAP, which works with multi-billion budgets in each programming period. Following a dialogue with Member States, 18 out of 28 CAP strategic plans¹⁹ make an explicit link with the Mission Soil, also in terms of allocating funding. Hence, the attention given to this policy scheme throughout this review. In addition, **in the CAP strategic plans²⁰, it is planned to set up around 6 500 operational groups under the EU CAP network, out of which at least 1,000 are expected to address soil management, directly contributing to the Mission Soil and its objectives.**

Instrument	Amount (EUR millions)
CAP 2023-2027 ²¹	50,574.9
CAP 2023-2027 - Operational Groups ²²	350.0
Mission ‘A Soil Deal for Europe’ budget ²³	301
Partnership for Research and Innovation in the Mediterranean Area (PRIMA) Work Programmes 2021-2023 ²⁴	153.4
Circular Bio-based Europe Joint Undertaking (CBE JU) Work Programmes 2022-2023 ²⁵	89.0

¹⁸ See: https://rea.ec.europa.eu/funding-and-grants/horizon-europe-cluster-6-food-bioeconomy-natural-resources-agriculture-and-environment/soil-mission_en

¹⁹ See website CAP strategic plans: https://agriculture.ec.europa.eu/cap-my-country/cap-strategic-plans_en

²⁰ https://agriculture.ec.europa.eu/cap-my-country/cap-strategic-plans_en

²¹ Initial estimation of CAP 2023-2027 contribution to Result Indicator R119. A more targeted analysis will be conducted, focusing only on some practices which affect directly soil protection and management.

²² <https://ec.europa.eu/eip/agriculture/en/eip-agri-projects/projects/operational-groups.html>

²³ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/how-to-participate/reference-documents:programCode=HORIZON>

²⁴ PRIMA annual work plan for 2022 (<https://prima-med.org/wp-content/uploads/2022/01/AWP22.pdf>) and for 2023 (https://prima-med.org/wp-content/uploads/2023/01/ADOPTED_AWP2023_VERSION_C_2023_578_1_EN_annexe_acte_autonome_cp_part1_v1-final.pdf)

²⁵ <https://www.cbe.europa.eu/system/files/2023-03/CBE-JU-Annual-Work-Programme-Budget-2023.pdf>

Instrument	Amount (EUR millions)
European Innovation Council (EIC) Work Programme 2023 ²⁶	65.0
European Joint Programme EJP SOIL Work Programmes 2020–2025 (²⁷)	40.0
LIFE Programme ²⁸	70.0
Digital Europe Programme: complementary funding to Mission Soil activities in relation to Destination Earth (planned for 2024 and/or 2025 depending on outputs of Mission projects)	30.0
EAC/EACEA international actions (Erasmus Mundus. Joint Masters ²⁹ , Capacity Building in Higher Education ³⁰ and Jean Monnet ³¹ actions) (2020 – present)	63.0
EAC/EACEA international actions (Erasmus Mundus Joint Masters ³² , Capacity Building in Higher Education ³³ and Jean Monnet ³⁴ actions) (2020 – present)	63.0

Figure 16. EU level funding sources

Source: EC Funding and tender opportunities portal; mission secretariat.

The diversity of (policy) instrument and actions that are undertaken or mobilised and aligned with the available budget is fairly large. To make sense of how these actions are proceeding, and how complete they are, a portfolio analysis was conducted based on the framework shown below (Figure 17). For each of the operational objectives featuring centrally in the implementation plan, actual and foreseen actions are plotted against four levers that can help to drive change: science and technology; economy and finance; individual and collective action; and governance.

²⁶ https://eic.ec.europa.eu/system/files/2022-12/EIC%20Work%20Programme%202023_F%26T.pdf

²⁷ See: <https://ejpsoil.eu/about-ejp-soil/news-events/item/artikel/horizon-europe-funding>

²⁸ Estimated EU contribution to projects reporting on quantitative improvements in soil quality selected under LIFE 2021 calls. This amount does not include other projects that could address soil issues without having chosen to report on them. These amounts will be confirmed in 2024. Future estimates cannot be done due to the bottom-up approach of the programme.

²⁹ <https://erasmus-plus.ec.europa.eu/opportunities/individuals/students/erasmus-mundus-joint-masters-scholarships>

³⁰ <https://erasmus-plus.ec.europa.eu/opportunities/organisations/cooperation-among-organisations-and-institutions/capacity-building-higher-education>

³¹ <https://erasmus-plus.ec.europa.eu/opportunities/organisations/jean-monnet-actions-stimulating-teaching-and-research-on-the-european-union>

³² <https://erasmus-plus.ec.europa.eu/opportunities/individuals/students/erasmus-mundus-joint-masters-scholarships>

³³ <https://erasmus-plus.ec.europa.eu/opportunities/organisations/cooperation-among-organisations-and-institutions/capacity-building-higher-education>

³⁴ <https://erasmus-plus.ec.europa.eu/opportunities/organisations/jean-monnet-actions-stimulating-teaching-and-research-on-the-european-union>

Operational Objective 1: Build capacities and the knowledge base for soil stewardship

This operational objective is well on track, mostly because it relies heavily on actions that are covered by the first three HE WPs discussed in the next sub-section (Budget for the mission's implementation). The Commission services, in close collaboration with MS and other stakeholders, co-created the R&I agenda that identified specific objectives and key topics to be addressed by HE calls. These calls are proceeding as planned, and the call on LLs has even been accelerated. Specific activities are on-going to maintain/achieve consistency and coherence in the broad range of HE projects. Moreover, projects such as SOLO are delivering input to a long-term research agenda and the identification of key performance indicators (KPI) for the outputs of mission funded research.

Negotiations with philanthropic institutions are advanced on developing joint activities with and leveraging complementary funding from organisations such as the Bill and Melinda Gates Foundation (that has recently announced complementary funding to benefit the Mission of up to EUR 30m) and the Novo Nordisk Foundation.

Operational Objective 2: Co-create and upscale place-based innovations

Living labs are at the core of the Mission Soil. Due to the novelty of the concept – as proposed under the mission – significant efforts have gone into communication and outreach to potential applicants and multipliers of LL calls. This work is crucial in view of creating a shared understanding about the concept and help communities to organise around LLs. In addition, a support structure is in the making (through a framework partnership and a specific grant agreement). It will be operational early 2024 to provide a range of services to applicants, the growing network of LLs and to the EC.

The projects PREPSOIL and NATIOONS are also heavily involved in preparatory work and capacity building notably by organising engagement sessions and promoting the first LL call (in WP 2023) in all Member States and associated countries.

As a result of intensive preparation, the first call for LL was advanced by a year and already published in WP 2023 (instead of WP 2024, as foreseen in the implementation plan). Once LLs are up and running, the diffusion of lessons will be supported by a dedicated living lab support structure and by the EIP-AGRI. It is expected that operational groups funded under the CAP will replicate solutions tested in LLs. This will be a powerful mechanism to scale up the impact of the mission and promote LL-type activities beyond Horizon Europe funding. Furthermore, through the development of territorial management agreements in about 30 pilot regions (13 in 2023 and 20 in 2024), local and regional authorities will have strategies in place to integrate soil management into policies and to leverage funding.

In terms of 'Economy and Finance' levers, it is expected that instruments such as the CAP operational groups and new funding schemes coming out from a study commissioned by the European Investment Bank (EIB) will **help to continue and even upscale the number of LLs created under the Mission Soil**. Interviewees and survey respondents raised the point that more transparency is needed with regards to recognition, approval and support of LLs, as well as possible strategies for LLs to sustain themselves once they have been established. As work in LL progress, there will be a need to develop material that provide information on instruments to sustain LL activities beyond Horizon Europe.

Operational Objective 3: Develop an integrated EU monitoring system

The launch of actions for developing, validating, harmonising and integrating indicators for soil health is proceeding as planned and has become more pertinent in the context of preparing the Commission's proposal for a Soil Monitoring Directive and moves from the private and public sectors to reward and certify carbon removals. This includes Mission Soil activities under Horizon Europe – like the projects BENCHMARKS³⁵ and AI4Soilhealth³⁶ - as well as work undertaken by the JRC in cooperation with the MS and the European Environment Agency (EEA). The increase in carbon markets is a clear example of the role of 'economy and finance' levers which will be supported by the Mission Soil monitoring and accompanying activities to develop business models for soil health (e.g. payment for ecosystem services such as improved biodiversity, see Figure 15).

According to survey respondents and interviewees, **more policy actions or clarifications are needed to ensure that indicators, once available, will indeed be used for changing incentives**. Several interviewees stress that both the Commission's proposal for a Soil Monitoring Directive and the effective use of the CAP (for rewarding healthy soils, e.g. via provided ecosystem services) requires solid indicators, as well as reference values for those indicators. Countries have different soils and different interests, so they will not easily agree on reference values. The soil science community itself might stay away from making political decisions, one interviewee noted, thereby highlighting how the mission has not only a technical nature but in some respects also a political dimension. It is important to consider that reference values do not need to be uniform across regions: countries could propose their own reference values depending on how they are performing and how ambitious they are. This can be negotiated at the EU level, hence, it is helpful if there is objective monitoring that can provide the baseline of how soil health has been developing in recent years in a specific place. The latter is covered by the actions for this operational directive, but **more attention could be paid to helping MS with utilising the indicators for national soil health regulation and for their national CAP strategic plans**.

³⁵ See <https://soilhealthbenchmarks.eu/>: "BENCHMARKS proposes the co-development within 24 European case studies of a multi-scale and multi-user focused monitoring framework that is transparent, harmonised and cost-effective. Underpinned by the best scientific knowledge and technologies this framework provides a clear soil health index for benchmarking, using indicators that are pertinent to the objective of assessment, applicable to the land use and logistically feasible."

