



Thematic cluster of
the Evaluation
Knowledge Bank

EUROPEAN
EVALUATION
HELPDESK
FOR RURAL DEVELOPMENT



Monitoring and evaluation of soil erosion

Policy evaluation context

Soil erosion is a fundamental environmental indicator for the UN and the EU in CMEF and PMEF:

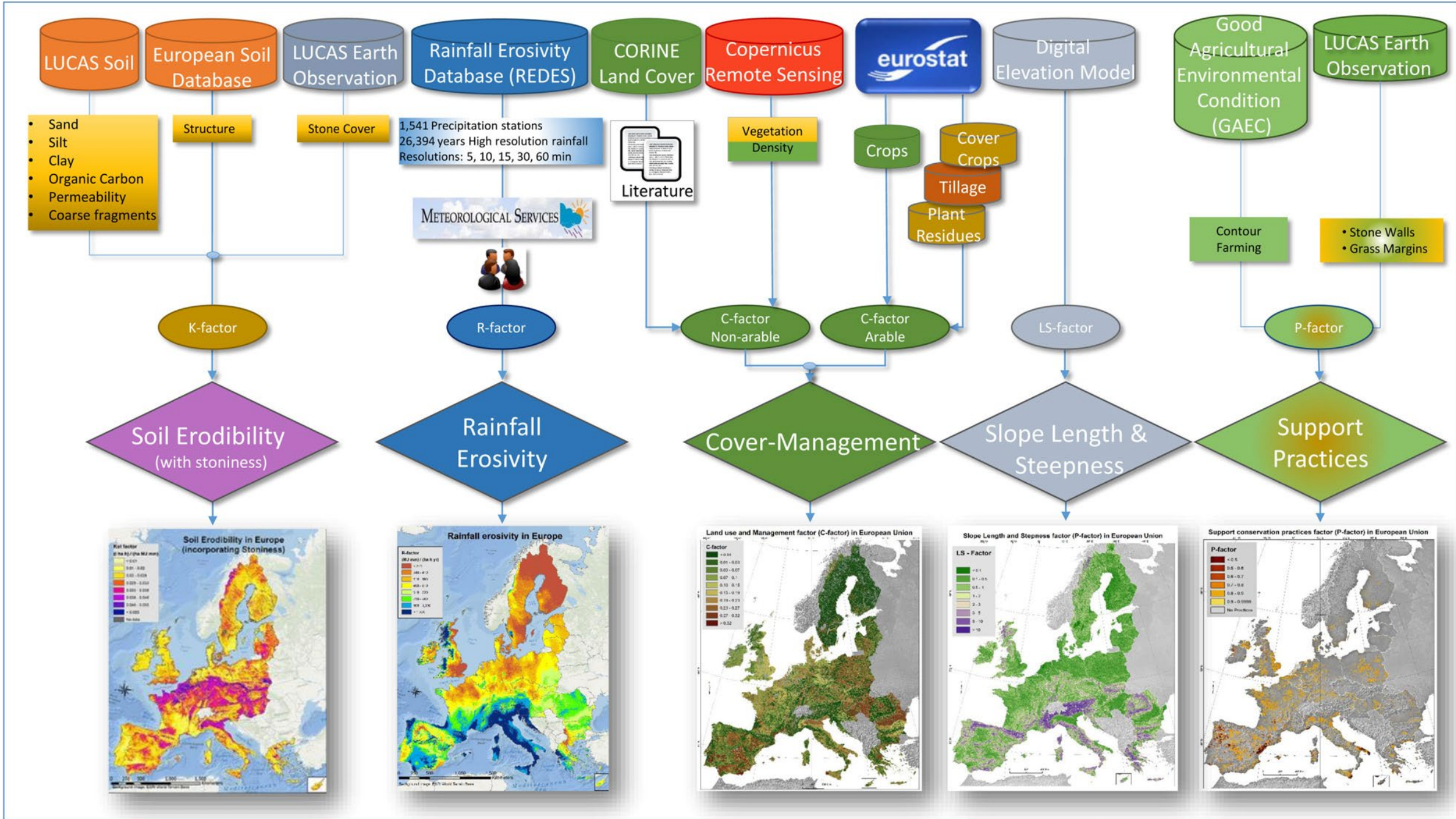
- **A UN Sustainable Development Goal 15 ‘Life on Land’**
- **CMEF**
 - Impact indicator I.13 for measuring ‘soil erosion by water’, Eurostat’s agri-environmental indicator AEI 21 and the Context Indicator 42:
 - Sub-indicator I.13-1 estimates the rate of soil loss by water erosion
 - Sub-indicator I.13-2 estimates the agricultural area affected by a certain rate of soil erosion
 - Common Evaluation Question (CEQ) 28
- **PMEF**
 - Impact indicator for I.13 on ‘Reducing soil erosion: % of agricultural land in moderate and severe soil erosion’.
 - Result indicator R.19^{PR} on ‘Improving and protecting soils: % of UAA under supported commitments beneficial for soil management to improve soil quality and biota (such as reduce tillage, soil cover with crops, crop rotation included with leguminous crops)’.
- **GAEC**
 - GAEC 5 on ‘Tillage management, reducing the risk of soil degradation and erosion, including consideration of the slope gradient’



