INTERACTIVE DECISION TOOL

DATA FOR THE ASSESSMENT OF RDP ACHIEVEMENTS AND IMPACTS

IMPACT INDICATOR:

I.12 SOIL ORGANIC MATTER IN ARABLE LAND

CONTENTS   LOGIC MODEL

JANUARY 2019

Contents

The Evaluation Helpdesk is responsible for the evaluation function within the European Network for Rural Development (ENRD) by providing guidance on the evaluation of RDPs and policies falling under the remit and guidance of DG AGRI's Unit C.4 'Monitoring and evaluation' of the European Commission (EC). In order to improve the evaluation of EU rural development policy the Evaluation Helpdesk supports all evaluation stakeholders, in particular DG AGRI, national authorities, RDP managing authorities and evaluators, through the development and dissemination of appropriate methodologies and tools; the collection and exchange of good practices; capacity building, and communicating with network members on evaluation related topics.

Additional information about the activities of European Evaluation Helpdesk for Rural Development is available on the Internet through the Europa server (http://enrd.ec.europa.eu).

ACKNOWLEDGEMENTS

INTRODUCTION

The choice of a suitable evaluation approach is a critical step in the evaluation process. The wish to carry out a robust assessment of the policy's effects needs to be matched with those aspects which factor into conducting an evaluation (data and information availability, budget and resources, and the skills of the evaluators).

In the non-binding Guidelines, '*Assessment of RDP impacts and achievements in 2019*', published in August 2018, logic models have been presented for the 13 Common CAP impact indicators covering Pillar II. These logic models support Member States in discussing different criteria for the choice of evaluation approaches for assessing the RDP's impacts during the evaluation activities in 2019 and the ex-post (2024).

The **decision tool, 'Data for the assessment of RDP achievements and impacts'**, transports the logic models developed in the above Guidelines into an interactive format, while providing further detailed and practical information. The decision tool has been specifically **designed for RDP** evaluators who may wish to gain further insights into the criteria for each step of the decision making process when choosing an evaluation approach. This tool also provides practical recommendations on what to do in case of data gaps both in the short and long term, when solutions are needed.

OBJECTIVES

The **interactive decision tool** consists of a set of 7 logic models covering the 13 Pillar 2 CAP Impact Indicators. The 7 logic models can be read separately and aim to:

- **Assist evaluation stakeholders** in their decision on which evaluation approaches they can use for the assessment of the common RDP impact indicators, as well as providing the necessary data and information sources at the EU level for these approaches.
- **Provide recommendations on possible solutions for overcoming data-gaps at the national and regional levels** (e.g. by providing guiding questions, practical hints and links to external information sources).

The tool focuses on data and information sources pertinent for the assessment of RDP achievements and impacts in 2019 and the ex-post. The decision tool is based on the Guidelines '*Assessment of RDP impacts and achievements in 2019*'. Additionally, the tool provides:

- Explanations on data needs for proposed evaluation approaches including availability and suitability of data for RDP evaluations (frequency, delays, time series).
- Important questions to consider.
- Links to existing data sources and good practices.
- Complementary information on evaluation methods and their data needs.

HOW TO USE THE TOOL

This interactive decision tool contains a set of **7 logic models**:

Sector-related impacts

I.01 Agricultural entrepreneurial income

I.02 Agricultural factor income

I.03 Total factor productivity in agriculture

Socio-economic impacts

I.14 Rural employment rate

I.15 Degree of rural poverty

I.16 Rural GDP per capita

Environmental impacts

I.07 Emissions from agriculture
I.07 – 1 GHG emission from agriculture
I.07 – 2 Ammonia emissions from agriculture

I.08 Farmland Bird Index (FBI)

I.09 High Nature Value (HNV) farming

I.10 Water Abstraction in Agriculture

I.11 Water Quality:
I.11-1 Gross Nutrient Balance (GNB) *(Gross Nitrogen Balance (GNB-N) and Gross Phosphorus Balance (GNB-P))*
I.11-2 Nitrates in freshwater

I.12 Soil organic matter in arable land

I.13 Soil erosion by water
I.13-1 Estimated rate of soil loss by water erosion;
I.13-2 Estimated agricultural area affected by a certain rate of soil erosion by water

HOW TO USE THE TOOL

Navigation within the clickable logic model:

Brings the user back to the starting page of the **logic model**	Are variables explaining participation known? Takes the user to that specific **decision question** of the logic model	**Starting decision question** of the logic model	Hyperlinked text Takes the user to an external source or to another slide
Examples	Additional notes	Previous page	Next page
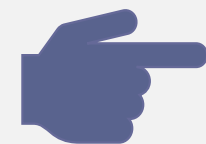
HOW TO USE THE TOOL

Structure:

Each logic model begins with a description of the:
- **RDP size, uptake** and other aspects that have to be considered for the selection of the evaluation approach.
- **Data availability for CMES indicators** needed to assess net impacts at the micro and macro levels, as well as, the specificities in the data availability for regionalised RDPs.
- **Data availability for selected additional indicators**.
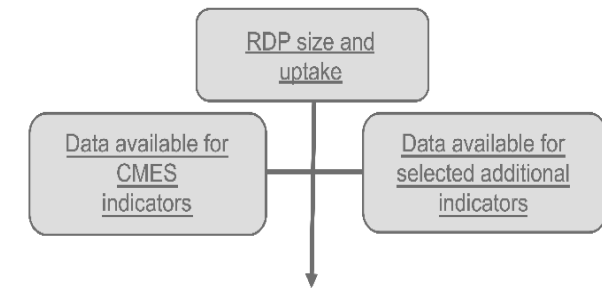
Each **decision question** is organised in a way that facilitates the answers to the following **sub-questions**:
- Why is this question important?
- What are the conditions in order to answer the question with YES?
- Are there any specificities to be considered for regionalised RDPs?
- What can be done to improve the data situation (In the short term (for AIR 2019) and long-term (for ex-post)?

Each sub-question can be explored by clicking on its link.

Does the data allow for the construction of comparison groups of beneficiaries and non-beneficiaries?

Why is this question important?

What are the conditions in order to answer the question with YES?

Are there any specificities to be considered for regionalised RDPs?

What can be done to improve the data situation?

Short-term solutions (for AIR 2019)

Long-term solutions (for ex-post)

By answering each decision question in the tool with either a '**YES**' or a '**NO**' one will be taken to the next question, which will ultimately lead one to all possible evaluation approaches that can be applied given the specific criteria they have selected.