³⁶ See <https://ai4soilhealth.eu/>: The AI4SoilHealth Horizon Europe project 2022--2026 is "Accelerating collection and use of soil health information using AI technology to support the Soil Deal for Europe and EU Soil Observatory"

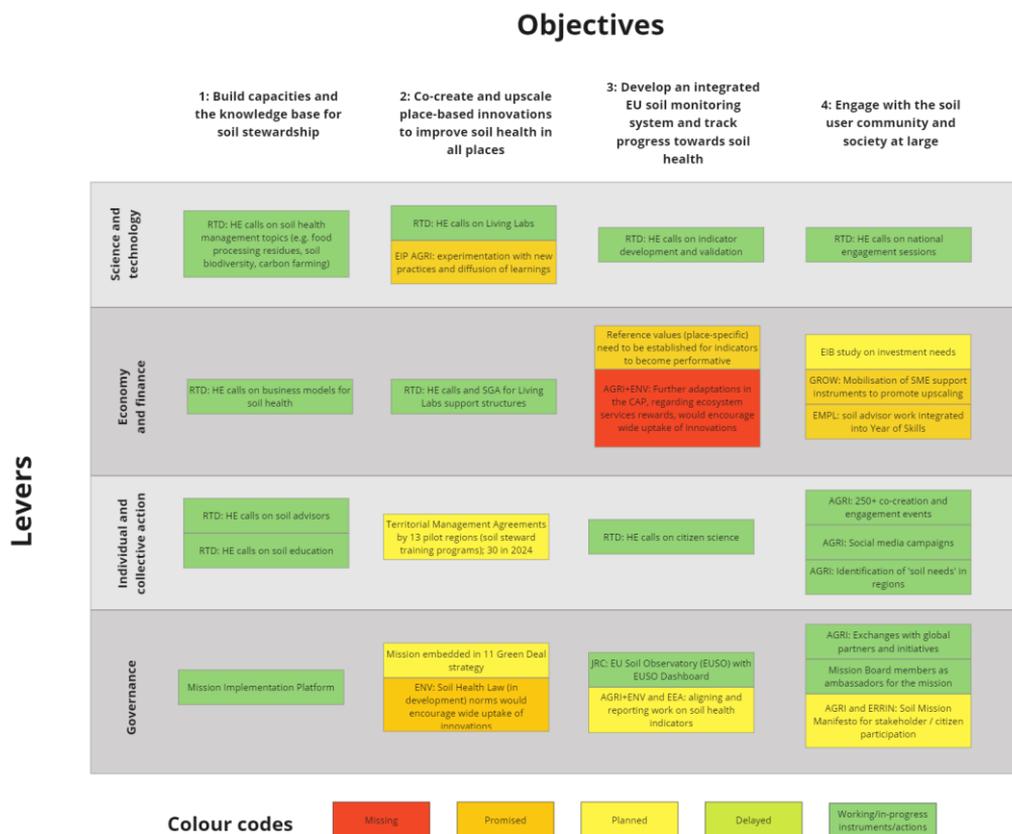


Figure 17. Portfolio mapping of actions deployed or envisaged as part of the Mission Soil.

Source: Study team own elaboration

Operational Objective 4: Engage with the soil user community and society at large

In the mission's initial phase, substantial emphasis has been given to the fourth operational objective, notably regarding communication and outreach. The mission was presented at more than 300 events in Europe and beyond and generated several outputs: four videos, three factsheets, two podcast episodes, one "Result pack" on earlier R&I projects for soil health, articles, press releases, peer reviewed articles, interactive games and regular social media posts. More than 2 500 replies were received following a survey regarding people's awareness about soil challenges.

Anchoring the missions in countries/regions is, according to most interviewees, not yet at the level where it should be in the medium to longer term. However, this is not because of a dearth of initiatives. Together with European Regions Research and Innovation Network (ERRIN) and the Committee of the Regions, the mission launched in April 2023 its manifesto through which regions, municipalities and other stakeholders can voice their support to the mission.³⁷ Only one month after its launch, the Manifesto has more than 600 signatories out

³⁷ <https://errin.eu/events/launch-mission-soil-manifesto>

of which about 100 are institutions (public/regional authorities, companies, research institutes). Moreover, the 'Healthy Municipal Soils' (HuMUS) project started in 2023, which specifically engages with regions for the mission.³⁸ Communication with the MS has been effective, not only through regular interactions with the programme committee but also through the training of national contact points and the TRAMI project³⁹. As a result, **nine MS have created specific Mission Soil mirror groups and many more have organised mechanisms for mission implementation across ministries**. This resembles a suggestion provided by multiple interviewees, namely the introduction of national hubs in which heterogeneous stakeholders convene around soil health issues for which mission results may provide an answer. Instead of adding more and more structures, it might be more helpful to invest in clarifying and intensifying the initiatives and connections that already have been put in place. At the same time, **it remains important to further enhance policy linkages between the mission's actions and national policies** to reflect on how mission and national activities can mutually support each other. Important steps in this respect have been taken, e.g. by establishing a regular dialogue with CAP managing authorities or with the mirror groups.

Regarding the mobilisation of stakeholders and citizens, most survey respondents consider that it is unclear how stakeholders can become involved in the mission (Figure 18). It should be noted here however that the survey was conducted before the mission manifesto was launched, in April 2023. The second most important barrier raised by the survey respondents is that there are insufficient instruments and actions to support the involvement of stakeholders and citizens in the mission. The issue is not how to find relevant stakeholders, and how to manage the interaction with them, but rather to come with a proposition that invites those stakeholders to play a meaningful role in collective efforts to improve the health of soils outside the mission competitive calls and events. This finding is also consistent with the results shown in Figure 18, which suggest that **ensuring that communities and local actors can benefit from their involvement is a key enabling factor for broad engagement and active participation in the mission**. As this is a common concern for all missions, it is recommended to look into new types of activities that go beyond Horizon Europe and/or competitive calls. These concerns will be addressed to some extent by upcoming projects which foresee significant involvement of citizens and stakeholders in the areas of citizen science and the involvement of creative industries in soil health activities.

³⁸ <https://cordis.europa.eu/project/id/101091050>

³⁹ <https://www.trami5missions.eu/>

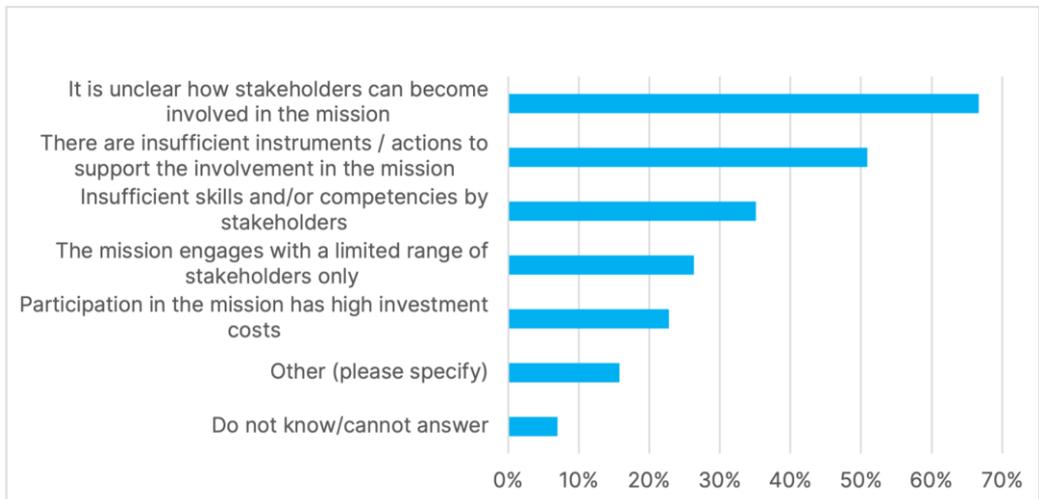


Figure 18. Main barriers to mobilising stakeholders and citizens (N=57)

Source: online survey conducted by the study team

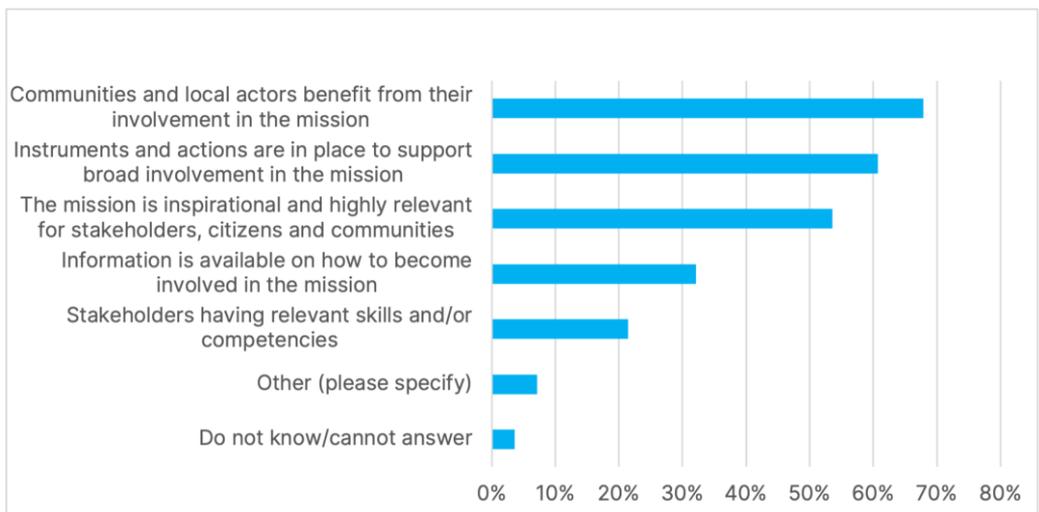


Figure 19. Factors enabling broad engagement and active participation in the mission (N= 56)

Source: online survey conducted by the study team

Finally, the economy and finance lever (i.e. the set of possibilities for driving change through financial rewards) brings to the fore some specific parts of ‘society at large’ that could be mobilised for driving the application of soil health improving practices. **This also includes the private sector (e.g. food producers, investors), which still deserves more attention.** There are some indications that firms like Nestlé, Moët Hennessy and others are already very active on promoting soil health, and that the private sector is interested in soil management practices related to carbon farming (i.e. capturing CO₂ from the atmosphere, for instance via reforestation or the use of cover crops)⁴⁰. Elaboration of what can be expected

⁴⁰ https://climate.ec.europa.eu/eu-action/sustainable-carbon-cycles/carbon-farming_en

can be valuable for providing a long-term business perspective that firms and investors can respond to. Particularly promising in this respect are the recently started projects funded by the HE call ‘Incentives and business models for soil health’⁴¹ as well as current and forthcoming projects exploring different aspects of carbon farming, also in LLS⁴². Moreover, the EIB is preparing a study on investment needs in the mission area. The aim of the study is to identify key market players, quantify their investment needs, and establish an overview of lending opportunities the EIB could consider in order to respond to those particular needs. This could also lead to new financial instruments. Another possible financial lever could be the intention of DG GROW to mobilise SME support instruments for promoting the upscaling of innovative soil management practices.

