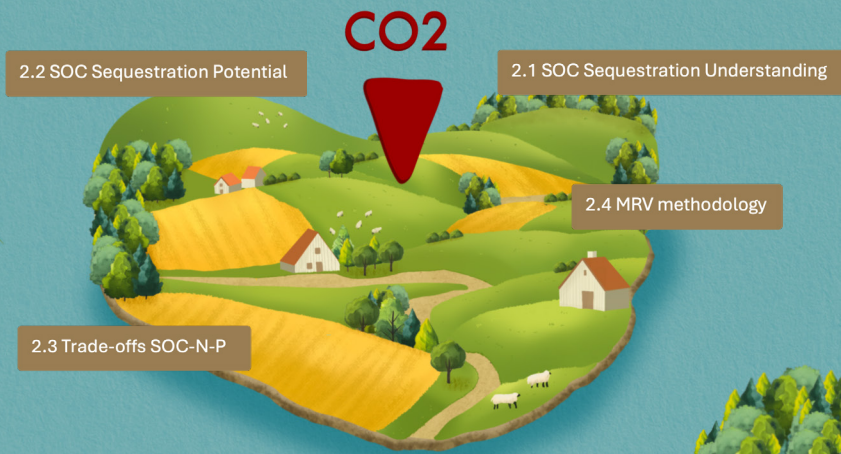
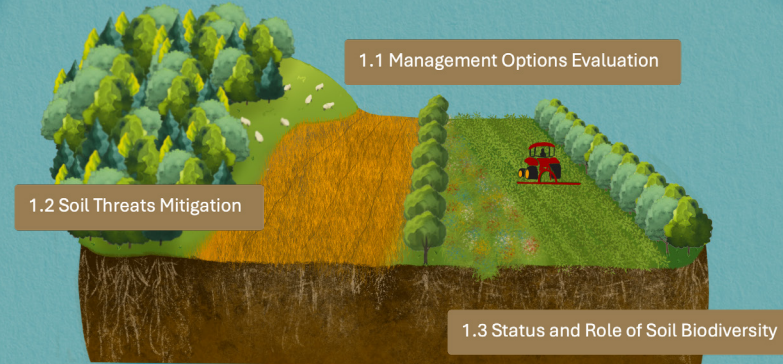


# Towards climate-smart sustainable management of agricultural soil

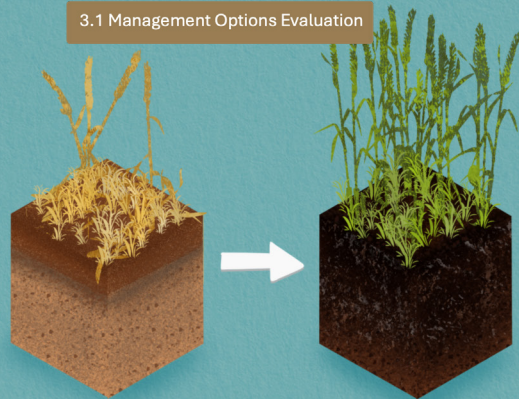
Outputs of the research programme EJP SOIL European co-funded research programme.



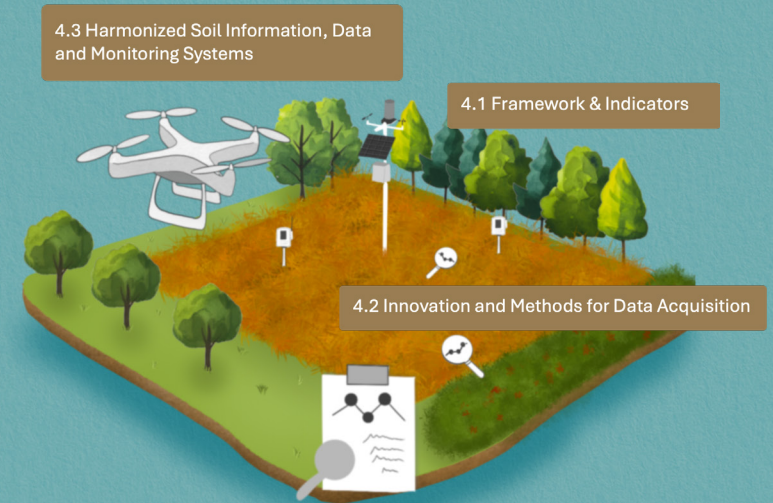
## 2. Climate Change Mitigation



## 1. Sustainable Land Management



## 3. Climate Change Adaptation



## 4. Soil Information Assessing & Monitoring



## 5. Fostering Adoption

# Towards Climate-smart sustainable management of agricultural soil

Outputs of the research programme EJP SOIL European  
co-funded research programme.

January 2025



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funding from the European  
Union's Horizon 2020  
research and innovation  
programme under grant  
agreement N° 862695



Towards climate-smart sustainable management of agricultural soil: Outputs of the European co-fund research programme EJP SOIL © 2025 by Laura Laroche, Christina Hachem-Majdalani, Anna Besse-Lototskaya, Raisa Gerasina and Claire Chenu is licensed under [CC BY 4.0](#)

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# 1. Sustainable land Management

Information about this theme will follow soon.