HOW TO USE THE TOOL

The tool will suggest various applicable approaches based on the data and other information:

- **Approach A** **(an evaluation approach in an optimal data situation).**
  It can be used in 2019 and/or can be planned for the ex post evaluation.

- **Approach B** **(an alternative evaluation approach in case of data gaps).**
  In several cases, approach B contains a qualitative component.

Approach A (optimal)

Approach B (alternative)

In case of questions or any technical difficulties in accessing the files, please contact
the European Evaluation Helpdesk for Rural Development:
E-mail: info@ruralevaluation.eu
T: +32 2 737 51 30

Impact indicator: I.12

Approach A (optimal)
SOM assessment based on 0-60 cm soil depth
Use indicators:
- I.12
- SOC 0-60 cm
- SOC change
- SOM bio

Approach B (alternative)

High-level SOM assessment
Use indicators:
- I.12
- SOC 0-60 cm
- SOC change

Medium level SOM assessment
Use indicators:
- I.12
- SOC change
- SOM bio

Minimum level SOM assessment
Use indicator I.12

Other approaches

Complement assessment with SOM modelling results, results from regional/national soil monitoring programmes, demo trials and/or scientific publications where existing

Complementary qualitative analysis Focus Groups Delphi, MAPP, etc.

RDP size and uptake

Data available for CMES indicators

Data available for selected additional indicators

Does a soil monitoring programme exist?

Use LUCAS data both for beneficiary and non-beneficiary groups

Does the data allow for the construction of comparison groups of beneficiaries and non-beneficiaries?

Use soil monitoring data for beneficiary group and LUCAS data for non-beneficiary group

What is the available depth of soil sampling?

Is biological soil testing practiced?

Is biological soil testing practiced?

The indicator 'Soil organic matter in arable land' concerns **ONLY** soil organic matter in arable land. Organic matter in soil under meadows, pastures and permanent crops is not measured by this indicator.

Although the title of the indicator refers to soil organic matter (SOM) the impact indicator I.12 must be reported in terms of soil organic carbon (SOC) and not in terms of SOM content (in many field trials, literature and databases, it is common to report SOM values rather than SOC values).

The conversion from SOM to SOC is achieved by multiplying the SOM value by 0.58 (van Belemmen factor). This is due to the fact that humified organic matter of most soils contains approximately 58% carbon. However, due to variations in vegetation cover (SOM composition, depth in profile, etc.) this conversion factor in some cases is not accurate. We therefore recommend that all soil analysis determines the SOC directly rather than deriving it from the SOM content.

I.12 Soil organic matter in arable land

Impact indicators <u>fiches</u>

Guidelines *Assessing RDP achievements and impacts in 2019*, PART II, Chapters 2.7.1 and 2.10.1, Section: 'Intervention logic'

Related Common Evaluation Questions:
CEQ 26: 'To what extent has the RDP contributed to improving the environment and to achieving the EU biodiversity strategy target of halting the loss of biodiversity and the degradation of ecosystem services, and to restore them?'

Guidelines *Assessing RDP achievements and impacts in 2019*, PART III, Chapter 3.7, Section: 'Clarification of general intervention logic linked to the CEQ'

CEQ 28: 'To what extent has the RDP contributed to the CAP objective of ensuring sustainable management of natural resources and climate action?'

Guidelines *Assessing RDP achievements and impacts in 2019*, PART III, Chapter 3.5, Section: 'Clarification of general intervention logic linked to the CEQ'

RDP size and uptake

The size, uptake of measures, and structure of the RDP are important factors in the selection of the evaluation approach. If few beneficiaries are supported by measures under the given rural development priorities and focus areas which affect soil organic matter and if no significant RDP effects can be expected, then the evaluator can only apply less robust evaluation approaches (e.g. SOM modelling or qualitative methods). If the RDP is large and has sufficient uptake, it is better to invest in building up the soil monitoring programmes and applying more advanced evaluation approaches while using additional indicators such as the SOM bio and SOM change. It is also important to measure the SOM at a depth deeper than 20 cm (e.g. 0 – 60 cm or at the depth corresponding with the arable top soil layer in the country/region).

What is the unit of analysis and data available (EU-level)?

- At the micro level, the unit of analysis is the agricultural holding. However, since the SOM at an agricultural holding level is usually assessed by taking and analysing soil samples from several points (fields), each soil sampling location can be considered as a sub-micro unit of analysis.

- At the macro level, the unit of analysis is the territory covered by the RDP because the indicator I.12 has to be reported in megatons of the total SOC in arable land.

- Specifities in the data availability for regionalised RDPs.

Soil monitoring programmes:
- Comprehensive data on SOC content in arable land at the micro level is possible to obtain only through a soil monitoring programme that is designed for the purpose of the evaluation of RDPs. These monitoring programmes are based on soil sampling and soil testing involving both beneficiary and non-beneficiary farms and are the best data sources for assessing I.12.

  ⓘ Note

  🔍 Examples:

  - Austria

  - Germany

  - Spain

  - France

  - Italy

  - Lithuania

  - The United Kingdom

Data available:

- Data on SOC content in arable land at the micro level cannot be found in, or extrapolated from FADN, EU Farm structure surveys, Paying Agency databases or common databases of the Ministries of agriculture and environment.

- The only EC database containing information on SOC in arable land is the <u>Land Use and Coverage Area Frame Survey (LUCAS)</u>. This database is based on a topsoil (0-20 cm depth) assessment measuring the key physical and chemical properties of soil, including SOC. <u>LUCAS 2009 topsoil data</u> includes SOC data from 19,969 samples from 25 Member States and provides information on SOC (expressed as kg/C per kg/soil). However, of these, samples only about 8,000 soil sampling locations are <u>classified as arable soils</u>. The maps produced are freely available for download from the <u>European Soil Data Centre website</u>.

  Bulgaria and Romania have been sampled in 2012 and the results are included in this data collection. Croatia was included in the LUCAS 2015 survey and the data is still not available yet. Soil samples are taken at the precise GIS (geographical information system) coordinates and each location is geo-referenced. This allows the LUCAS database to also provide SOC data at the micro level.

