SOILveR European knowledge platform on soil and land management

Soil health – Wallonia (Belgium)

Esther GOIDTS, SPW ARNE
5th November 2024

Soil Health related regulatory context

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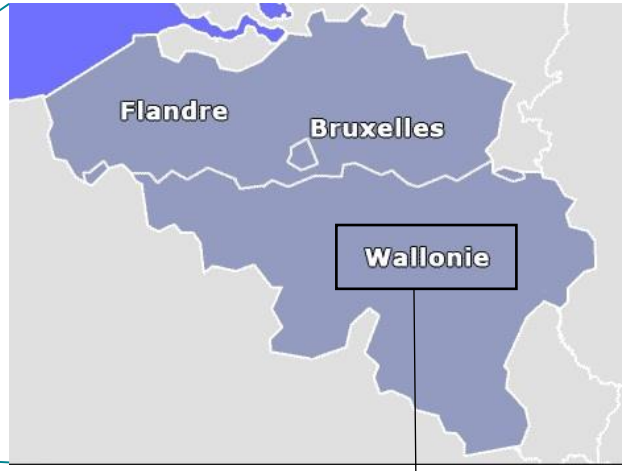
Belgium

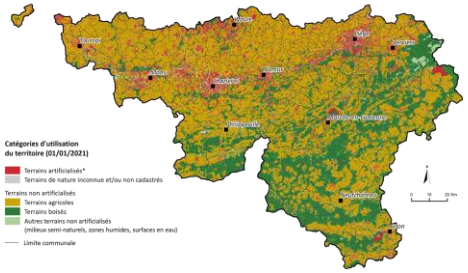


- 11,7 millions inhabitants
- 30 688 km²
- 377 inhab/km² (*EU: 109 inhab/km²*)
- 3 administrative regions in charge of environmental & agricultural competences (and partly health) since 1980

=> Regional soil legislations

Wallonia

Wallonie



3,6 M inhabitants (*217 inhab/km²*)

16 901 km² *(55% of BE surface)*

- *52% agriculture*
- *32% forest*
- *11% artificialised*

Soil Health related regulatory context

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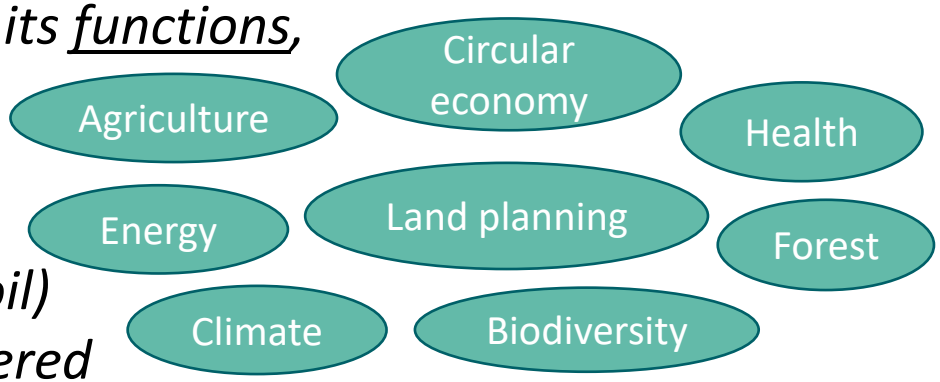
- ***Soil Decree 2018***
  - *aims to preserve "soil quality" (though not defined) and its functions,*
  - *to prevent "soil threats/degradation" and remediate degradated soils*
  - *promote sustainable soil management,*

  ⇒ *but 90% is **focusing on soil pollution** (incl. excavated soil)*

  ⇒ ***No dedicated guidance for soil health** but rather scattered sectoral guidances*