## 1.1 Management options evaluation

Information about this topic will follow soon.



Peer-reviewed  
Articles



Policy briefs  
and Notes



Deliverables  
and Reports



Datasets



Webinars &  
Educational Materials

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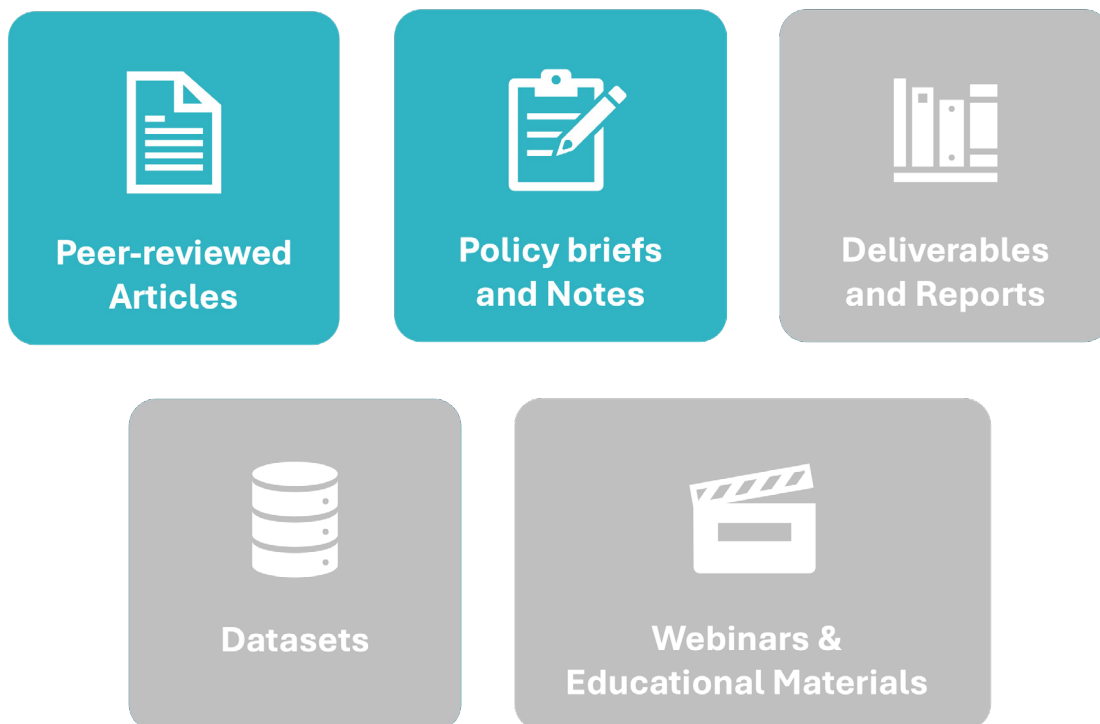
## *Policy Briefs and Notes*

**Keesstra, S. D., Munkholm, L. (Ed.), Zechmeister-Boltenstern, S. (Ed.), Taghizadeh-Toosi, A., Knadel, M., Nørgaard, T., Arthur, E., Lund Jensen, J., Pulido-Moncada, M., de Notaris, C., & Vervuurt, W.** 2021. Towards climate-smart sustainable management of agricultural soils: EJP SOIL Deliverable D2.6 Set of reports on State of knowledge in agricultural soil management . EJP SOIL Work Package 2 Deliverable. Wageningen University & Research. <https://doi.org/10.18174/563872>

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## 1.2 Soil threats mitigation

Information about this topic will follow soon.



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**Makovníková, J. , Kološta, S. and Pálka, B.** 2024. Factors Influencing the Acidification Trends in Agriculture Soils: A Case Study of Slovakia. *Journal of Geoscience and Environment Protection*, 12, 269-282. <https://doi.org/10.4236/gep.2024.129015>

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## 1.3 Status and Role of Soil Biodiversity

Information about this topic will follow soon.



### Peer reviewed articles

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## 2. Climate change mitigation

Information about this theme will follow soon.

### 2.1 SOC sequestration understading

Information about this topic will follow soon.



**Peer-reviewed  
Articles**



**Policy briefs  
and Notes**



**Deliverables  
and Reports**



**Datasets**



**Webinars &  
Educational Materials**

## Peer reviewed articles

- Angers, D. ; Arrouays, D. ; Cardinael, R. ; Chenu, C. ; Corbeels, M. ; Demenois, J. Farrell, M.; Martin, M., Minasny, B., Recous, S., Six, J.** 2022. A well-established fact: Rapid mineralization of organic inputs is an important factor for soil carbon sequestration. *European Journal of Soil Science*, 73(3). <https://doi.org/10.3929/ethz-b-000548479>
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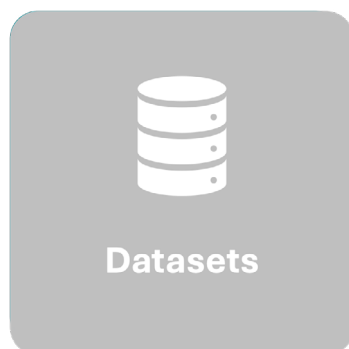
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## 2.2 SOC sequestration Potential

Information about this topic will follow soon.