  The <u>LUCAS 2009 topsoil data</u> is available in the following downloadable files:

  - o LUCAS_TOPSOIL_v1: an Excel file that contains the geographical coordinates of the locations where the data was sampled and for each location the values of a number of properties;

  - o LUCAS_Romania_Bulgaria_2012.zip: 2 Excel files containing data for Romania and Bulgaria, from the LUCAS 2012 campaign;

  - o LUCAS_TOPSOIL_v1_spectral: consists of a file that contains multispectral reflectance data (format available: RDATA).

  The LUCAS data can be freely downloaded after prior registration through a 'Request Form'. The LUCAS programme collects and analyses soil samples every three years. The complete set of data is only available for the assessment undertaken in 2009. The samples collected during 2012 (Bulgaria and Romania) and 2015 (including Croatia) are currently being analysed and the data is expected to be available soon. In 2018, a new sampling programme has been launched, but the results of these measurements are unlikely to be ready before 2020. The report '<u>LUCAS Topsoil Survey: methodology, data and results</u>' provides detailed insight into the design and methodology of the data collection.

- The 'Harmonised Soil Carbon Database' is a state-of-the-art (30 arc-second) raster database established by the IIASA (International Institute for Applied Systems Analysis based in Austria) and the UN FAOis and contains information on SOM for all EU Member States. The database contains information on the topsoil (0-30 cm) and subsoil carbon content (30-100 cm). However, the SOC values available in this database is presented in grids and is based on the SOC content of the dominant soil type in each re-gridded cell rather than on the soil analysis undertaken at geo-referenced sampling points. For this reason, this database is a less suitable source of information for micro level analysis.

Several Member States run soil monitoring programmes whose primary objective is not necessarily for supporting the evaluation of RDPs. Nevertheless, these soil monitoring programmes can also be very good sources for data for the assessment of I.12. These databases are likely to contain data on SOC because this is one of the most important soil fertility indicators and is included in the vast majority of soil monitoring programmes. Unfortunately, these types of monitoring programmes are less likely to have robust data both for RDP beneficiaries and non-beneficiaries.

National and regional soil monitoring programmes whose datasets might contain useful information for assessing SOC:

- **Austria:** Bodeninformationssystem BORIS

- **Germany:** BGR database

- **Germany:** Soil Information System of Bavaria

- **Germany:** Soil Information System Lower Saxony

- **Germany:** Soil Information System North Rhine-Westphalia

- **Germany:** Schleswig-Holstein Soil Information System

- **Spain:** Digital Atlas of Galicia Soils

- **France:** GisSOl database

- **Italy:** Soil Map of Basilicata Region

- **Italy:** The soils of Emilia-Romagna Region

- **Italy:** Soil Maps of Friuli–Venezia Giulia Region

- **Italy:** The Soils of Lombardy

- **Italy:** The Soils of Tuscany

- **Italy:** Soil Maps of Veneto

- **Lithuania:** Soil Map of Lithuania

- **The UK:** National Soil Map

- **The UK:** Scotland's soils

Data available:

- Estimates for SOC in arable land, underline estimates of total SOC content in arable land and the average SOC content at the Member State level for 2012 is available at the Web site of the European Commission (LUCAS).

    ⓘ Note

- The above-mentioned LUCAS database is one of the most reliable sources of data on SOC in arable land at the macro level. LUCAS data is reported at the Member State level, but since they are geo-referenced, they can be downscaled to the level of regional RDPs.

The average per hectare value of SOC in arable land for each Member State can be obtained if the estimate of total SOC content in arable land is divided by the total number of hectares of arable land. However, such a figure has low 'credibility' and practical use for the purpose of the evaluation of I.12. Spatial, temporal, climatic, geographical and pedogenetic arable land variations exist regionally and even locally within each Member State.

Specificities in the data availability for regionalised RDPs.

There are no specificities for the data available for regionalised RDPs. The data on SOC in arable land at the level of regional RDPs can be obtained only by upscaling data from local soil monitoring programmes (if existing) or by downscaling LUCAS and/or data obtained by the national soil monitoring programmes.

Data availability for selected additional indicators

Examples of additional indicators, unit of analysis and data sources are provided in the Guidelines *Assessing RDP achievements and impact in 2019*, PART IV, Chapter 4.5, Section 4.5.1 'Additional indicators (examples)'

In order to assess SOC in a more comprehensive manner it is recommended to use three additional indicators:

- **SOC 0-60 cm** and **SOM bio** – data for these two indicators can be obtained only through soil sampling and analysis (soil monitoring). These cannot be retrieved from any EU or other supra-national databases. However, some national, regional or soil monitoring programmes undertaken within individual research projects might contain this information. Evaluators are encouraged investigate all potential sources.

- **SOC change** (in megatons and in %, see the Guidelines *Assessing RDP achievements and impact in 2019*, PART IV, Chapter 4.5.1) – it is important to point out that this additional indicator does not require any additional soil sampling or soil analysis. It can be calculated (extrapolated) from the existing data for I.12 (soil depth 0-20 cm) or data from the additional indicator SOM 0-60 cm.

RDP size and uptake

Data availability for CMES indicators

Data availability for selected additional indicators

Does a soil monitoring programme exist?

YES   **NO**
1a   1b

Does a soil monitoring programme exist?

Why is this question important?

What are the conditions in order to answer the question with YES?

Are there any specificities to be considered for regionalised RDPs?

What can be done to improve the data situation?

Short-term solutions (for AIR 2019)

Long-term solutions (for ex-post)

Guidelines *Assessing RDP achievements and impact in 2019*, PART II, Chapter 2.1 and 2.7 and PART IV, Chapter 4.5.
Guidelines *Assessment of RDP results*, Annex 11, Chapter 2.10.

RDP size and uptake

- Data availability for CMES indicators
- Data availability for selected additional indicators

Does a soil monitoring programme exist?

YES   **NO**

1a   1b

Does a soil monitoring programme exist?

Why is this question important?

A good soil monitoring programme is a precondition for obtaining sound data on SOC content in arable land. In order to provide an accurate and reliable assessment of SOC in arable land, one must take soil samples from the field and test them in a laboratory. No assessment of SOC in arable land based on observations obtained through rapid visual assessments or results of qualitative surveys can match the accuracy and credibility of evaluations based on soil monitoring programme data.

What are the conditions in order to answer the question with YES?

The soil monitoring programme needs to be in place.