Soil erosion evaluations in Europe

- The most commonly used erosion model is the Universal Soil Loss Equation (USLE) and its revised version (RUSLE).
- The model is used by all European Environmental Information and Observation Network (EIONET) participating countries for estimating long-term average annual soil loss by sheet and rill erosion
- The Joint Research Center of the European Commission (JRC-Ispra) has produced estimates of the indicators available in raster format and at a 100mx100m resolution available to any interested party
- Eurostat provides the JRC estimates of soil erosion by water, by erosion level, land cover and NUTS 3 regions
- The JRC projects soil loss by water erosion in Europe by 2050 and highlights the 'erosion hotspots' or areas to be attended by policy measures





The estimation of soil loss factors for Europe in RUSLE2015

RUSLE and the Evaluation Knowledge Bank: The Big Picture

Data for Assessing Soil Erosion

Earth Observations

Other massively collected data

Monitoring and controlling greening rules

Cover crops and plants residues

Tillage, mowing and other farm practices

NIVA – [E.O Monitoring and traffic lights](#)
ENVISION – [Analytics on vegetation and Soil Index](#)
TimeStamp – [Tool to monitor funding sites](#)

SEN4CAP – [Grassland mowing tool](#)
SEN4CAP – [agricultural practices monitoring](#)
SENSAGRI – [Map of tillage changes](#)

Farm Practices

C-Factor Arable

Crop type maps

Land cover, vegetation and density

SEN4CAP – [Cultivated crop type map](#)
SENSAGRI – [Crop type, yield and biomass](#)
ENVISION – [Cultivated crop type map](#)

Crop type and density

C-Factor Non-Arable

Cover Management

Constructing composite soil indicators

Minimum soil cover for avoiding soil erosion
 Environmental performance tool

ENVISION – [Analytics on vegetation and Soil Index](#)
DIONE – [E.O. based Environmental Performance Tool](#)

Support to runoff risk assessment

R-factor

Rainfall Erosivity

Field Observations (geotagged photos and field sensors)

Geotagged photos revealing status of soil surface

DIONE – [Geotagged photos to complement E.O. data](#)
NIVA – [E.O Monitoring and traffic lights](#)

Support to estimate the presence of gully erosion

C-Factor Arable and Non-Arable

Cover Management

Sensors to transmit soil properties and produce a soil property map

DIONE – [Soil Property Map](#)

Support to estimate soil erodibility

K-Factor

Soil Erodibility

Drones

Non-producing EFAs, Support practices (grass margins)

DIONE – [Crop – type maps, non-productive EFAs, permanent pastures and farming activities](#)

Grass margins
 Non-productive EFAs

P-Factor

Support Practices

Knowledge Bank





Input to RUSLE

Support to RUSLE


Potential uses in soil erosion evaluation

RUSLE factors

the **Cover Management** C-Factor depends on:

- the followed farm practices
 - cover and catch crops, e.g., TimeStamp - Tool to monitor catch crops
 - the management of residues, e.g.,  - Analytics on vegetation and Soil Index
 - disturbance of the field with tillage, ploughing and mowing , e.g.,  – Map of tillage changes
- Land cover, vegetation and density
 - crop type maps, e.g.,  - Cultivated crop type map
 - Density, e.g,  - yield and biomass

the **Support Practices** P-factor factor depends on:

- permanent grassland, non-productive EFAs, green margins, e.g.,  - Crop type maps, non-productive EFAs, permanent pastures and farming activities