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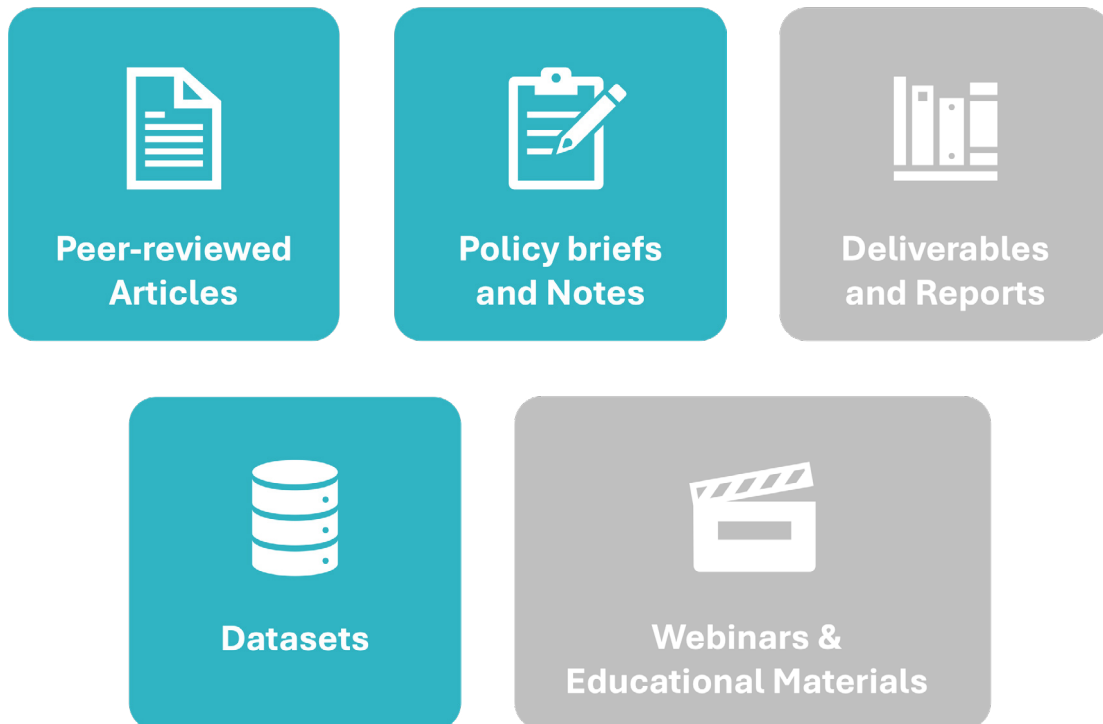
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## 2.3 Tradeoffs SOC - N-P

Information about this topic will follow soon.



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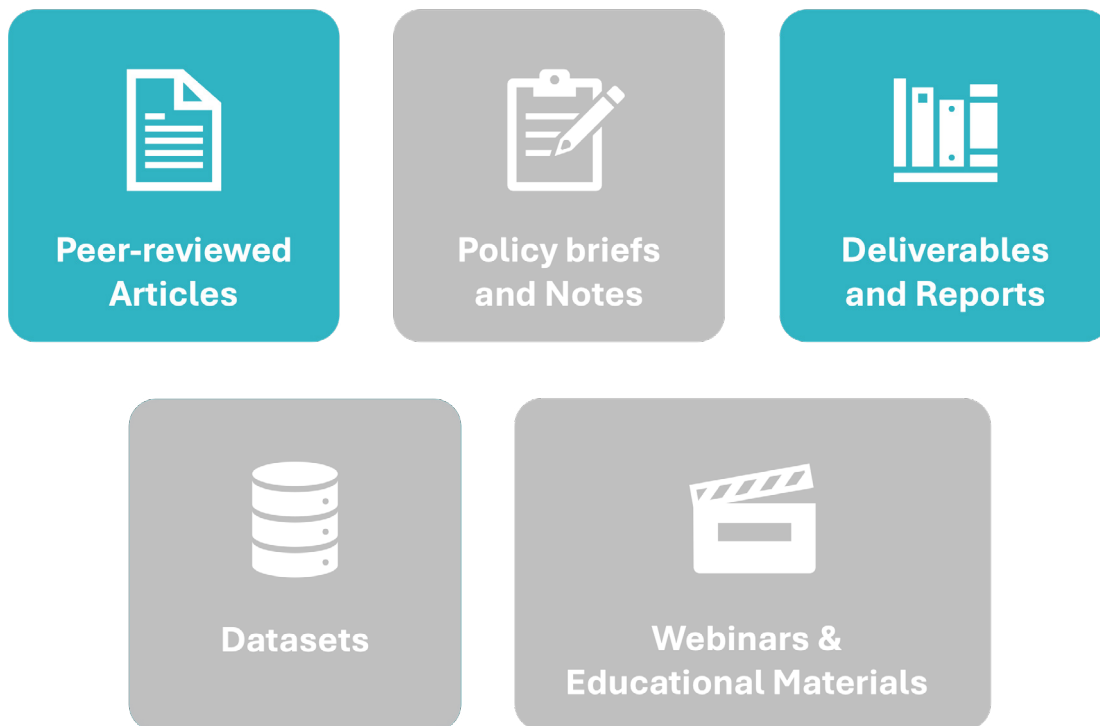
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## 2.4 MRV Methodology

Information about this topic will follow soon.