This means that the following types of soil monitoring programmes qualify:
- those that are specifically (primarily) designed to serve as an input for the evaluation of the RDP;
- those that might be established for other reasons (e.g. preparation of national soil maps) but do measure and explicitly provide data on SOC in arable land;

If the soil monitoring programme covers a sufficient number of RDP supported and non-supported parcels/holdings.

Are there any specificities to be considered for regionalised RDPs?

There are no specificities in this regard to regionalised RDPs.

RDP size and
uptake

Data availability for CMES
indicators

Data availability for selected
additional indicators

Does a soil monitoring
programme exist?

YES   **NO**

1a   1b
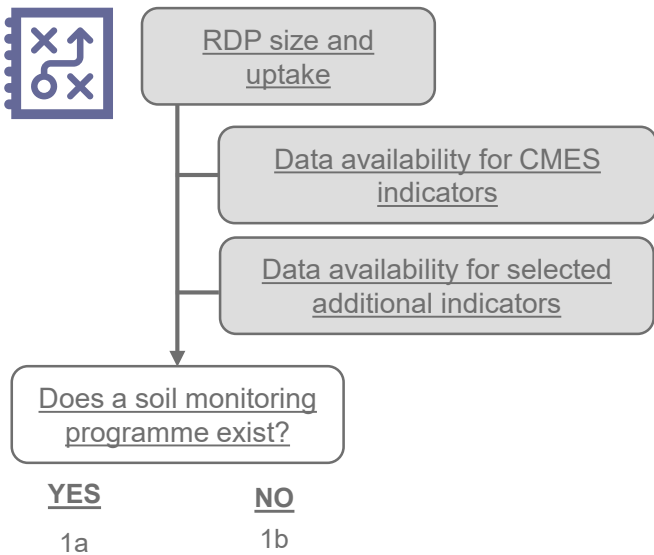
Does a soil monitoring programme exist?

What can be done to improve the data situation?

Short-term solutions (for AIR 2019)

There are no quick-fix solutions that can replace a soil monitoring programme. However, the logic model for I.12 does provide an alternative approach in case there is no monitoring programme yet established.

For this alternative it is advised to follow the path 1b indicated in the model.

Long-term solutions (for ex-post)

Managing Authorities are recommended and encouraged to set-up a sound soil monitoring programme designed for the purpose of the assessment of the impacts of RDP's measures on SOC for the ex post evaluation and beyond (the indicator will partly continue in the next programming period in the set of result indicators). The setting-up and implementation of such a monitoring programme might be expensive in the short term, but it will be cost effective in the long term (financing can be achieved through M20: Technical Assistance).

RDP size and uptake

Data availability for CMES indicators

Data availability for selected additional indicators

Does a soil monitoring programme exist?

YES   1a

Does the data allow for the construction of comparison groups of beneficiaries and non-beneficiaries?

YES   **NO**

2a   2b

Does the data allow for the construction of comparison groups of beneficiaries and non-beneficiaries?

Why is this question important?

What are the conditions in order to answer the question with YES?

Are there any specificities to be considered for regionalised RDPs?

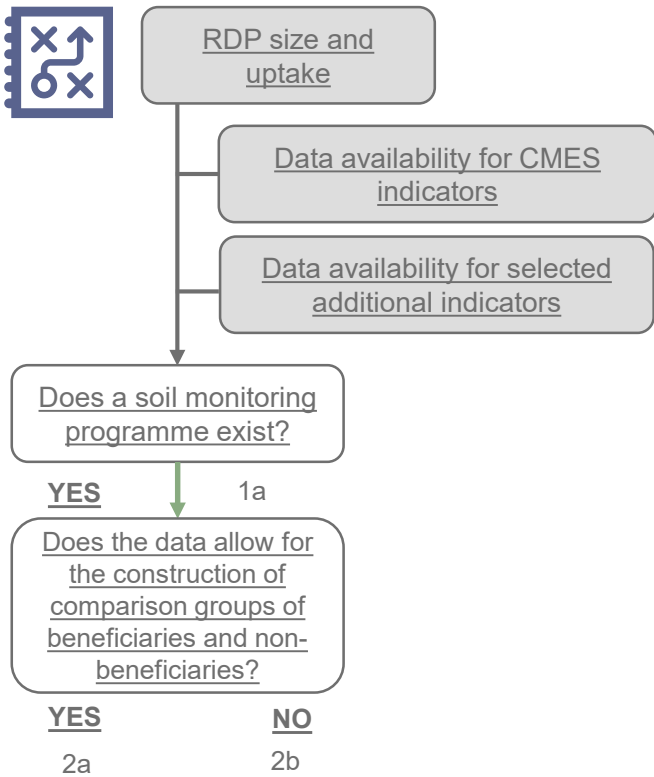**What can be done to improve the data situation?**

Short-term solutions (for AIR 2019)

Long-term solutions (for ex-post)

Guidelines *Assessing RDP achievements and impact in 2019*, PART II, Chapter 2.1 and 2.7 and PART IV, Chapter 4.5.
Guidelines *Assessment of RDP results*, Chapter 2.1 and 6.2, and Annex 11, Chapter 2.10.
Guidelines for the ex post evaluation of 2007-2013 RDPs, Chapter 4.3

Flowchart

- RDP size and uptake
  - Data availability for CMES indicators
  - Data availability for selected additional indicators

Does a soil monitoring programme exist?

YES → 1a

Does the data allow for the construction of comparison groups of beneficiaries and non-beneficiaries?

YES 2a   **NO** 2b

Does the data allow for the construction of comparison groups of beneficiaries and non-beneficiaries?

Why is this question important?

The impacts of the RDP on SOC in arable land can only be effectively assessed if a comparison of RDP beneficiaries and those who do not benefit from measures targeting SOC in arable land is achieved. Measuring SOC within the group of beneficiaries (even if regularly and over a longer period) alone will only provide part of the information needed and will not be able to show the RDP's net effects. Consequently, any findings attained should be dealt with extreme care and conclusions should be considered as only partially explanatory. Therefore, knowing if a databases facilitates the construction of comparison groups is key for the assessment of RDP's impacts on SOC.

What are the conditions in order to answer the question with YES?

The data collected from the soil monitoring programme conducted on the agricultural holdings should allow for the construction of comparison groups. For this to be achieved the data should allow for either:

- The construction of two groups: a group of beneficiaries and a group of non-beneficiaries which can then be matched.
- The construction of more than two groups to set up the counterfactual.