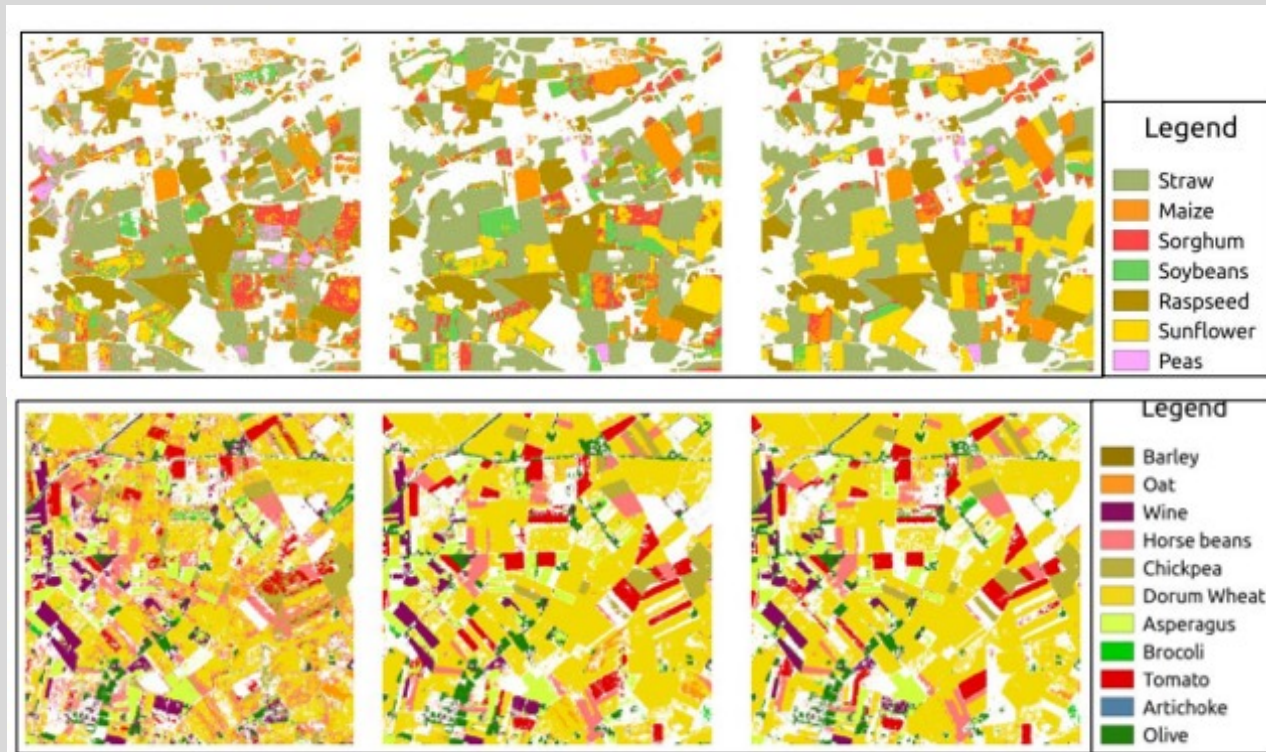
Potential uses in soil erosion evaluation

Other uses

Earth Observations data can assist evaluators to address the evaluation question:

How much of UAA under cover crops (a soil erosion management practice) is supported by the RDP?

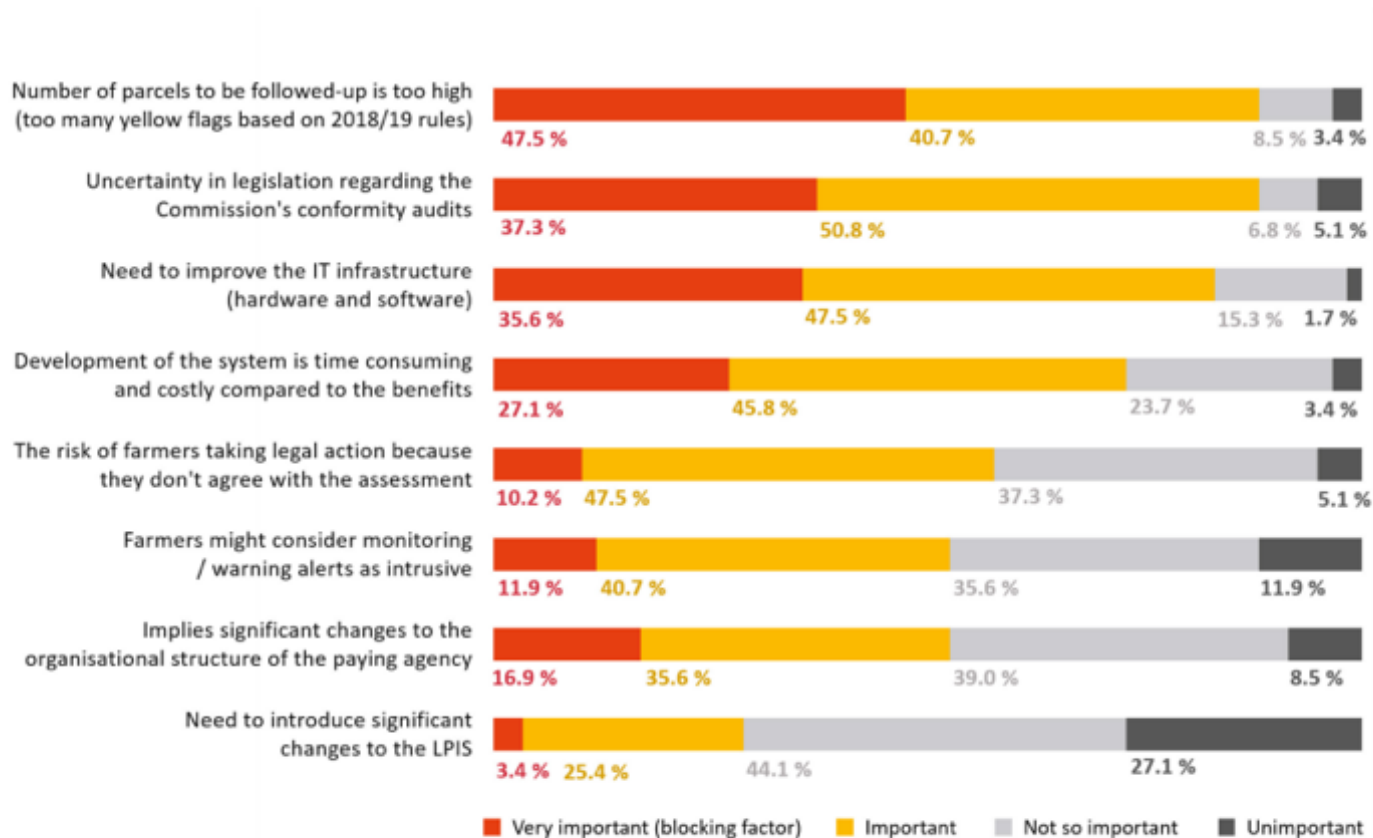
Overlay a SENSAGRI seasonal crop type map with an LPIS map of farms supported for maintaining cover crops. Which is the percentage of supported cover crops?