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## ***Deliverables and Reports***

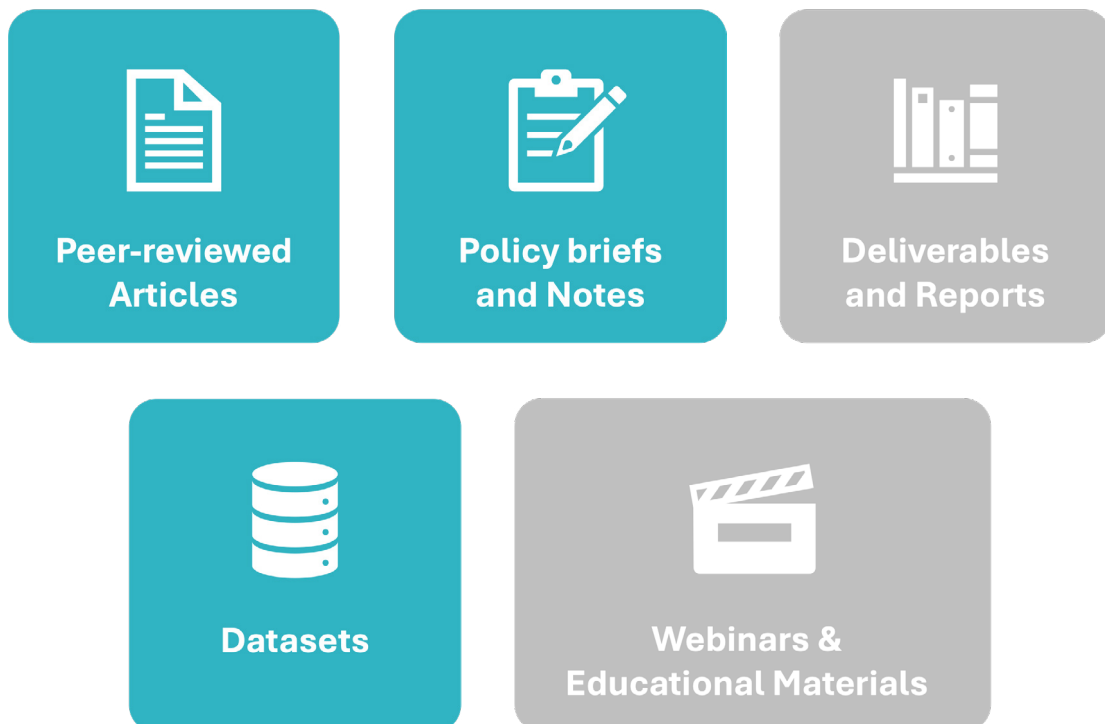
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# 3. Climate change adaptation

Information about this theme will follow soon.

## 3.1 Management options evaluation

Information about this topic will follow soon.



- Peer-reviewed Articles**
- Policy briefs and Notes**
- Deliverables and Reports**
- Datasets**
- Webinars & Educational Materials**

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## Peer reviewed articles

- Blanchy, G., Bragato, G., Di Bene, C., Jarvis, N., Larsbo, M., Meurer, K., Garre, S.** 2023. Soil and crop management practices and the water regulation functions of soils: a qualitative synthesis of meta-analyses relevant to European agriculture. *SOIL*, 9: 1–20. <https://doi.org/10.5194/soil-9-1-2023>
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## Datasets

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- Lærke, P. E., & Rodriguez, A.** (2024). INSURE DK Vejrumbro 2020\_21 [Data set]. In To harvest or not to harvest: Management intensity did not affect greenhouse gas balances of Phalaris arundinacea paludiculture (Vol. 44, Numéro 79). Zenodo. <https://doi.org/10.5281/zenodo.14161652>
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## 4. Soil Information Assessing & Monitoring

Information about this theme will follow soon.

### 4.1 Framework & Indicators

Information about this topic will follow soon.