Are there any specificities to be considered for regionalised RDPs?

There are no specificities in this regard to regionalised RDPs.

RDP size and uptake

Data availability for CMES indicators

Data availability for selected additional indicators

Does a soil monitoring programme exist?

YES   1a

Does the data allow for the construction of comparison groups of beneficiaries and non-beneficiaries?

YES   **NO**

2a   2b
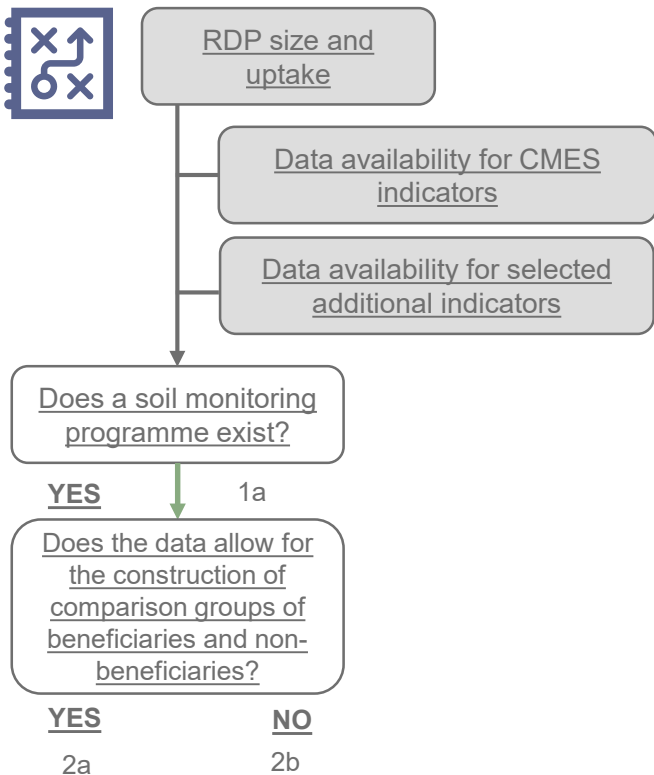
Does the data allow for the construction of comparison groups of beneficiaries and non-beneficiaries?

What can be done to improve the data situation?

Short-term solutions (for AIR 2019)

There are no quick-fix solutions if the data does not allow for the construction of comparison groups. However, the logic model for I.12 does provide an alternative approach in case comparison groups cannot be constructed.

This alternative solution is visible if one follows the path 2b indicated in the model.

Long-term solutions (for ex-post)

Establishing a soil monitoring programme specifically designed (comprising of both RDP beneficiaries and non-beneficiaries) for the purpose of assessing the impacts of RDP measures on SOC and soil erosion by water (I.13).

Flowchart (left)

RDP size and uptake

Data availability for CMES indicators

Data availability for selected additional indicators

Does a soil monitoring programme exist?

YES 1a

Does the data allow for the construction of comparison groups of beneficiaries and non-beneficiaries?

YES 2a

What is the available depth of soil sampling?

0-60 cm   **0-20 cm**
3a   3b

What is the available depth of soil sampling?

Why is this question important?

What are the conditions in order to answer the question?

Are there any specificities to be considered for regionalised RDPs?

What can be done to improve the data situation?

Short-term solutions (for AIR 2019)

Long-term solutions (for ex-post)

Guidelines *Assessing RDP achievements and impact in 2019*, PART II, Chapter 2.1 and 2.7 and PART IV, Chapter 4.5

What is the available depth of soil sampling?

Flowchart

- RDP size and uptake
  - Data availability for CMES indicators
  - Data availability for selected additional indicators
- Does a soil monitoring programme exist?
  - **YES** — 1a
- Does the data allow for the construction of comparison groups of beneficiaries and non-beneficiaries?
  - **YES** — 2a
- What is the available depth of soil sampling?
  - **0-60 cm** — 3a
  - **0-20 cm** — 3b

Why is this question important?

The impact indicator I.12 assesses the total SOC in arable land in the topsoil layer (0-20 cm) only. This provides only partial information concerning the content of soil carbon in arable land, since only a minor portion of the total SOC is stored in the top 0-20 cm. In order to obtain a more comprehensive picture of the SOC in arable land, the evaluator should check what is the depth of the arable land. Ideally, the arable land being assessed should be sampled up to a depth of 60 cm instead of only 20 cm.

What are the conditions in order to answer the question?

The main condition is to have the information on the depth of the topsoil.

Are there any specificities to be considered for regionalised RDPs?

There are no specificities in this regard for regionalised RDPs.

Flowchart (left)

- RDP size and uptake
  - Data availability for CMES indicators
  - Data availability for selected additional indicators

↓

- Does a soil monitoring programme exist?

YES — 1a

↓

- Does the data allow for the construction of comparison groups of beneficiaries and non-beneficiaries?

YES — 2a

↓

- What is the available depth of soil sampling?

0-60 cm — 3a | **0-20 cm** — 3b

What is the available depth of soil sampling?

What can be done to improve the data situation?

Short-term solutions (for AIR 2019)

If the soil is only sampled at a depth of 0-20 cm, the logic model for I.12 provides an alternative approach.

If this is the case it is then advised to follow path 3b indicated in the model.

Long-term solutions (for ex-post)

Establish a soil monitoring programme, which samples soil at a depth up to 60 cm.

Is biological soil testing practiced?

RDP size and uptake

Data availability for CMES indicators

Data availability for selected additional indicators

Does a soil monitoring programme exist?

YES   1a

Does the data allow for the construction of comparison groups of beneficiaries and non-beneficiaries?

YES   2a

What is the available depth of soil sampling?

0-60 cm   3a

Is biological soil testing practiced?

YES   **NO**

4a   4b

Why is this question important?

What are the conditions in order to answer the question?

Are there any specificities to be considered for regionalised RDPs?

What can be done to improve the data situation?

Short-term solutions (for AIR 2019)

Long-term solutions (for ex-post)

Guidelines *Assessing RDP achievements and impact in 2019*, PART II, Chapters 2.1 and 2.7 and PART IV, Chapter 4.5.

Flowchart (left)

- RDP size and uptake
  - Data availability for CMES indicators
  - Data availability for selected additional indicators
- Does a soil monitoring programme exist?
  - **YES** — 1a
- Does the data allow for the construction of comparison groups of beneficiaries and non-beneficiaries?
  - **YES** — 2a
- What is the available depth of soil sampling?
  - **0-60 cm** — 3a
- Is biological soil testing practiced?
  - **YES** — 4a
  - **NO** — 4b

Is biological soil testing practiced?