3.3.3. Budget for the mission’s implementation

As discussed in the previous section, one major funding source for the mission’s implementation is the Horizon Europe mission budget. The first three mission calls under Horizon Europe have been launched as planned. The Horizon Europe actions provide opportunities for research and innovation, in line with the priorities highlighted in the mission implementation plan. The Mission Soil calls are mobilising and connecting communities working on soil protection (researchers, land managers, industries, etc.) some of which in the past have received little attention, in particular when it comes to research funding.

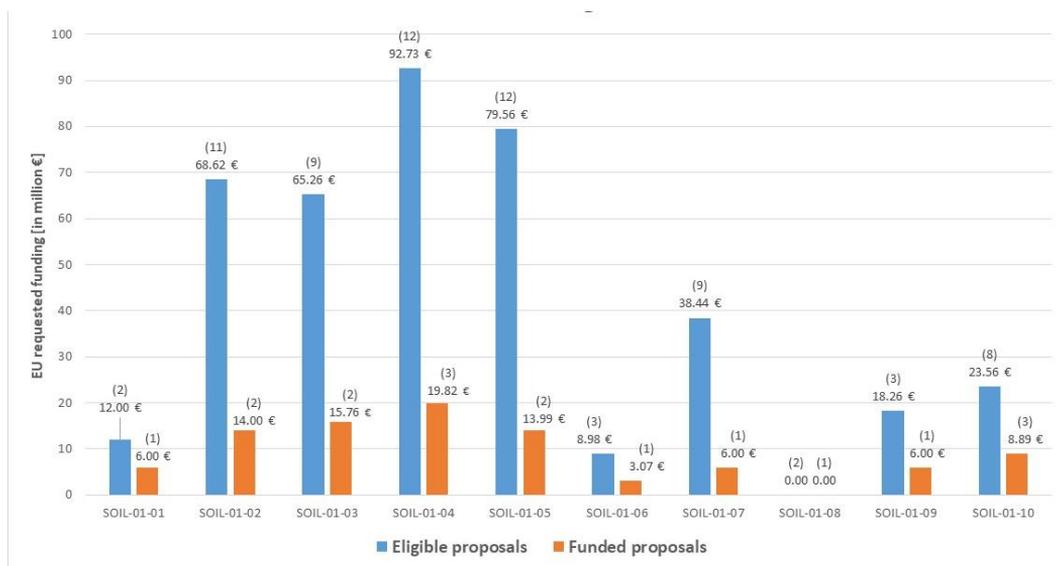


Figure 20. Overview of eligible and funded proposals for WP 2022 calls.

Source: mission secretariat

The tables in Annex 5.4 shows the topics of the calls of WP 2021, WP 2022 and WP 2023. For WP 2021 also the names of the selected projects are included; the grant agreements for the 2022 calls will be signed by June 2023, and the call for 2023 closes in September 2023. The calls have targeted all four operational objectives of the mission. As shown in Figure 20, the number of eligible proposals for the WP 2022 calls generally exceeds the capacity of what

⁴¹ The projects that were launched via HORIZON-MISS-2021-SOIL-02-05: Incentives and business models for soil health are: InBestSoil, Novasoil and SoilValues.

⁴² Projects Credible, MaRVIC, MRV4SOC; topic HORIZON-MISS-2023-SOIL-01-09: Carbon farming in living labs.

could be funded rather well. This holds for the calls on food processing residues (02); soil biodiversity (03); decontamination and reuse of land (04); monitoring, verification, reporting of soil carbon (05); soil education (07); and – with 8 relatively small proposals - innovation from biowaste (10). There were less applications for the calls on building the knowledge repository (01) and the network of carbon farming (06), perhaps because only a few networks in the soil science community were well-positioned to compete here. Topic 08 concerns the support structure for LLs, which is a special grant agreement instead of an open call.

Figure 21 shows the EU MS where applicants received funding from the calls for the Mission Soil by end 2022. Overall, **most of the funding so far has been landing in central and south-west Europe**. What stands out is the large amount of funding allocated to activities in Spain, a country with advanced soil health expertise to face the challenge of half of the land area being deemed (very) highly susceptible to degradation and desertification (JRC 2016). Beneficiaries in Eastern Europe and northern Europe have been less involved in the first HE calls, which might be explained by factors like less expertise required for winning the calls or by less familiarity with the calls. It should be noted that this first image is probably not reflective of how the total HE budget will be spent, since later calls seek different types of expertise and actions (notably the establishment of the LLs and LHs throughout Europe).

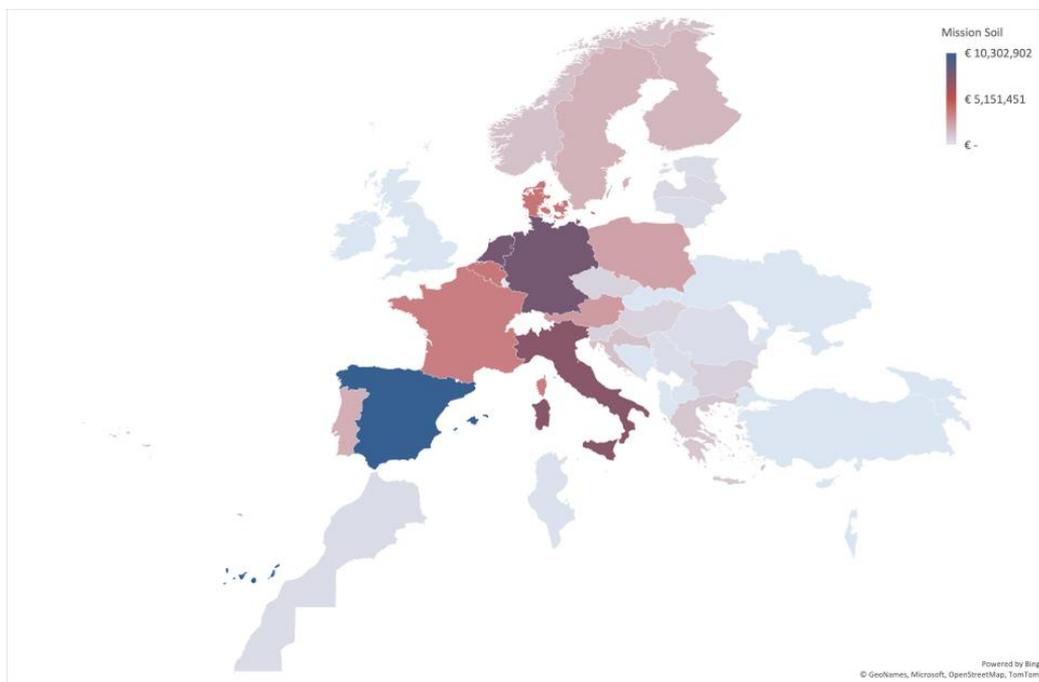


Figure 21. Geographic distribution of funding from the HE calls for the Mission Soil
 Source: authors, data extracted on 21 March 2023 from the Horizon Europe dashboard.

Interviewees expect that **the mission will be a major driver for enhancing capacities for soil research and soil management**, even though this effect may take some years to materialise. The mission could have a crowding-in effect regarding improving the inflow of researchers from other domains and actors from various sectors, as seen in a number of projects. Yet, while leaving limited time between sequential projects/initiatives fits with the urgency of the challenge, it could also lead to funding fragmented and weak(er) initiatives that do not fully serve the purpose of the mission. An observation advanced in multiple

interviews is that the HE mission work programmes have been launched rather quickly, “almost as if there’s a hurry to spend the money”. The research funding that is allocated via HE actions has come within a very short time span, often with very tight deadlines, thus putting some strain on the community of potential applicants.

One consideration proposed in the interviews would be to first **construct a more detailed roadmap regarding what to do (and in which order) for the topics mentioned in the implementation plan**. According to interviewees, such a roadmap development should happen in collaboration with stakeholders other than researchers themselves. It should be noted that in fact the development of work programmes takes place as a co-creation exercise involving a range of Commission services and Member States, who in turn consult their stakeholders. In addition, projects such as EJP Soil and SOLO, contribute to developing long-term strategic roadmaps. The objective of the SOLO project is “to identify current knowledge gaps, drivers, bottlenecks, and novel research and innovation approaches to be considered in the Mission Soil research and innovation roadmap”.⁴³

Interviewees from the academic sector also observe a risk that the field cannot absorb all the research funding or will not take the time to co-create new proposals. The combination of little time and significant funding volumes might lead researchers to revert to their more traditional mono-disciplinary and scientific excellence-oriented approaches to soil science, instead of looking for connections with other projects, disciplines, and ‘unusual suspects’ including users that could play a role in more integrated and applied experiments. This would, for instance, be experiments which unite landowners, farmers, municipalities and even citizens in redefining what producing healthy food means for them and trying out holistic adaptive management approaches that address and balance multiple ecosystem services at the same time. The latter also relates to projects that examine how soil management practices perform on a wide range of indicators regarding both physical/chemical and socio-economic dimensions - and thus also cover the possible side-effects or adoption hurdles of soil management practices. Interviewees welcome the development that the HE actions focus on socio-economic aspects, co-creation based diffusion, citizen science, and training a new generation of soil advisors. Some interviewees nevertheless state that more attention for education would still be welcome.

Apart from the EU level, there is also funding being mobilised at the national level. This involves, for instance, Member States’ contributions to EU programmes like EJP SOIL and PRIMA or private sector contributions such as by the Joint Undertaking Circular Bioeconomy Europe. Additionally, MS also have their own policies and programmes. One prominent example is the German R&I soil programme BONARES (“Soil as a sustainable resource for the bioeconomy”), with a budget of EUR 108m for the period 2015-2025.⁴⁴ This example shows that relevant funding schemes would not only include new programmes, possibly influenced by the EU mission, but also existing programmes that can be used for contributing to the activities and goals of the Mission Soil. Box 1, on the next page, describes for the case of the Netherlands how the EU mission relates to national efforts to spur R&I for addressing soil health issues. The Netherlands was chosen because it has a strong position in soil science while also facing severe challenges in that respect. Moreover, it is also one of the few countries with a nation-wide multi-mission innovation strategy, also covering soils. This makes it interesting to see whether useful connections with the Mission Soil have emerged.