Peer-reviewed  
Articles



Policy briefs  
and Notes



Deliverables  
and Reports



Datasets



Webinars &  
Educational Materials



## Peer reviewed articles

- Acutis, M.; Tadiello, T.; Perego, A.; Di Guardo, A.; Schillaci, C. & Valkama, E.** 2022. EX-TRACT: An excel tool for the estimation of standard deviations from published articles. *Environmental Modelling & Software*, 147: 1-9. <https://doi.org/10.1016/j.envsoft.2021.105236>
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- Matson, A., Fantappiè, M., Campbell, G. A., Miranda-Vélez, J. F., Faber, J. H., Gomes, L. C., Hessel, R., Lana, M., Mocali, S., Smith, P., Robinson, D. A., Bispo, A., van Egmond, F., Keesstra, S., Saby, N. P. A., Smreczak, B., Froger, C., Suleymanov, A., Chenu, C.** 2024. Four Approaches to Setting Soil Health Targets and Thresholds in Agricultural Soils. *Journal of Environmental Management*, 371:123141. <https://doi.org/10.1016/j.jenvman.2024.123141>
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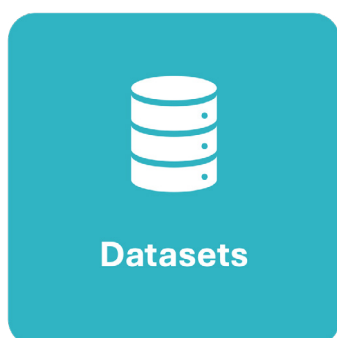
**Matson, A., Fantappiè, M., A. Campbell, G., F. Miranda-Vélez, J., H. Faber, J., Carvalho Gomes, L., Hessel, R., Lana, M., Mocali, S., Smith, P., Robinson, D., Bispo, A., van Egmond, F., Keesstra, S., P.A. Saby, N., Smreczak, B., Froger, C., Suleymanov, A., & Chenu, C. (2024).** A framework for setting soil health targets and thresholds in agricultural soils. EJP SOIL policy brief. Zenodo. <https://doi.org/10.5281/zenodo.13970554>

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**Pavlu, L., Sobocka, L., Boruvka, L., Penizek, V., Adamczyk, B., Baumgarten, A., Castro, I. V., Cornu, S., De Boever, M., Don, A., Feziene, D., & Vervuurt, W. 2021.** Towards climate-smart sustainable management of agricultural soils: Deliverable 2.2 Stocktaking on soil quality indicators and associated decision support tools, including ICT tools. EJP SOIL Work Package 2 Deliverable. Wageningen University & Research. <https://doi.org/10.18174/563875>

## 4.2 Innovation and Methods for data acquisition

Information about this topic will follow soon.



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- Zayani, H.; Fouad, Y.; Michot, D.; Kassouk, Z.; Baghdadi, N.; Vaudour, E.; Lili-Chabaane, Z.; Walter, C.** 2023. Using Machine-Learning Algorithms to Predict Soil Organic Carbon Content from Combined Remote Sensing Imagery and Laboratory Vis-NIR Spectral Datasets. *Remote Sens.*, 15: 4264. <https://doi.org/10.3390/rs15174264>

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- Gabriel, J. L., San-Juan-Heras, R., Delgado, M. del M., Lazaro, A., & Rodríguez-Martín, J. A.** (2024). Soil grid data for agricultural fields in Spain for STEROPES (EJP Soil) project (ECe, texture, soil organic carbon, pH) [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.14104483>
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- Metzger, K., Liebisch, F., Herrera, J. M., Guillaume, T., Walder, F., & Bragazza, L.** (2024). Agroscope\_SoilSpectralLibrary\_2024 [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.11204174>

## 4.3 Harmonised soil information, data and monitoring systems

Information about this topic will follow soon.



### Peer reviewed articles

**Froger, C. Tondini, E. Arrouays, D., Oorts, K., Poeplau, C., Wetterlind, J., Putku, E., Saby, N. P. A., Fantappie, M., Styc, Q., Chenu, C., Salomez, J., Callewaert, S., Vanwindekens, F. M., Huyghebaert, B., Herinckx, J., Heilek, S., Harbo, L. S. Gomesi, L. D. C., Lazaro-Lopez, A., Rodriguez, J. A., Pindrak, S., Smreczak, B., Beno, A., Bakacsi, Z., Teuling, K., van Egmond, F., Hutar, V., Palka, B., Abraham, D., Bispo, A.** 2024. Comparing LUCAS Soil and National Systems: Towards a Harmonized European Soil Monitoring Network. *Science and Remote Sensing*, 9: 100118. <https://doi.org/10.1016/j.geoderma.2024.117027>

**Meurer, KHE; Hendriks, CMJ; Faber, JH; Kuikman, PJ; van Egmond, F; Garland, G; Putku, E; Barancikova, G; Makovnikova, J; Chenu, C; Herrmann, AM; Bispo, A.** 2024. How does national SOC monitoring on agricultural soils align with the EU strategies? An example using five case studies. *European Journal of Soil Science* e13477, (1-20). <https://doi.org/10.1111/ejss.13477>

**Meurer, KHE; Hendriks, CMJ; Faber, JH; Kuikman, PJ; van Egmond, F; Garland, G; Putku, E; Barancikova, G; Makovnikova, J; Chenu, C; Herrmann, AM; Bispo, A.** 2024. How does national SOC monitoring on agricultural soils align with the EU strategies? An example using five case studies. *European Journal of Soil Science* e13477, (1-20). <https://doi.org/10.1111/ejss.13477>

Vanino, S.; Pirelli, T.; Di Bene, C.; Bøe, F.; Castanheira, N.; Chenu, C.; Cornu, S.; Feiza, V.; Fornara, D.; Heller, O.; Kasparinskis, R.; Keesstra, S.; Lasorella, M.V.; Madenoğlu, S.; Meurer, K.H.E.; O'Sullivan, L.; Peter, N.; Piccini, C.; Siebielec, G.; Smreczak, B.; Thorsøe, M.H.; Farina, R. 2023. Barriers and opportunities of soil knowledge to address soil challenges: Stakeholders' perspectives across Europe. *Journal of Environmental Management*, 325: 116581. <https://doi.org/10.1016/j.jenvman.2022.116581>