Why is this question important?

Short term changes in SOC, including increases due to the implementation of RDP measures occur gradually and are not easily detectable due to the high background of soil C level. In most cases, it takes a decade or so before a significant change is detectable. Therefore, it is important to assess if there are any additional indicators which could assess biologically-active forms of SOM that can be used as short-term indicators of longer-term changes in SOM.

What are the conditions in order to answer the question?

The main condition is to practice biological soil testing.

Are there any specificities to be considered for regionalised RDPs?

There are no specificities in this regard for regionalised RDPs.

Flowchart (left side)

- RDP size and uptake
  - Data availability for CMES indicators
  - Data availability for selected additional indicators

Does a soil monitoring programme exist?

YES — 1a

Does the data allow for the construction of comparison groups of beneficiaries and non-beneficiaries?

YES — 2a

What is the available depth of soil sampling?

0-60 cm — 3a

Is biological soil testing practiced?

YES — 4a   **NO** — 4b

Is biological soil testing practiced?

What can be done to improve the data situation?

Short-term solutions (for AIR 2019)

If no biological soil testing is practiced, the logic model for I.12 provides an alternative approach.

In this situation it is advisable to follow path 4b indicated in the model.

Long-term solutions (for ex-post)

Establish a soil monitoring programme and conduct biological soil testing.

RDP size and uptake

- Data availability for CMES indicators
- Data availability for selected additional indicators

Does a soil monitoring programme exist?

YES   1a

Does the data allow for the construction of comparison groups of beneficiaries and non-beneficiaries?

YES   2a

What is the available depth of soil sampling?

0-60 cm   3a

Is biological soil testing practiced?

YES   4a

SOM assessment based on 0-60 cm soil depth
Use indicators: I.12, SOC 0-60 cm, SOC change, and SOM bio

This evaluation approach is applicable for the micro level assessment through the monitoring of the common and additional indicators (I.12, SOC 0-60 cm, SOC change and SOM bio) with the soil monitoring programme and constructing a counterfactual by building groups of non-beneficiaries and beneficiaries. One must then compare the soil samples of both in order to net out the RDP's effects on soil organic matters.

While SOM shows changes only in a longer time frame, by using SOM bio in the assessment one can also potentially observe short term changes in the soil.

Read more in Guidelines *Assessing RDP achievements and impact in 2019*, PART II, Chapter 2.7.3 and PART IV, Chapter 4.5.2.

Use LUCAS data both for beneficiary and non-beneficiary groups

RDP size and uptake

Data availability for CMES indicators

Data availability for selected additional indicators

Does a soil monitoring programme exist?

NO   1b

Use LUCAS data both for beneficiary and non-beneficiary groups

YES   1b

Why is this issue important?

What are the conditions in order to address this issue?

Are there any specificities to be considered for regionalised RDPs?

What can be done to improve the data situation?

Short-term solutions (for AIR 2019)

Long-term solutions (for ex-post)

Guidelines *Assessing RDP achievements and impact in 2019*, PART II, Chapter 2.1 and 2.7 and PART IV, Chapter 4.5.

Flowchart

- RDP size and uptake
  - Data availability for CMES indicators
  - Data availability for selected additional indicators

Does a soil monitoring programme exist?

NO 1b

Use LUCAS data both for beneficiary and non-beneficiary groups

YES 1b

Use LUCAS data both for beneficiary and non-beneficiary groups

Why is this issue important?

If a soil monitoring programme does not exist, then one should use LUCAS data as it is the only possible way of obtaining data on SOC for both beneficiaries and non-beneficiaries.
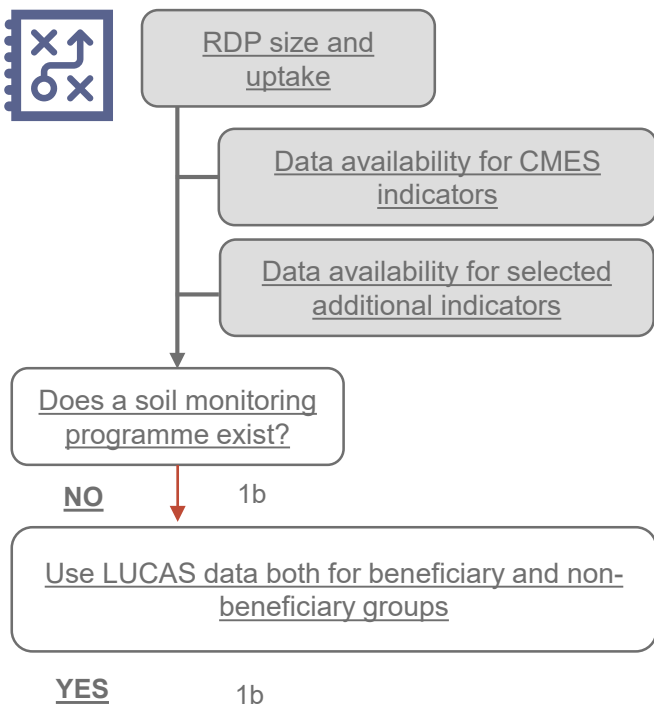
What are the conditions in order to address this issue?

LUCAS data can always be used in this case for all Member States.

Are there any specificities to be considered for regionalised RDPs?

There are no specificities in this regard to regionalised RDPs.

Use LUCAS data both for beneficiary and non-beneficiary groups

What can be done to improve the data situation?

Short-term solutions (for AIR 2019)

Use LUCAS data and follow path 1b of the logic model for I.12.

Complement LUCAS data with data obtained from (follow path 5a or path 5b):
- Other soil monitoring programmes, such as regional or national programmes established to prepare/improve national or regional soil maps, monitor erosion, collect data for demo trials/research programmes, etc.
- Qualitative analysis using Focus Groups, Delphi, MAPP, etc.

Long-term solutions (for ex-post)

Establish a soil monitoring programme specifically designed to assess the impact of RDP measures on SOC (and I.13) by being able to compare both RDP beneficiaries and non-beneficiaries.

RDP size and uptake

Data availability for CMES indicators

Data availability for selected additional indicators

Does a soil monitoring programme exist?