⁴³<https://soils4europe.eu/about>

⁴⁴<https://www.bonares.de/home-de>

Overall, the impression that arises from combining the insights from desk research and interviews, is that **the amount of funding available for the Mission Soil has been appropriate in this first phase during 2021-2023**: it allowed for undertaking a broad range of actions that all have their natural place in driving change (see also subsections 3.3.1 and 3.3.2). However, **the mission will only succeed if sufficient funding is secured over the next years (2024 – 2027), to set up the expected number of LL and scale up exemplary solutions through LHs**. Some concerns have been identified regarding the content and timing of instruments, but the budget itself was not seen as a problem. This is consistent with the survey findings (Figure 22), which shows that most respondents (in particular from academic sector) qualify the allocated resources at the European level in the first phase had been sufficient.

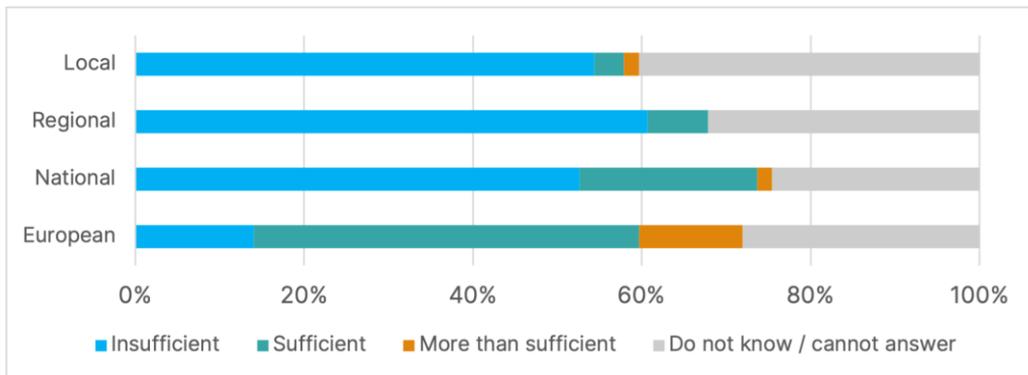


Figure 22. Are the allocated resources sufficient to realise the mission objectives (N=57)

Source: online survey conducted by the study team

It is regarded by interviewees as crucial that budgets are continued beyond 2023 and are adequate for the needs of the mission. Some wonder whether other EU funds like the European Agricultural Fund for Rural Development (EAFRD) and the European Regional Development Fund (ERDF) can be better mobilised for funding LL and dissemination activities (especially in countries with less strong economies), once they have shown their potential. For national, regional and local levels, on the other hand, survey respondents clearly state that allocated resources are insufficient, or that they don't know. This underlines the recurring observation that at the EU level the basis for mission implementation is solid, but **more attention is needed for bringing on board the sub-EU levels where experimentation and policy adaptations still needs to start**.

Over the past years soil health has become a controversial topic in the Netherlands, since EU law requires Member States to bring nitrogen emissions below the agreed limit (also in relation to protected Natura2000 areas). This has led to a severe crisis (affecting agriculture, housing, industry), and a strong demand for more policy guidance. Water scarcity/abundance and quality is another soil-related topic that might turn into a crisis within a couple of years.

The Netherlands has a relatively rich tradition in soil science, and heavy involvement in the broad range of already existing policy initiatives and networks in this field, so in that sense the Mission is not bringing something new. It rather puts a spotlight on a field that is well-developed and now enjoys more international attention. Moreover, the Mission is regarded as a welcome initiative for going beyond soil science (in an agriculture context), and instead focus on experimenting with application/diffusion of soil health management practices for a broader range of soils.

At the national level, mostly the ministries of Agriculture, Nature & Food (LNV) and of Infrastructure & Water Management (IenW) are active drivers of policies that promote soil health. The Ministry of Economic Affairs and Climate Policy is responsible for the national mission-oriented innovation policy framework, which was initiated already back in 2018, but has not linked this to the EU missions. One of the four mission themes (led by LNV) concerns agriculture, water and food, with one of the six underlying missions (A-F) addressing soils as part of mission goal A on circular agriculture.⁴⁵ Sub-goals A1 and especially A2 explicitly consider soil health as a focal topic. Efforts to enhance soil health are so far not strongly connected to the EU mission, interviewees stated that linkages are not sufficiently clear.

LNV is currently looking into possibilities to create region-specific 'field labs'. This is consistent with the mission's focus on LLs but does not follow from it. Moreover, several consulted innovation intermediaries in regional (agricultural) networks were not aware yet of how well their activities fit the Mission's vision and associated policy actions. Awareness amongst some key actors in the target group for Living Lab orchestrators still seems low.

The National Contact Points (NCP) play an important role in informing stakeholders about the opportunities of the EU framework programmes for R&I. They support the increased focus on broadening calls and projects towards different types of stakeholders who are not typically involved in R&I. At the same time this poses some challenges, since it also requires the NCPs to explore new channels for reaching out to actors they normally don't interact with. This has led to some new initiatives like creating an interest group and promoting it via social media. Some relevant actors have heard about the mission (calls) via other channels, suggesting that other communication initiatives are working well but also demanding more action from the NCPs. Several activities are foreseen, including projects supported by the European Commission. One example would be an international NCP project on how to deal with mission calls. There is also praise for broker events that already took place. A highlight mentioned by one interviewee is the relatively novel practice of gathering coordinators of awarded projects, in order to strengthen community development and knowledge exchange.

The NCPs are also engaging with policy officials of the ministries mentioned above, for instance as part of participation in a national level Mission Soil working group that was established for coordination purposes. The overall impression stemming from such interactions is that also in policy circles there is still too little knowledge about what the Mission Soil and associated policy actions entail. One primary concern is that it is unclear what is expected from MS, e.g. regarding their financial contributions. More visibility for soil health problems is appreciated, but the implementation plan and related documents are considered as too abstract for understanding how those problems will be tackled. Multiple interviewees recommend the development and/or strong communication of a long term vision on how the LL will be financed and on what else MS can do to drive (and benefit from) the mission.

Box 1 Case study on national/regional policy response – The Netherlands

⁴⁵ TOAF1910-Kennisagenda-A5-landscape-English-1.pdf (topsectoragrifood.nl)

3.4. Progress towards meeting the mission's goals

The progress made since the EC proposed the mission area, back in 2018, is positive. This particularly holds for the formulation of mission goal, objectives and indicators, the development of an implementation plan, and the first steps for putting the implementation plan in to action.

The mission and its implementation plan, which were published only 18 months ago, are rolled out in three interconnected phases, with the pilot phase running until 2025. A consistent feedback point from interviews is that the mission projects implementation level at the time of this study is still in a very early stage. This is not surprising given the timing of calls, evaluations and grant preparations. The first mission projects funded under the WP 2021 started at the end of 2022 or early 2023, and the second projects are still in the selection phase (grant agreements foreseen for June 2023)⁴⁶. Hence, only little can be said about what the possible outcomes of these projects. A positive observation is that the calls have yielded a large number of eligible proposals, allowing for the selection of the most promising ones.

Additionally, the EC and in particular the mission secretariat (sometimes through commissioned projects) started a broad range of initiatives to promote the mission and to implement actions complementing the Horizon Europe WPs. For instance, in summer 2022, a consultation process was started for identifying regional soil needs, create an interactive map of already existing LL, and enhance access to soil information in MS. Over the course of 2023 and 2024 engagement sessions are being organised in MS to raise awareness and support the creation of LL. The establishment of the first wave of LL supported by the mission is foreseen for 2024, as part of the current 'introduction and pilot phase' running until 2025. This will be followed by the 'expansion and innovation phase' (2025-2030) and the 'scaling up and mainstreaming phase' (2027-2030).

Most survey respondents state that the mission is progressing in line with its implementation plan. Particularly notable is the high percentage of respondents strongly agreeing with the statement that the mission is creating or is likely to create added value compared to existing initiatives or instruments. In comparison with the response for other missions, this high number of strongly agreeing respondents stands out. While it is still much too early to quantify the added value, it is becoming clear where that value can be found and how it comes about. In line with the (desk research based) observations presented in section 3.3, interviewees and survey respondents consistently praise the strong coherence between the implementation plan with its associated actions and the mission board's views on what the mission needs. The four building blocks ('operational objectives') have the potential to reinforce each other, since LL (partially drawing on citizen engagement) can for instance benefit from harmonised monitoring while they can also bring forward new practices that can be used for improving soil health elsewhere. The four operational objectives entail actions that cover all eight specific objectives that are important for completing the mission. In addition to actions belonging to those operational objectives, many extra actions are being undertaken to mobilise and align complementary policies. The policy impact that the mission is beginning to create can notably be found in the contributions to the at least 12 Green Deal strategies and to the CAP as a major financial EU instrument under shared management.

⁴⁶ Source: information provided by mission secretariat.

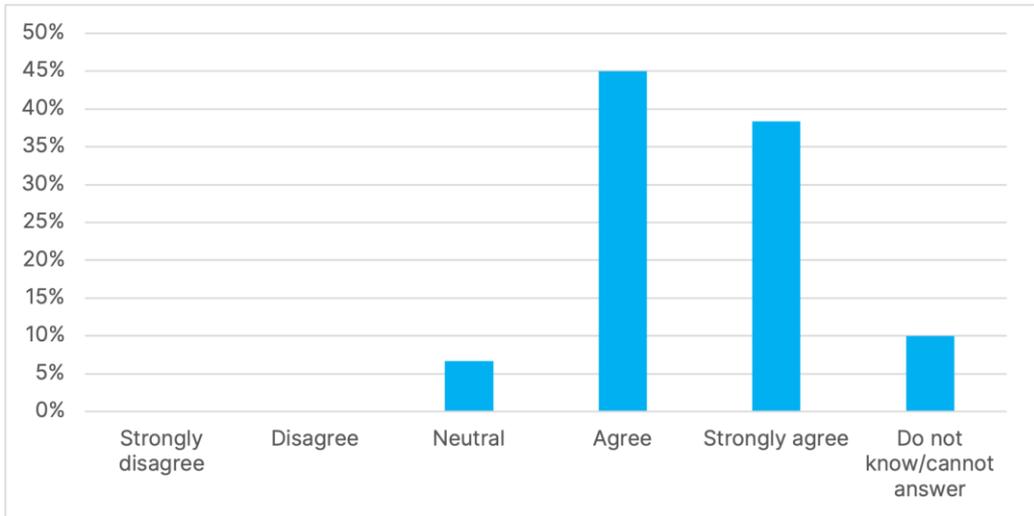


Figure 23. The mission is likely to create added-value (N=60)

Source: online survey conducted by the study team

When asked whether they regard the mission’s overall objective (“to establish 100 LLs and LHs to lead the transition towards healthy soils by 2030”) as achievable, most survey respondents expressed a positive impression. Almost 85% (strongly) agreeing with the statement is substantially higher than observed for most other missions, with only the Mission Cancer coming close with 74% of respondents selecting those categories. This finding might look optimistic, but a possible explanation here is that respondents considered the objective of establishing 100 LLs as a means to making significant improvements to soil health as feasible even if soil formation and soil altering processes may take decades. Moreover, as one survey respondent remarks: “100 LLs and LHs can be set up by 2030, but that will not mean that European soils’ health is good enough to perform the functions they have to”. Many survey respondents express their doubt regarding the MS efforts to make the most of the LLs that will be established.