## *Policy Briefs and Notes*

Mason, E., Froger, C., Bispo, A., Fantappiè, M., Hessel, R., van Egmond, F., Wetterlind, J., Božena, S., Bakacsi, Z., & Chenu, C. (2023). Soil monitoring systems challenges / recommendations towards harmonization. EJP SOIL policy brief. <https://doi.org/10.5281/zenodo.13973516>

## *Deliverables and Reports*

Andrenelli, M. C., Armolaitis, K., Aponte, C., Arrouays, D., Assennato, F., Bakacsi, Z., Barbetti, R., Basile, A., Bevivino, A., Bispo, A., Blombäck, K., Borůvka, L., Buttafuoco, G., Cagnarini, C., Calzolari, C., Callewaert, S., Cockx, K., Cousin, I., D'Avino, L., ... Wetterlind, J. (2023). Deliverable 6.5 Guidelines for accounting and mapping agricultural soil carbon, fertility and degradation changes at different scales. EJP SOIL Work Package 6 Deliverable. <https://doi.org/10.5281/zenodo.14651688>

Bispo, A., Arrouays, D., Saby, N., Boulonne, L., Fantappiè, M., Armolaitis, K., Bakacsi, Z., Baumgarten, A., Brenna, S., Dernova, V., van Egmond, E., Hessel, R., Hutar, V., Kasparinskis, R., Knotters, M., Meuli, R. G., Nuutinen, V., Oorst, K., O'Sullivan, L., ... Wetterlind, J. (2021). Proposal of methodological development for the LUCAS programme in accordance with national monitoring programmes. EJP SOIL Work Package 6 Deliverable. <https://doi.org/10.5281/zenodo.12705644>

Fantappiè, M., Peruginelli, G., Conti, S., Rennes, S., Le Bas, C., van Egmond, F., Smreczak, B., Wetterlind, J., Chenu, C., Bispo, A., Oorts, K., & Bulens, J. (2021). Report on the national and EU regulations on agricultural soil data sharing and national monitoring activities. EJP SOIL Work Package 6 Deliverable. <https://doi.org/10.5281/zenodo.10014912>

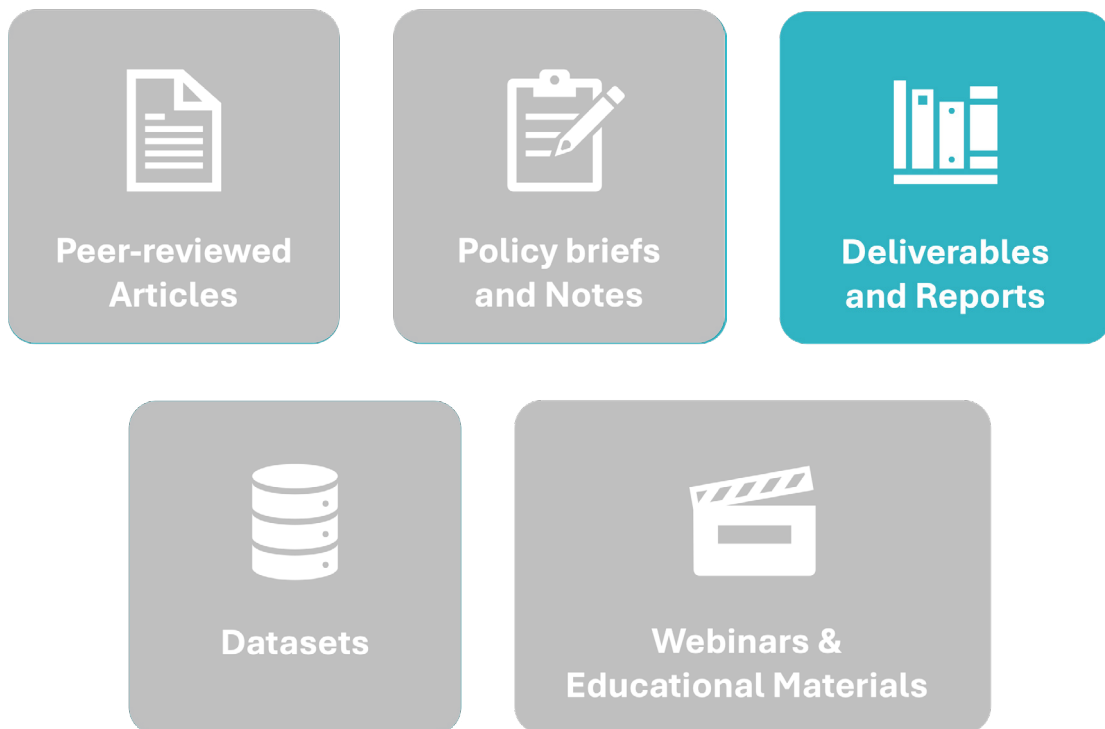
van Egmond, F. M., Andrenelli, M. C., Arrouays, D., Aust, G., Bakacsi, Z., Batjes, N. H., Bispo, A., Borůvka, L., Brus, D., Bulens, J. D., Calzolari, C., De Natale, F., Di Bene, C., Donovan, L., Fantappiè, M., Farkas-Iványi, K., Gardin, L., Kempen, B., Knotters, M., ... Yahiaoui, R. (2021). Report on harmonized procedures for creation of databases and maps. EJP SOIL Work Package 6 Deliverable. <https://doi.org/10.5281/zenodo.12704083>

# 5. Fostering adoption

Information about this theme will follow soon.