YES   1a

Does the data allow for the construction of comparison groups of beneficiaries and non-beneficiaries?

NO   2b

Use soil monitoring data for beneficiary group and LUCAS data for non-beneficiary group

YES   2b

Use soil monitoring data for beneficiary group and LUCAS data for non-beneficiary group

Why is this issue important?

What are the conditions in order to address this issue?

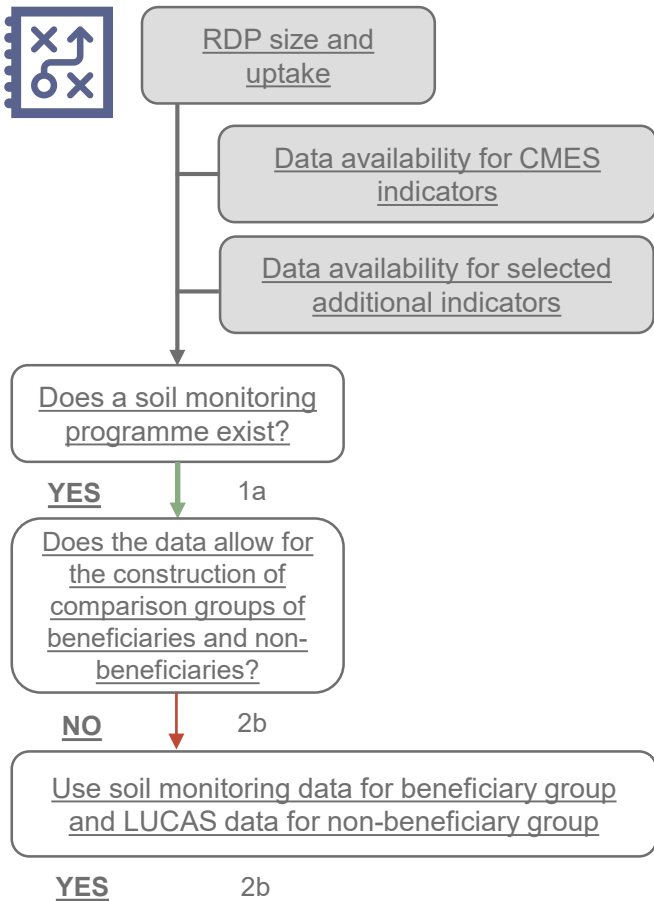**Are there any specificities to be considered for regionalised RDPs?**

What can be done to improve the data situation?

Short-term solutions (for AIR 2019)

Long-term solutions (for ex-post)

Guidelines *Assessing RDP achievements and impact in 2019*, PART II, Chapter 2.1 and 2.7 and PART IV, Chapter 4.5.

Flowchart (left side)

- RDP size and uptake
  - Data availability for CMES indicators
  - Data availability for selected additional indicators

Does a soil monitoring programme exist?

YES — 1a

Does the data allow for the construction of comparison groups of beneficiaries and non-beneficiaries?

NO — 2b

Use soil monitoring data for beneficiary group and LUCAS data for non-beneficiary group

YES — 2b

Use soil monitoring data for beneficiary group and LUCAS data for non-beneficiary group

Why is this issue important?

If a soil monitoring programme exists, but the data does not allow for the construction of comparison groups then the soil monitoring data collected for beneficiaries can be compared to the LUCAS data on non-beneficiaries. This is the only viable way of obtaining data on SOC for both groups.
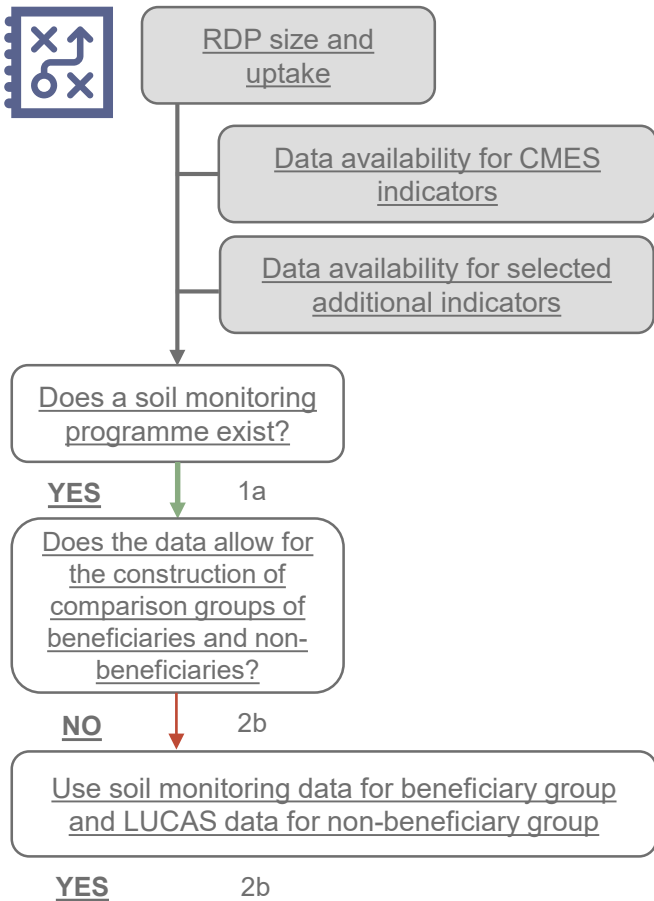
What are the conditions in order to address this issue?

To have a operational soil monitoring programme, which can be used to collect data on beneficiaries which can then be compared with LUCAS data which is available for all Member States.

Are there any specificities to be considered for regionalised RDPs?

There are no specificities in this regard to regionalised RDPs.

Flowchart

RDP size and uptake

Data availability for CMES indicators

Data availability for selected additional indicators

Does a soil monitoring programme exist?

YES 1a

Does the data allow for the construction of comparison groups of beneficiaries and non-beneficiaries?

NO 2b

Use soil monitoring data for beneficiary group and LUCAS data for non-beneficiary group

YES 2b

Use soil monitoring data for beneficiary group and LUCAS data for non-beneficiary group

What can be done to improve the data situation?

Short-term solutions (for AIR 2019)

Use both the soil monitoring programme data and LUCAS data and follow path 2b indicated in the logic model for I.12.

Complement LUCAS data with data obtained from (follow path 5a or path 5b):
- Other soil monitoring programmes, such as regional or national programmes established to prepare/improve national or regional soil maps, monitor erosion, collect data for demo trials/research programmes, etc.
- Qualitative analysis using Focus Groups, Delphi, MAPP, etc.