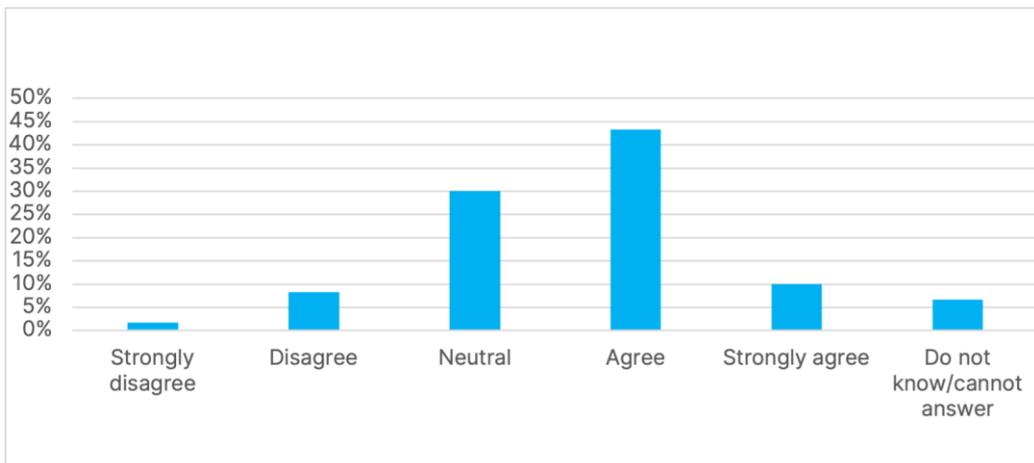


Figure 24. The mission’s overall objective is achievable by 2030 (N=60)

Source: online survey conducted by the study team

The mission scoping and vision is supported, but there is a general feeling of the mission not getting sufficient traction to also reach the aim of substantially increasing soil health in a broad range of European areas. Survey respondents also draw attention to the absence of definitions about what healthy soils represent, despite the fact that the mission proposes a set of seven indicators for soil health.

In sum, progress in terms of *mission implementation* is broadly to plan. However, a point that is emphasised throughout all interactions undertaken as part of this study is that actual *mission success* will now depend on other EU policies (notably the CAP and the Commission's proposal for a Soil Monitoring Directive) and on how national policymakers will implement those. The added value of the mission is often linked to the various ways the mission can leverage or support those other policies, which by design look promising. There seems to be a need, however, to further engage with national and regional policymakers to better explain the accessibility and relevance of mission outputs. Despite ongoing efforts to engage them, many of the consulted stakeholders did not fully see how they could benefit from the mission and how to contribute to it. As one survey respondent puts it: "While the instruments and opportunities offered by the mission are quite visible at European level, there is a lack of visibility and clarity on the connection with actions and funding opportunities at national, regional and local level: the actions and tools implemented place at these different levels are not necessarily visible and their articulation with the mission objectives is not explicit."

4. Conclusions and future options

4.1. Overall conclusions

The Mission Soil has had a good kick-off in terms of the vision and goals that were formulated, as well as the directions this gives to policy intervention. While for many years there has been insufficient progress in this field, soil health is now increasingly being recognised as an urgent and transversal topic, interlinking vital soil functions like food production, water storage/purification/regulation, preserving biodiversity, nutrient cycling, contamination reduction, climate regulation (e.g. via carbon capturing), and cultural services. The ambitious mission is both a needed and suitable start for initiating, mobilising and aligning EU and national/regional policy efforts for counteracting soil degradation.

Particularly promising is that the design of the mission goes beyond merely programming R&I in a more impact-oriented way: improving soil health across Europe is genuinely leading, and all policy actions have a logical place in the strategy for achieving that goal. This also implies that while some actions are knowledge-oriented and support R&I on soil management practices, most attention goes to improving the conditions that make stakeholders receptive to adopting such practices (both old and new). Sensitivity to place-specific variation in soils, economic structures and especially institutional landscapes is a clear strength of how the mission is designed. Another added value is emerging from the mission's traction vis-à-vis the private sector and international partners.

As for the governance structure, while challenging, solid mechanisms have been put in place to connect various actors across the Commission, Member States and sectors as well as to link R&I with many other policy and funding initiatives. The arrangements that have been put in place are functional for achieving coordination amongst a broad range of policy actors, both horizontal (across different EC DGs and networks) as well as vertical (across EU and national/regional policy actors). This coordination is necessary to create synergies between relevant policies and funding and the Mission Soil. Promotion of the mission is ongoing as well, and an increasing amount of EU and national policies make reference to it (e.g. 18 out of 28 CAP strategic plans). At the same time, awareness about the mission in Member States is still rather low. This holds especially for policy officials outside the domain of R&I policy. This challenge has been recognised from the beginning, and there are several initiatives to overcome it (e.g. via projects supporting NCPs in spreading the mission to a broader audience; direct interaction with policy officials). With the recent launch of the Mission Soil manifesto and engagement sessions being carried out in all Member States and associated countries, some important additional steps are being taken. Overall, improving commitment from the national/regional level is regarded as an important mechanism for leveraging the well-targeted outputs of the mission's "core" policy actions (as supported via HE Work Programmes).

The portfolio of policy instruments is extensive yet coherent, with many reinforcing linkages across them. The strongest example is the investment in developing, validating and harmonising a soil health indicator infrastructure: this is a basis both for 'holistic' experimentation with soil health management practices (what is the impact of a practice, on a wide range of physical, chemical, biological and socio-economic indicators); for implementing and enforcing the proposed Soil Monitoring Directive (which requires indicators and reference values); implementing carbon farming policies; and for (re-)designing reward schemes (like the CAP). The latter three factors are formally not part of the mission itself, but they all require the mission's outputs and they are crucial for achieving the ultimate goal. As indicated in the change mechanisms identified when constructing a theory of change, installing norms/regulations and rewarding good behaviour are strongly

complementary to advancing soil health management practices, promoting soil health literacy, and developing soil indicators and a monitoring framework. Much of this is in the hands of national policy makers who are in the position to implement laws and reward schemes that improve the 'playing field' for maintaining healthy soils and can thus be decisive for mission success. Apart from offering subsidies, the playing field can also benefit from strategies to make markets reward healthy soils better. Several projects address this, but many questions on socio-economic issues still remain to be answered. Budget-wise the HE part of the mission was well-endowed in the first phase (2021–2023) and requires continued support throughout 2024–2027 to meet its goal and objectives.

Finally, progress towards mission goals is proceeding as planned or has been even accelerated. At this stage this implies that the implementation of actions is on schedule. The interest for the calls is high, and the amount of available funding allows for broadening the community of researchers involved in soil science. Safeguarding multi- and trans-disciplinarity is essential, at least for action lines like the creation and management of the LLs and LHs in which researchers, landowners, land managers and other stakeholders will participate in practice-oriented research activities.

To substantiate the abovementioned assessment findings, Figure 25 shows per operational objective which main steps (out of a much longer range of initiated actions) have been taken, and what challenges still lie ahead. Bottom-line is again that there is not much that needs to be repaired, as the foundation of the mission is largely solid, but that it is rather the next steps (towards aligning non-R&I policies) that might now be the critical ones.

Mission Building Blocks	Mission Building Blocks	Challenges ahead
To build capacities and the knowledge base for soil stewardship	<p>HE work programmes have been developed, and associated calls have been launched (2021-2023), to fund research on soil health management topics, business models, soil advisors, soil education, etc.</p> <p>A Mission Implementation Platform has been established.</p>	<p>Ensuring that not just the calls cover different disciplines, but that also individual projects are truly multi- or trans-disciplinary. The projects should be holistic and focus on putting techniques to practice.</p> <p>Ensuring that potential applicants have sufficient time to develop new proposals. And ensuring coherency in the portfolio of awarded projects, e.g. by connecting them.</p>
To co-create and upscale place-based innovations	<p>HE WP calls on LLs and support structures.</p> <p>Through the NATIOONS project organisation of engagement sessions for LLs in all Member States and associated countries</p> <p>Set up of a support structure for LLs Labs (through a framework partnership and specific grant agreement)</p>	<p>The adoption and implementation of the proposed Soil Monitoring Directive could massively drive the upscaling (uptake) of place-based solutions.</p> <p>This mainly requires more familiarity of Member States with progress in harmonised indicator infrastructure.</p>

Mission Building Blocks	Mission Building Blocks	Challenges ahead
<p>To develop an integrated EU monitoring system</p>	<p>HE WP calls on soil health indicators development and validation.</p> <p>Administrative agreement with the Joint Research Centre to oversee mission activities on monitoring</p> <p>Launch of EUSO Dashboard.</p>	<p>Development of method that uses the indicators for agreeing on reference values for policies (EU Soil Monitoring Directive, CAP). A robust set of definitions, indicators, reference values and monitoring practices would then need to be matched with policy designs / adaptations that demand and reward soil health improvements.</p>
<p>To engage with the soil user community and society at large</p>	<p>Identification of 'soil needs' in regions.</p> <p>Engagement with regions, potential LL applicants students and citizens</p> <p>Training of specialised soil advisors</p> <p>Diverse set of co-creation and engagement events, social media campaigns, partnership exchanges.</p> <p>Preparation of EIB study on investment needs and of Territorial Management Agreements.</p> <p>Comprehensive communication, outreach and engagement activities have been carried out</p>	<p>Clarifying how citizens and other societal stakeholders can play a role in LLs and LHs, especially the ones not focused on agriculture and food.</p>

Figure 25. Overview of implementation steps taken and challenges ahead.

4.2. Options for the future development of the mission

Together the assessment findings point in the direction of several possibilities to develop the mission further. Some of these suggestions follow logically from synthesising the state of play, while others have been proposed in interviews, survey responses, or the workshop. To reflect the order of relevance, the overview below first discusses options that address the main challenges that have been identified. Additionally, some extra considerations are provided.