## 5.1 Support tools evaluation

Information about this topic will follow soon.





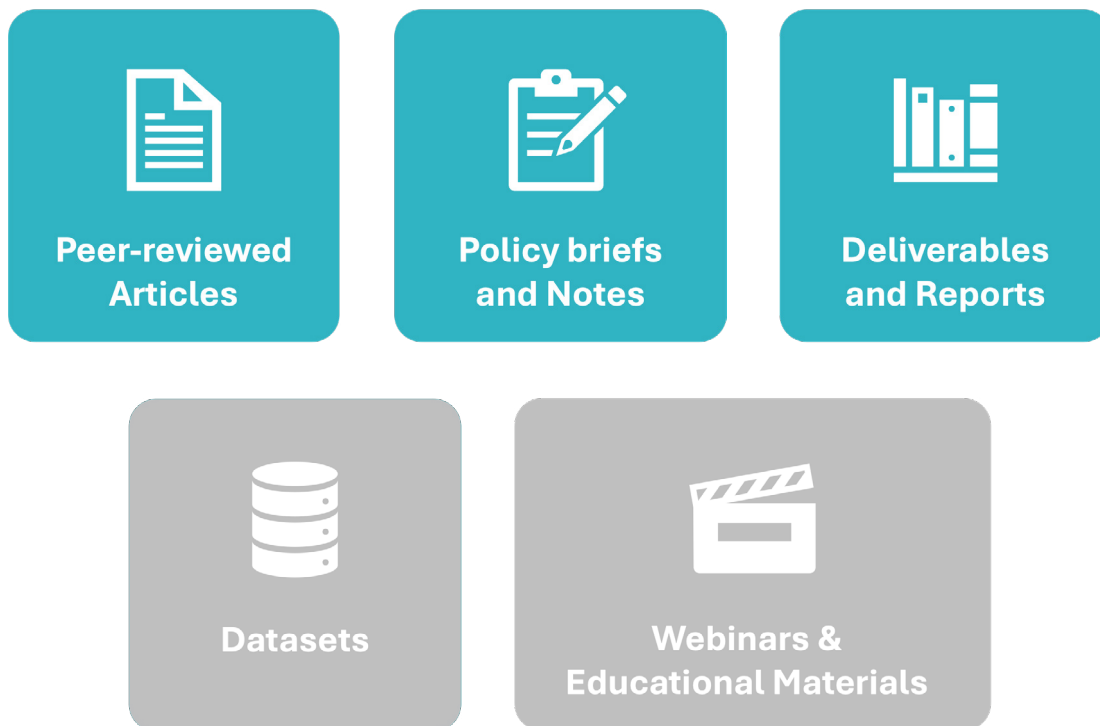
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**Dara Guccione, G., Pirelli, T., Phillips, A., & Varia, F.** (2021). Resources, Infrastructure and Capabilities Inventory (RICI) online platform for policy stakeholders. EJP SOIL Work Package 8 Deliverable. <https://doi.org/10.5281/zenodo.12721510>

**Higgins, S., Kadziuliene, Z., & Paz, A.** (2021). Stocktake study and recommendations for harmonizing methodologies for fertilization guidelines. EJP SOIL Work Package 2 Deliverable. <https://doi.org/10.18174/564678>

## 5.2 Tools for stakeholder engagement

Information about this topic will follow soon.



### *Peer reviewed articles*

**Mason, E; Gascuel-Odoux, C; Aldrian, U; Sun, H; Miloczki, J; Götzinger, S; Burton, VJ; Rienks, F; Di Lonardo, S; Sandén, T.** 2024. Participatory soil citizen science: An unexploited resource for European soil research. *European Journal of Soil Science* e13470, (1-17). <https://doi.org/10.1111/ejss.13470>