Long-term solutions (for ex-post)

Establish a soil monitoring programme specifically designed to assess the impacts of the RDP measures on SOC and I.13. by being able to compare RDP beneficiaries with non-beneficiaries.

RDP size and uptake

Data availability for CMES indicators

Data availability for selected additional indicators

Does a soil monitoring programme exist? —**NO**→ Use LUCAS data both for beneficiary and non-beneficiary groups —**YES**→

1b

YES 1a

Does the data allow for the construction of comparison groups of beneficiaries and non-beneficiaries? —**NO**→ Use soil monitoring data for beneficiary group and LUCAS data for non-beneficiary group —**YES**→

2b

YES 2a

What is the available depth of soil sampling? —**0-20 cm**→ Is biological soil testing practiced? —**NO**→

3b 3b2

Minimum level SOM assessment
Use indicator I.12

This approach can be achieved by monitoring the common impact indicator I.12 through the soil monitoring programme at the micro level and using the LUCAS database for the macro level.

At the micro level, the netting out of the RDP's effects are achieved through applying a counterfactual by constructing groups of non-beneficiaries and beneficiaries, and comparing the soil samples of both in the soil monitoring programme.

At the macro level, the LUCAS database should be scaled down and eventually overlaid with LPIS data to obtain the counterfactual, which will then facilitate the netting out of the programme effects.

Read more in Guidelines *Assessing RDP achievements and impact in 2019*, PART II, Chapter 2.7.4 and PART IV, Chapter 4.5.3.

RDP size and uptake

Data availability for CMES indicators

Data availability for selected additional indicators

Does a soil monitoring programme exist?

YES 1a

Does the data allow for the construction of comparison groups of beneficiaries and non-beneficiaries?

YES 2a

What is the available depth of soil sampling?

0-20 cm 3b

Is biological soil testing practiced?

YES   **NO**
3b1   3b2

Is biological soil testing practiced?

Why is this question important?

What are the conditions in order to answer the question?

Are there any specificities to be considered for regionalised RDPs?

What can be done to improve the data situation?

Short-term solutions (for AIR 2019)

Long-term solutions (for ex-post)

Guidelines *Assessing RDP achievements and impact in 2019*, PART II, Chapter 2.1 and 2.7 and PART IV, Chapter 4.5.

Flowchart (left column)

- RDP size and uptake
  - Data availability for CMES indicators
  - Data availability for selected additional indicators

↓

- Does a soil monitoring programme exist?

YES — 1a ↓

- Does the data allow for the construction of comparison groups of beneficiaries and non-beneficiaries?

YES — 2a ↓

- What is the available depth of soil sampling?

0-20 cm — 3b ↓

- Is biological soil testing practiced?

YES — 3b1   **NO** — 3b2

Is biological soil testing practiced?

Why is this question important?

Short-term changes in SOC, including potential increases due to the implementation of RDP measures occur gradually and are not easily detectable due to the high background of soil C level. In most cases it takes a decade or so before a significant change is achieved. Therefore, it is important to assess if there are any additional indicators which could assess biologically-active forms of SOM that can be used as short-term indicators of longer-term changes in SOM.

What are the conditions in order to answer the question?

By practicing biological soil testing (follow path 3b1).

Are there any specificities to be considered for regionalised RDPs?

There are no specificities in this regard to regionalised RDPs.

RDP size and uptake

Data availability for CMES indicators

Data availability for selected additional indicators

Does a soil monitoring programme exist?

YES   1a

Does the data allow for the construction of comparison groups of beneficiaries and non-beneficiaries?

YES   2a

What is the available depth of soil sampling?

0-20 cm   3b

Is biological soil testing practiced?

YES   **NO**
3b1   3b2

Is biological soil testing practiced?

What can be done to improve the data situation?

Short-term solutions (for AIR 2019)

If biological soil testing is not practiced, the logic model for I.12 provides an alternative approach.

It is then recommended that one follows path 3b2 indicated in the model.

Long-term solutions (for ex-post)

Establishing a soil monitoring programme and practising biological soil testing.

Flowchart

- RDP size and uptake
  - Data availability for CMES indicators
  - Data availability for selected additional indicators

Does a soil monitoring programme exist?

YES — 1a

Does the data allow for the construction of comparison groups of beneficiaries and non-beneficiaries?

YES — 2a

What is the available depth of soil sampling?

0-20 cm — 3b

Is biological soil testing practiced?

YES — 3b1

Medium level SOM assessment
Use indicators I.12; SOC change; SOM bio

The evaluation approach at the micro-level is based on the monitoring of the common impact indicator I.12 and two additional indicators (SOC change and SOM bio) through the soil monitoring programme.

At the macro level, the LUCAS database can be used. Programme effects are netted out through applying a counterfactual by constructing groups of non-beneficiaries and beneficiaries and comparing the soil samples of both in the soil monitoring programme.

At the macro level, the LUCAS database should be scaled down and eventually overlaid with LPIS data to obtain the counterfactual and net out the programme's effects.

Read more in Guidelines *Assessing RDP achievements and impact in 2019*, PART II, Chapter 2.7.4 and PART IV, Chapter 4.5.3.

RDP size and uptake

Data availability for CMES indicators

Data availability for selected additional indicators

Does a soil monitoring programme exist?

YES　　1a

Does the data allow for the construction of comparison groups of beneficiaries and non-beneficiaries?

YES　　2a

What is the available depth of soil sampling?

0-60 cm　　3a

Is biological soil testing practiced?

NO　　4b

High level SOM assessment
Use indicators I.12, SOC 0-60 cm, SOC change

The evaluation approach at the micro-level is based on the monitoring of the common impact indicator I.12 and two additional indicators (SOC 0 – 60 cm and SOC change) through the soil monitoring programme.

At the macro level, the LUCAS database can be used. Programme effects are netted out through applying a counterfactual by constructing groups of non-beneficiaries and beneficiaries and comparing the soil samples of both in the soil monitoring programme.

At the macro level, the LUCAS database should be scaled down and eventually overlaid with LPIS data to obtain the counterfactual and net out the programme's effects.

Read more in guidelines *Assessing RDP achievements and impact in 2019*, PART II, Chapter 2.7.4 and PART IV, Chapter 4.5.3.

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