IMPROVE TRACTION AT THE NATIONAL/REGIONAL/LOCAL LEVEL

Currently alignment of resources across governance levels is a key challenge, as the mission is much less on the agenda on national, regional and local policy level. At the same time, this is where critical activities need to take place, like creating awareness, improving soil literacy, managing LLs, designing soil health regulation, and adjustment of reward schemes. One clear call to action is to clarify and communicate what exactly is expected from actors operating at or between policy levels. Looking at the fine-grained reflections provided by stakeholders with intimate knowledge of EU and/or national policy making, there are several options that may be considered (in parallel, while paying attention to different socio-political contexts):

- Look into building a positive, understandable, appealing narrative around soil health, and focus more on highlighting generalisable good practice examples not relying on R&I. If the mission is mostly perceived as an R&I issue, chances of success might be thin. The topic of soil health should become as urgent and 'attractive' as other challenges typically gaining more public attention. This requires a delicate balance between emphasising the various reasons that imply a strong need to act while also stressing the realistic possibilities to do so (which do not necessarily require technological breakthroughs or radical policy shifts). It is imperative to come with a proposition that invites stakeholders to play a meaningful role in collective efforts to improve the health of soils. What that role looks like might differ per stakeholder (policy makers, land owners, land managers, citizens, etc.), which points at the relevance of a communication strategy using a spectrum of traditional and modern communication channels for targeting audiences with messages most relevant to them.⁴⁷ Some of these audiences might currently not realise that they are an actor in the transition to healthy soils, or they are waiting for others to translate the mission to their particular context and consider options for engaging. The mission could more actively participate in reaching out to a diversity of stakeholders that can directly contribute and thereby also involve additional actors. One example would be the wide plethora of regional cluster organisations (e.g. agricultural-innovation intermediaries) focused on business activities that place significant demands on soils. Making sure the mission is on their radar is not enough: just as important is clarity on how these organisations or their many constituents can contribute to and at the same time benefit from the mission.
- An equally relevant audience is the Council of the EU that bring together ministers of member states, such as the Ministers for agriculture or environmental issues. The fact that the Mission Soil was presented in the Council's Special Committee on Agriculture is

⁴⁷ Particularly relevant for communication strategies are the living labs and lighthouses, as these will be designed to demonstrate possible ways to enhance soil health. Communication amongst local level actors is possibly more effective than (or at least a welcome complement to) a centrally coordinated campaign. In line with the above, it will be important to not just demonstrate very novel soil management practices or practices that only work under very specific conditions, but also stress the promise of relatively established practices (e.g. regenerative techniques) that can be economically feasible even without dedicated policy support.

very welcome. Further interactions with audiences from beyond the field of R&I policy are strongly encouraged. In particular, Member States sectoral policy departments can make a difference, by means of adopting and adjusting regulations; it is essential to utilise different possible entry points into national (and sub-national) policy arenas. Intensifying the route via the Council might help to overcome the lagging familiarity and involvement of ministers, and, in their wake, of policy officials, who have a critical role to play in the next phases of the mission.

- Another possible way to go beyond the community of R&I policy makers (and associated actors) could be to embed the key LLs element more strongly in Cohesion Policy funding. Place-based experimentation fits the scope of the ERDF rather well (Cappellano et al, 2023), and it would provide a natural way to allocate substantial resources to soil health in countries/regions where boosting economic development ultimately has a higher priority than addressing environmental issues.
- Adding to the previous point, it would also be good to support the creation of additional ‘national mirror groups’, i.e. hub-like structures that unite diverse (policy) stakeholders at the national level. They might be an important link in involving the policy actors that should know about the mission and that can make a change. Several countries already have such groups, so it is recommended to pay particular attention to countries that have been less prompt or eager to engage with the mission.
- Make sure that there is enough funding to effectively launch a minimum of 100 LLs and scale up exemplary solutions in LLs/LHs and respond to the demand for more clarity on what models and funding constructions might be used to establish/manage LLs and keep them running after HE funding ends. Although the LL concept is not yet widely diffused, the mission has served to promote it (as a general approach in research, not just in the soil context). The LLs are a promising tool for coordinating place-specific multi-stakeholder experimentation and require continued support to live up to their potential. Likewise, there should be an approach for monitoring and analysing the performance of the LLs themselves, which is also a requirement for assessing the progress of the mission.

ENSURE THAT PURSUING HEALTHY SOILS IS ECONOMICALLY FEASIBLE

A second main issue is to make sure that actors like landowners and land managers have the right incentives for improving and maintaining soil health. First of all, it should be noted that some soil management practices are by themselves already cost-effective. While attention might go to improving yield quantity and quality, it is often through cost-saving (e.g. less fertiliser and tillage) that practices like regenerative agriculture can pay off – both environmentally and economically. The LLs and LHs, at the centre of the mission’s vision, will be a key mechanism for both improving and demonstrating the inherent benefits of such soil management practices. Additional courses of action are research projects that demonstrate how such practices are positive investments, and communication activities that get this message across in audiences now seeing soil health as another problem they prefer to ignore. “What’s in it for me” should be the leading question, and both LL based as well as international examples can help to show how improving soil health can increase net incomes. Such activities should also address the strategic importance of anticipating soil related challenges as a consequence of climate change. Ideally the recently started projects on business models already cover these strategic/financial issues.

Second, the economic feasibility is likely to augment when improving soil health becomes mandatory. This is where the proposed Soil Monitoring Directive comes into play, as it is a

prime mechanism for changing the competitive environment in which landowners and managers operate. Implementing this proposed directive will mostly be a European and national affair, which makes it part of the first main challenge discussed above. However, the proposed directive could be particularly powerful (for rebalancing the playing field for soil health) if also imports from outside the EU need to comply with similar standards, thereby also underlining the importance of EU-wide coordination. Looking into possibilities to achieve this – if not through the proposed directive itself then through additional legislation – fits the missions' ambition to reduce not just the European but the global soil footprint (which requires measures for avoiding that soil degradation merely shifts to outside the EU).

A third mechanism for stimulating desirable behaviour is to alter subsidy schemes. At least in the agri-food subdomain, the CAP could be a very powerful tool in this respect. However, knowledge on how CAP can be used to fund measures (EIP-AGRI operational groups, training for advisers) should be further communicated and could serve as an example on how to create synergies with other funds under shared management. The message that the CAP can be used in certain ways to support the Mission Soil should be reinforced amongst the managers of the CAP funds when it comes to programming the next multiannual financial framework (MFF) period.

Finally, there are possibilities to improve financial incentives via regular market dynamics:

- One suggestion is to utilise “healthy soil” certification/labels (analogue to organic food labels) so that producers can ask for a price premium. It is recommended to avoid creating extra labels, and instead adopt and implement existing ones. The proposed EU Soil Monitoring Directive is due to propose a definition of soil health and probably also introduce a soil health certificate for land transactions and a soil health passport for the removal of soils. Promoting the use of such labels, to drive market formation, would have significant synergies with the foreseen soil literacy campaigns. The label is a way of informing consumers, and it allows them to act on the awareness that is being created via the campaign.
- Another option is to enable market actors in the commercial value chain to position themselves at the organisational instead of the product level. A typical practice would be an alliance that businesses join to pledge their commitment to soil health, like the (non-binding) Mission Soil manifesto. If other actors like customers and investors appreciate the ambitions of the pledge, it could allow the alliance members to secure additional value. Moreover, if such an alliance would commit to a certain performance level, this could incentivise the aims of businesses joining the alliance.
- Potentially, there are many additional mechanisms for mobilising the private sector, including investors. This is currently being investigated in the projects on business models and practices like carbon farming, and in the study commissioned to the EIB that has already started. For investors it would be important to understand how positive influences on soil health can become part of ‘impact investment’ strategies of e.g. sustainable investment banks (public or private). This would probably require reliable indicators and certification again, pointing at synergies with other actions.

OTHER OPTIONS FOR FUTURE DEVELOPMENT OF THE MISSION

To conclude, the assessment of the first years of the Mission Soil has also generated improvement suggestions covering parts of the mission (vision, governance, instruments, budget) not covered in the preceding sections. These options are:

- Roll out a programme that allows garden owners to publicly signal that their soil is healthy, e.g. with a sign on their fence (as done in Austria). Although this only concerns small areas, it would be many small areas and a public signal helps to raise awareness amongst citizens.
- Consider separate calls for LLs targeted at areas with mostly urban and/or forest soils; otherwise they may have difficulties competing with agricultural LLs that are better prepared for the call's requirements. Given that many stakeholders are not part of pre-existing groups that have already organised themselves: interest for the topic and the process of self-organisation around it often still need to be fostered.
- Explore whether the mission can support free soil testing, so that landowners and land managers are more inclined to examine and then improve the health of soils.
- Recognise the need to support in a balanced way a wide range of stakeholders (small and big players) across Europe from groups with less access to financial and social capital resources (e.g. small grower cooperatives, individual landowners etc). Parameters in the set-up of Horizon Europe, e.g. the size of the grants and the reporting requirements, could create systemic barriers for wider participation although compared to other missions the Mission Soil has opted for smaller projects; in addition, living labs projects include the possibility of providing financial support to third parties in the form of grants to allow for the active and easier participation of appropriate stakeholders, including farmers.
- Adding to the previous point: more resources should be devoted to social science research as an integral part of the research - and not only in a utilitarian mode (serving science and innovation) but as a critical tool for exploring alternatives, experimenting with new policy arrangements or market arrangements. Similarly, arts and humanities are still considered as tools for dissemination of R&D (e.g. education), rather than as ways of achieving cultural change around soils through working on people's values, practices, narratives etc. There needs to be more stress placed on this in the future. Now there seem to be constraints in the sense of actions not always being designed for involving social sciences, actively experimenting with alternatives, which would typically require smaller funding and longer timelines for social engagement.