### *Policy Briefs and Notes*

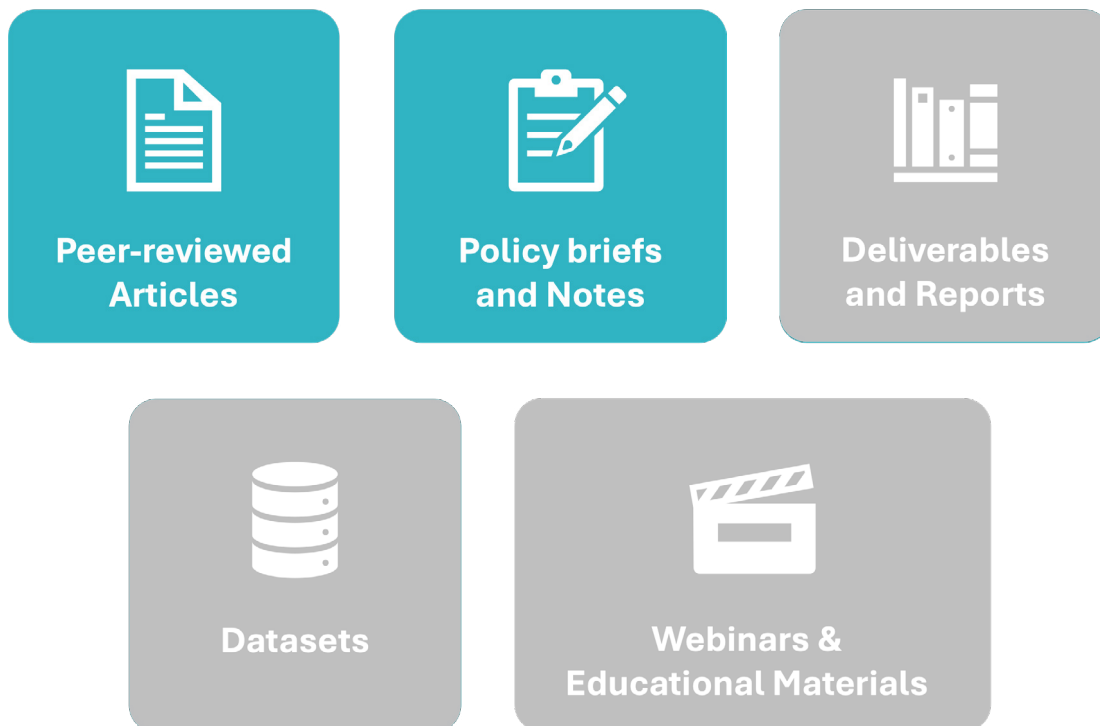
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## 5.3 Incentives and policy evaluation

Information about this topic will follow soon.



### Peer reviewed articles

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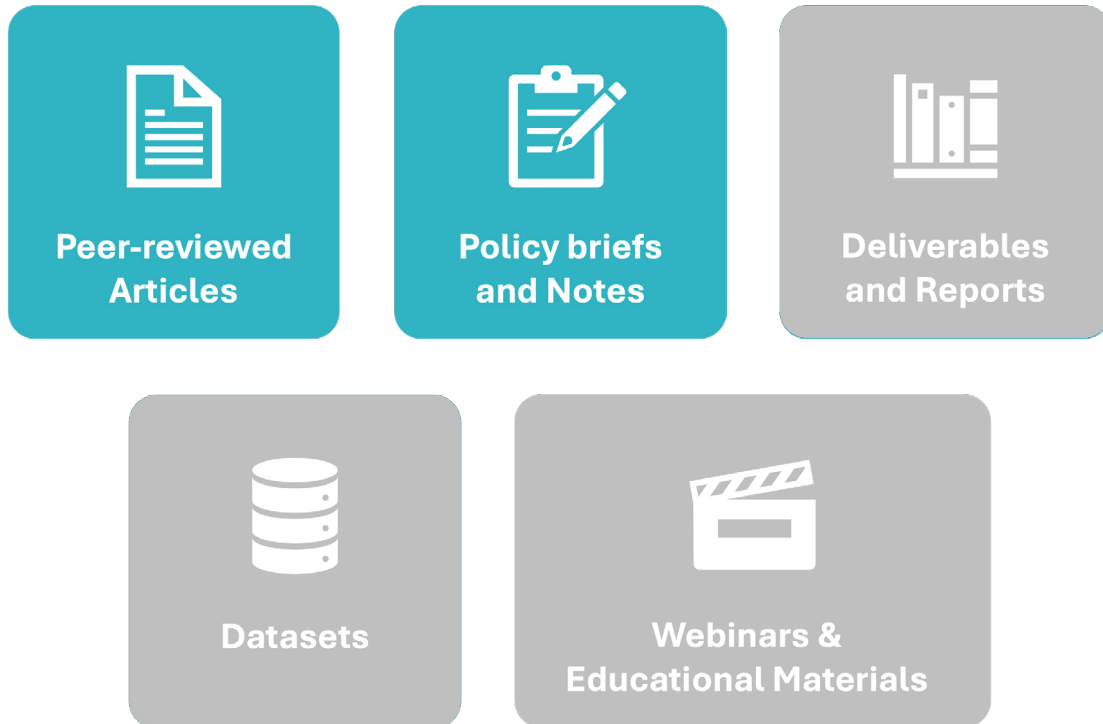
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**Criscuoli, I., Galioto, F., Martelli, A., Falconi, I., Dara Guccione, G., & Hvarregaard Thorsøe, M.** (2024). Towards a regulation on carbon removals in the EU: lessons learned from existing experiences. EJP SOIL policy brief. Zenodo. <https://doi.org/10.5281/zenodo.13970636>

## 5.4 Capacity building and education

Information about this topic will follow soon.



### *Peer reviewed articles*

**Veenstra, J., Coquet, Y., Melot, R., & Walter, C.** 2024. A European stakeholder survey on soil science skills for sustainable agriculture. *European Journal of Soil Science*, 75 (2): e13449. <https://doi.org/10.1111/ejss.13449>

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