From left to right:
Crop type products at three different dates 02/03/18, 06/07/18 and 29/10/18 in a French (top diagram) and 02/03/17, 30/06/17 and 03/11/17 in an Italian (bottom diagram) case study area. Source: SENSAGRI [Deliverable D7.17](#)

Caveats and limitations – Obstacles in Adopting Earth Observations (E.O)

Figure 12 – Obstacles preventing paying agencies from applying checks by monitoring



Source: ECA survey.

A recent [European Court of Auditors](#) report identified a number of obstacles which may prevent paying agencies from applying checks by monitoring. In order of importance these include:

- The proportion of inconclusive parcels
- Uncertainty in legislation
- Improvements in IT infrastructure
- The system is time consuming and costly

On the other hand the paying agencies do not see significant problems associated with the changes in the LPIS or the organisational structure of the agency.



Caveats and limitations –

Obstacles in Adopting Earth Observations (E.O) and other Massively Collected Data for Evaluation



Access of Managing Authorities and of evaluators to Earth Observation data:

- Are the data proprietary?
- Are the data confidential?
- Can the data be connected and associate with IACS and LPIS?



Transferability of algorithms and methods:

- Which is the cost of adapting algorithms and methods created for another Member State?
- Which are the skills required for adopting evaluations based on E.O.
- Effort and resource sharing in adopting E.O for evaluation (scale economies for E.O)
- E.O to be used in monitoring and evaluation. To be used for the evaluation of many environmental indicators



Massively produced data from drones, sensors and geotagged photos:

- Application in case study areas where there are eco-schemes, small sized plots, or other situations requiring higher resolution and detailed observations
- Resource sharing is also an issue



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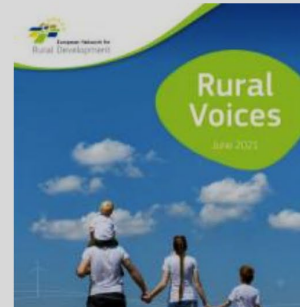
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Vision for
Rural Areas

Rural Voices report

The 'Rural Voices'
report provides a qualitative
analysis of the findings from
stakeholder workshops
contributing to the long-term
vision for rural areas.



Click on a country flag to
connect with rural Europe

Insights into various outputs developed in initiatives and projects at the EU and Member States levels concerning data infrastructures and data use.

A quick guide on potential use, showing how these outputs could be used for monitoring and evaluation of the CAP.

TOOLS

- Project Database
- Evaluation Knowledge Bank
- Share your Rural Story
- LAG Database
- CLLD Partner Search

This ENRD report records the hopes and dreams of more than 300 rural citizens from 15 different EU countries who participated in a series of workshops aimed at encouraging rural citizens to reflect on the social, economic, and environmental conditions of their own rural area and how it might change over the next 20 years, what developments they would like to see and the conditions and policies needed to reach their future vision.