5. Annexes

5.1. List of held interviews

Stakeholder group	Organisation	Interview date
Mission Secretariat	DG AGRI	03-Feb-2023
Mission Secretariat	DG AGRI	03-Feb-2023
Knowledge institute	WUR (also EJP)	06-Feb-2023
Deputy Mission Manager	DG RTD	08-Feb-2023
Mission Board Chair	Mission Board	09-Feb-2023
Mission Board Member	Mission Board	16-Feb-2023
Relevant network	EJP Soil	13-Mar-2023
Case (NL): NCP	National Contact Point - RVO	15-Mar-2023
Relevant network	FAO	16-Mar-2023
Case (NL): Ministry	Dutch Ministry of Economic Affairs and Climate Policy	17-Mar-2023
policy officer	DG Environment, Mission Owners Group member	23-Mar-2023
policy officer	DG Environment, Mission Owners Group member	23-Mar-2023
NGO	IFOAM EU	30-Mar-2023
NGO	IFOAM EU	30-Mar-2023
Case (NL): Ministry	Dutch Ministry of Agriculture, Nature and Food	12-Apr-2023
Mission Board Member and European Carbon Farmers	Carbon farming association	12-Apr-2023

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5.3. Survey tables

What type of organisation do you represent? Please select the most applicable.

Response	Number of responses	%
Regional (local) government institution or public agency	17	28%
National government institution or public agency	12	20%
Higher education institution (including academic research centres)	9	15%
EU institution or body	6	10%
Research and technology organisation (public or not for profit)	4	7%
Member of a mission board	3	5%
Non-governmental organisation (e.g. environmental organisations, civil society organisations)	3	5%
Business	1	2%
Not for profit associations and networks (e.g. European networks of regions, research organisations, patient organisations).	1	2%
International organisation (outside of the EU, e.g. OECD, United Nations, etc.)	0	0%
Private sector association (e.g. chamber of commerce, business federation)	0	0%
Other	4	7%

Source: Data from the study survey. N = 60

Please explain how you are involved in the selected EU Mission. Select one or more of the following options.

Response	Number of responses	%
My organisation is exploring future participation in the mission activities	26	43%
I or someone from my organisation has been involved in the mission board or other activities undertaken to define the mission area, objectives, or implementation plan	23	38%
My organisation is involved in the implementation of the mission	22	37%
My organisation is part of a national or regional level initiative relevant for the mission (including funding bodies)	17	28%
My organisation took part in one or more events organised by the mission	17	28%
My organisation is a beneficiary of project funding from the Horizon Europe's Mission Work Programme,	15	25%
My organisation is a beneficiary of project funding from other parts of Horizon Europe supporting or addressing the mission objectives	10	17%
My organisation is part of a European level initiative relevant for the mission	8	13%
I have been involved in the activities of an EU Cohesion Policy Managing Authority / Intermediate Body (or pre-accession programme equivalents)	0	0%
Other	2	3%
Do not know/cannot answer	2	3%

Source: Data from the study survey. N = 60

The mission is bold, inspirational and has the necessary scope: To what extent do you agree with the following statement about the mission?

Response	Number of responses	%
Strongly agree	25	42%
Agree	25	42%
Neutral	6	10%
Disagree	2	3%
Strongly disagree	0	0%
Do not know/cannot answer	2	3%

Source: Data from the study survey. N = 60

The mission has been selected in a transparent manner, including through the consultation of relevant stakeholders: To what extent do you agree with the following statement about the mission?

Response	Number of responses	%
Strongly agree	15	25%
Agree	18	30%
Neutral	9	15%
Disagree	3	5%
Strongly disagree	0	0%
Do not know/cannot answer	15	25%

Source: Data from the study survey. N = 60

The mission's overall objective is achievable by 2030: To what extent do you agree with the following statement about the mission objective?

Response	Number of responses	%
Strongly agree	6	10%
Agree	26	43%
Neutral	18	30%
Disagree	5	8%
Strongly disagree	1	2%
Do not know/cannot answer	4	7%

Source: Data from the study survey. N = 60

To what extent do you agree with the following statements?

Response	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Do not know/ cannot answer
The mission is progressing in line with its implementation plan	13% (8)	50% (30)	20% (12)	5% (3)	0% (0)	12% (7)
The mission is creating or is likely to create added-value compared to existing initiatives or instruments	38% (23)	45% (27)	7% (4)	0% (0)	0% (0)	10% (6)

Source: Data from the study survey. N = 60

The following list presents factors (barriers or drivers) that may influence mission implementation. Please rate the importance of the listed elements.

Response	5 – Very important	4	3	2	1 – Not important	Do not know/ cannot answer	Total N
Bold yet realistic mission objectives	63% (36)	25% (14)	7% (4)	0% (0)	0% (0)	5% (3)	57
Clear research & innovation objectives	65% (37)	30% (17)	2% (1)	0% (0)	0% (0)	4% (2)	57
Political support at the EU level	72% (42)	21% (12)	3% (2)	0% (0)	0% (0)	3% (2)	58
Political support at the national level	71% (41)	21% (12)	5% (3)	0% (0)	0% (0)	3% (2)	58
Political support at the regional and local level	60% (35)	29% (17)	3% (2)	3% (2)	0% (0)	3% (2)	58
Transparent governance and decision-making structures	55% (32)	34% (20)	5% (3)	0% (0)	0% (0)	5% (3)	58
Sufficient funding available at the EU level	71% (41)	16% (9)	10% (6)	0% (0)	0% (0)	3% (2)	58
Additional funding at the national, regional, and local level(s)	60% (35)	31% (18)	2% (1)	2% (1)	0% (0)	5% (3)	58
Broad stakeholder involvement and citizen participation	71% (41)	16% (9)	5% (3)	3% (2)	0% (0)	5% (3)	58
Outreach and communication activities	66% (38)	22% (13)	7% (4)	0% (0)	0% (0)	5% (3)	58
Other	/	/	/	/	/	/	14

Source: Data from the study survey. N = 58

What are the key elements that should help the mission to create value added? Select up to THREE options.

Response	Number of responses	%
Effective coordination between EU, national, regional, and local levels	44	75%
Coherence between available funding and mission objectives	29	49%
Strong commitment by different stakeholders	29	49%
National or regional policy instruments are complementary to the EU level mission instruments	24	41%
Effective cross-policy coordination at EU level	23	39%
Mission specific instruments create synergies with other existing policy programmes and initiatives	17	29%
Do not know/cannot answer	3	5%

Source: Data from the study survey. N = 59

The governance setup of the mission is suitable for steering and implementing the mission: To what extent do you agree with the following statement about the mission?

Response	Number of responses	%
Strongly agree	7	12%
Agree	23	40%
Neutral	16	28%
Disagree	2	3%
Strongly disagree	1	2%
Do not know/cannot answer	9	16%

Source: Data from the study survey. N = 87

In your view, what are the barriers to effective mission governance? Select up to THREE options.

Response	Number of responses	%
Challenges in aligning resources across different governance levels (EU, national, regional, etc.)	37	66%
Lack of clear cooperation structures between the mission governance bodies	24	43%
Divergence in the interests of different governance bodies	23	41%
Lack of clarity of responsibilities among the mission governance bodies	20	36%
Low involvement of non-governmental stakeholders	16	29%
Unfit communication channels	14	25%
Other	5	9%
Do not know/cannot answer	4	7%

Source: Data from the study survey. N = 56

What governance factors are present and enabling successful management? Select up to THREE options.

Response	Number of responses	%
Clearly defined responsibilities	23	40%
Convergence in the interests of different stakeholders	21	37%
Resources that are aligned across different governance levels (EU, national, regional, etc.)	20	35%
Clear and well-functioning communication channels	19	33%

Response	Number of responses	%
Clear cooperation structures between the mission governance bodies	16	28%
Effective involvement of non-governmental stakeholders	12	21%
Other	3	5%
Do not know/cannot answer	11	19%

Source: Data from the study survey. N = 56

To what extent do you agree with the following statements about how the mission is developed and implemented at the national, regional, and local levels?

Response	Discussions on the mission have not yet started	The mission is being discussed by public authorities, but not yet implemented	The mission is being discussed by public authorities and funding sources are being identified	The mission is being implemented through specific public policy instruments	Do not know / cannot answer
National level	9% (4)	42% (19)	11% (5)	11% (5)	27% (12)
Regional level	27% (12)	27% (12)	4% (2)	0% (0)	42% (19)
Local level	44% (20)	2% (1)	4% (2)	0% (0)	49% (22)

Source: Data from the study survey. N = 45

What are the factors limiting the implementation of the mission in your country? Select up to THREE options.

Response	Number of responses	%
Insufficient coordination between policy-making levels within the country (national, regional, local levels)	17	40%
Lack of interest on missions in national policy planning circles	14	33%
Divergence in the interests of national / regional / local stakeholders concerning the mission implementation	14	33%
Lack of interest on missions in regional / local policy planning circles	13	30%
Insufficient coordination between the EU and national policymakers	10	23%

Response	Number of responses	%
Engagement of the private sector	10	23%
Insufficient availability of skills	8	19%
The mission is not sufficiently relevant at the national level	4	9%
The mission is not sufficiently relevant at the local level	2	5%
The mission is not sufficiently relevant at the regional level	1	2%
Other	3	7%
Do not know/cannot answer	5	12%

Source: Data from the study survey. N = 43

What are the key enabling factors for mission implementation? Select up to THREE options.

Response	Number of responses	%
The national policy plans/strategies include a focus on one or more missions	19	44%
Effective coordination between the EU and national / regional local policymakers	16	37%
The mission is sufficiently relevant nationally	14	33%
Convergence in the interests of national / regional / local stakeholders concerning the mission implementation	14	33%
Effective coordination between policymaking levels within the country (national, regional, local)	10	23%

Response	Number of responses	%
Sufficient availability of skills	10	23%
The mission is sufficiently relevant regionally	8	19%
The regional / local policy plans/strategies include a focus on one or more missions	7	16%
Engagement of the private sector	7	16%
The mission is sufficiently relevant locally	5	12%
Other	0	0%
Do not know/cannot answer	4	9%

Source: Data from the study survey. N = 43

To what extent do the mission's objectives influence the R&I policy agenda at following levels of government?

Response	5 – Strong influence	4	3	2	1 – No influence	Do not know/cannot answer	Total N
Supranational policies and initiatives	35% (20)	19% (11)	11% (6)	12% (7)	0% (0)	23% (13)	86
National policies and initiatives	14% (8)	21% (12)	25% (14)	19% (11)	2% (1)	19% (11)	90
Regional or local policies and initiatives	9% (5)	9% (5)	21% (12)	19% (11)	11% (6)	32% (18)	88

Source: Data from the study survey. N = 57

The mission encourages broad engagement and active participation of stakeholders and citizens: To what extent do you agree with the following statement about the mission?

Response	Number of responses	%
Strongly agree	9	16%
Agree	32	55%
Neutral	10	17%
Disagree	4	7%
Strongly disagree	0	0%
Do not know / cannot answer	3	5%

Source: Data from the study survey. N = 58

In your opinion what are the main barriers to mobilising stakeholders and citizens? Select up to THREE options.

Response	Number of responses	%
It is unclear how stakeholders can become involved in the mission	38	67%
There are insufficient instruments / actions to support the involvement in the mission	29	51%
Insufficient skills and/or competencies of stakeholders	20	35%
The mission engages with a limited range of stakeholders only	15	26%
Participation in the mission has high investment costs	13	23%
Other	9	16%
Do not know/cannot answer	4	7%

Source: Data from the study survey. N = 57

What are the key enabling factors for broad engagement and active participation in the mission? Select up to THREE options.

Response	Number of responses	%
Communities and local actors benefit from their involvement in the mission	38	68%
Instruments and actions are in place to support broad involvement in the mission	34	61%
The mission is inspirational and highly relevant for stakeholders, citizens and communities	30	54%
Information is available on how to become involved in the mission	18	32%
Stakeholders having relevant skills and/or competencies	12	21%
Other	4	7%
Do not know/cannot answer	2	4%

Source: Data from the study survey. N = 56

In your opinion, are the allocated resources sufficient to realise the mission objectives at the EU, national, regional and local levels?

Response	More than sufficient	Sufficient	Insufficient	Do not know / cannot answer	Total N
European	12% (7)	46% (26)	14% (8)	28% (16)	57
National	2% (1)	21% (12)	53% (30)	25% (14)	57
Regional	0% (0)	7% (4)	61% (34)	32% (18)	56
Local	2% (1)	4% (2)	54% (31)	40% (23)	57

Source: Data from the study survey. N = 57

Are you aware of any national, regional actions or instruments that contribute to the mission objectives?

Response	Number of responses	%
Yes	21	38%
No	18	33%
Do not know/cannot answer	16	29%

Source: Data from the study survey. N = 55

5.4. Horizon Europe Work Programme topics of the Mission Soil

Topic	Budget (EUR million)	Selected project(s)
2021-SOIL-01-01 – Preparing the ground for healthy soils: building capacities for engagement, outreach and knowledge	5	PREPSOIL: Preparing for the Soil Deal Mission
2021-SOIL-02-01 – From knowledge gaps to roadmaps on Mission Soil objectives	5	SOLO: Soils for Europe
2021-SOIL-02-02 – Validating and further developing indicators for soil health and function	12	BENCHMARK: Building a European Network for the characterisation and harmonisation of Monitoring Approaches for Research and Knowledge on Soils AI4SoilHealth: Accelerating collection and use of soil health information using AI technology
2021-SOIL-02-03 – Linking soil health to nutritional and safe food	7	SOIL O-LIVE: The soil biodiversity and functionality of Mediterranean olive groves – the influence of land management on olive oil quality and safety
2021-SOIL-02-04 – Social, economic and cultural factors driving land management and land degradation	10	No projects selected
2021-SOIL-02-05 – Business models for soil health	10	InBestSoil: Monetary valuation of soil ecosystem services and creation of initiatives to invest in soil health NOVASOIL: Innovative business models for soil health SOILVALUES: Enhancing soil health through value based business models
2021-SOIL-02-06 – Engage with and activate municipalities and regions to protect and restore soil health	10	HuMUS – Healthy Municipal Soils
2021-SOIL-02-07 -National engagement sessions and support to the establishment of soil health living labs	3	NATI00NS – National engagement activities to support the launch of the Mission ‘A Soil Deal for Europe’ 100 Living Labs and Lighthouses

Topic	Budget (EUR million)	Selected project(s)
2021-SOIL-02-08 – Next generation soil advisors	5	NBSoil – Nature Based Solutions for soil management

Figure 26. Horizon Europe calls (topics) and selected projects for WP 2021

Source: Horizon Europe – Work Programme 2021-2022 Missions; <https://cordis.europa.eu>

Topic	Budget (EUR million)	Number of projects expected to be funded
2022-SOIL-01-01 Knowledge repository	6	1
2022-SOIL-01-02 Food processing residues	14	2
2022-SOIL-01-03 Soil Biodiversity	16	2
2022-SOIL-01-04 Decontamination and reuse of land	21	3
2022-SOIL-01-05 Monitoring, verification, reporting of soil carbon	14	2
2022-SOIL-01-06 Network of carbon farming	3	1
2022-SOIL-01-07 Soil education	6	1
2022-SOIL-01-08 Support structure for LLs	3.2	0
2022-SOIL-01-09 Citizen science	6	1
2022-SOIL-01-10 Innovations from biowaste	9	3

Figure 27. Horizon Europe calls (topics) and selected projects for WP 2022.

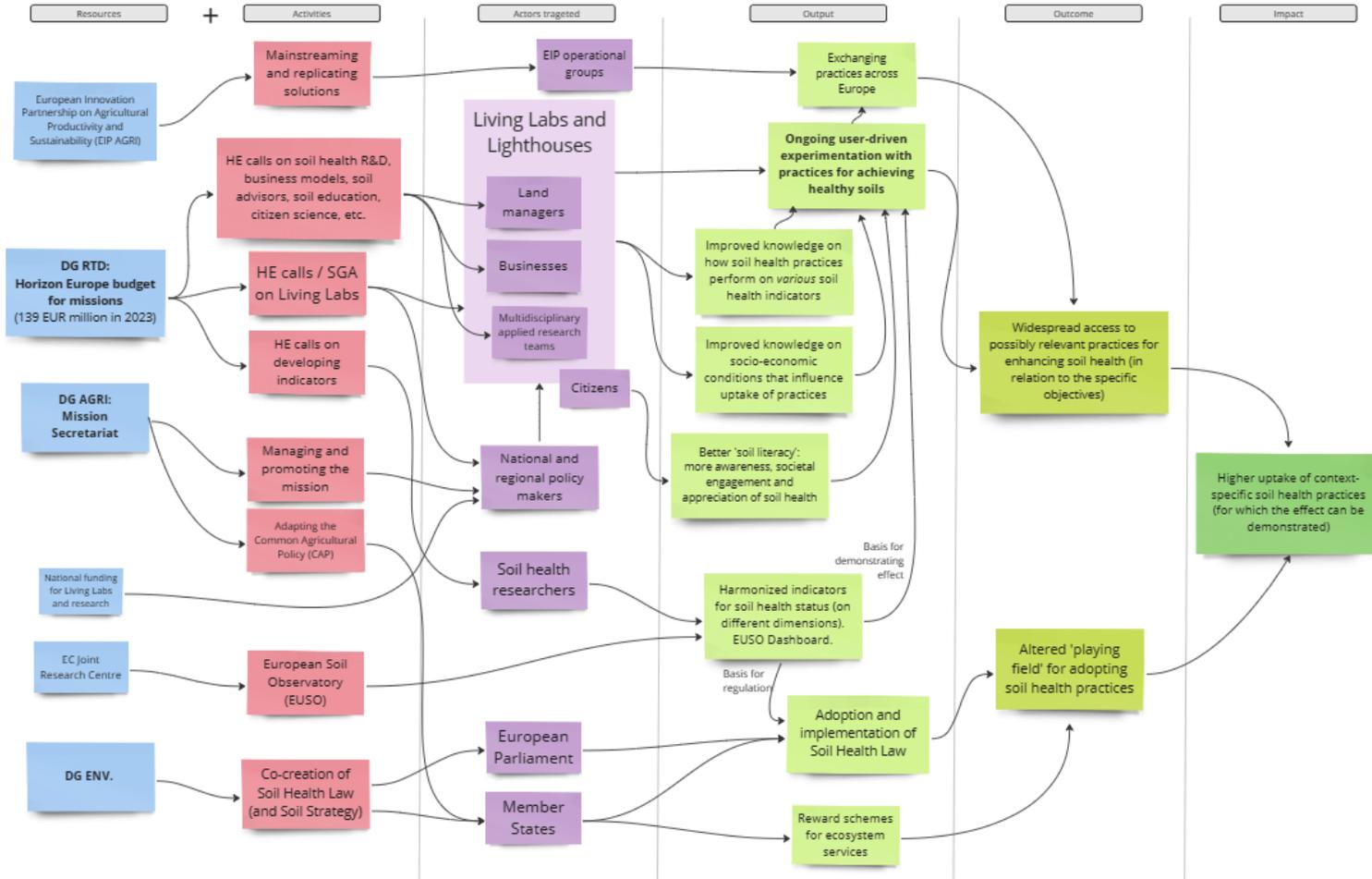
Source: Horizon Europe – Work Programme 2021-2022 Missions

Topic	Budget (EUR million)	Number of projects expected to be funded
2023-SOIL-01-01 Discovering the subsoil	12	2
2023-SOIL-01-02 Soil pollution processes – modelling and inclusion in advanced digital decision-support tools	14	2
2023-SOIL-01-03 Onsite digital technologies to monitor nutrients and chemical or biological stressors in soil and plants with relevance for food safety and nutrition	12	2
2023-SOIL-01-04 Innovations to prevent and combat desertification	14	2
2023-SOIL-01-05 Soil-friendly practices in horticulture, incl. alternative growing media	13	2
2023-SOIL-01-06 Soils in spatial planning	7	1
2023-SOIL-01-07 Back to earth: bringing communities and citizens closer to soil	6	1
2023-SOIL-01-08 Co-creating solutions for soil health in Living Labs	36	3
2023-SOIL-01-09 Carbon farming in living labs	12	1
2023-CLIMA-OCEAN-SOIL-01-01 Joint demonstration of an integrated approach to increasing landscape water retention capacity at regional scale	15	1
2023-OCEAN-SOIL-01 Joint demonstration of approaches and solutions to address nutrient pollution in the landscape-river-sea system in the Mediterranean sea basin	16	2

Figure 28. Horizon Europe calls (topics) and selected projects for WP 2023.

Source: Horizon Europe – Work Programme 2023-2024 Missions

5.5. Detailed theory of change for the mission



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The Mission Soil addresses soil health degradation and the detrimental consequences for essential ecosystem services. The mission's strategy goes beyond research and innovation actions, with a focus on establishing 100 living labs and lighthouses to engage stakeholders, facilitate experimentation and diffuse learnings to lead the transition towards healthy soils by 2030. The development of harmonised indicators is a precondition for game-changing legislation. The implementation plan is progressing well, but enhanced multi-level governance remains a medium to long term need in order to optimise the mission's impact.

Studies and reports