  ⇒ ***Coming Soil Monitoring Law (SML) will trigger SH concept***



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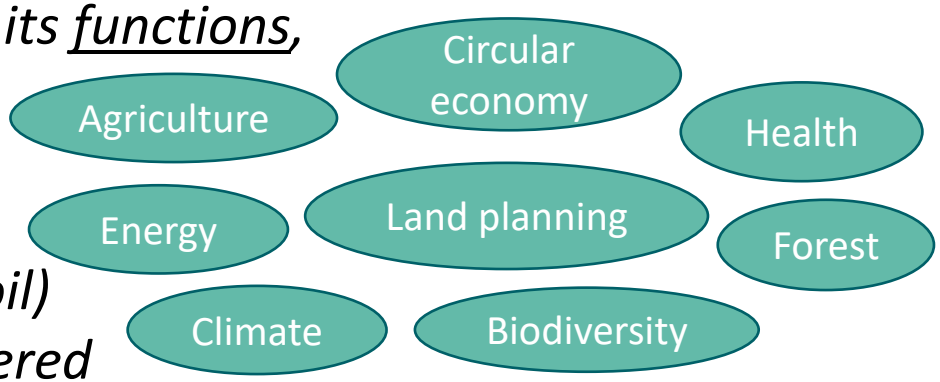

- *Basis for coordination within SPW (Public Service of Wallonia) lies at **SPW ARNE** in the "**Soil management Committee**"*

Wallonie service public SPW

SPW Agriculture, Natural resources and Environment

- ***Current legal developments :** diffuse pollution (risk assessment, norms, background levels…), emerging pollutants and soil quality assessment (integrated monitoring across land uses and soil quality index)*

Soil management and Land planning

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- **Code of Territorial Development** (**CoDT**) adopted in Dec 2023 is the **legislation** framing the development of the territory, *aims to ensure sustainable & attractive development while taking into account spatial optimisation*

  => report on artificialisation, urban sprawl & soil sealing every 3 yrs

- New **regional development plan** (**SDT**) adopted in April 2024 which defines the spatial **strategy** for Wallonia and sets 2 targets:

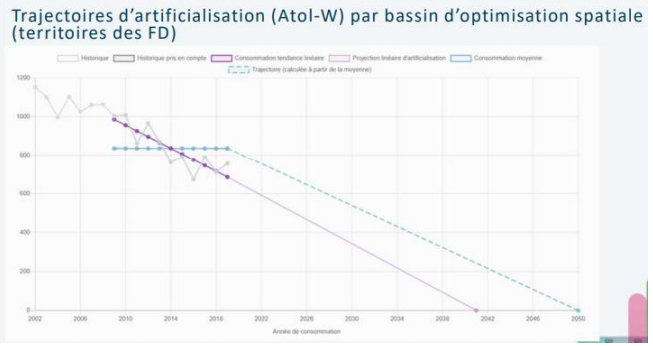
  1. *Reach No Net Land Take by 2050*
  2. *Reach a production of at least 3 out of every 4 new dwellings in "central areas"*

⇒ one trajectory of zero net artificialisation (target 1) and one trajectory of urban sprawl (target 2) are established per zones (7 zones in Wallonia) (including yearly threshold)

⇒ "**avoid - reduce – compensate**" principle

Mobilize artificialised land & waste lands including brownfields

Preserve ecosystem services & natural resources, limit soil sealing



Soil management and Land planning

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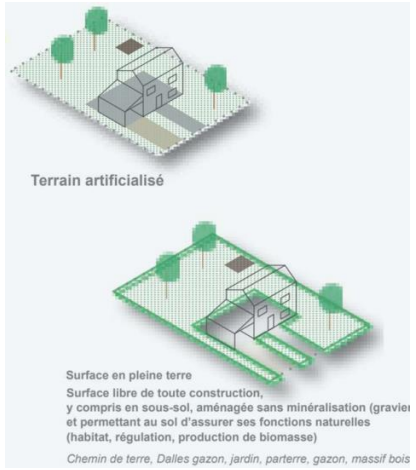
- **Concept of centrality** (link to spatial optimisation)

  To centralise activities (mainly housing and shops), organise and reinforce them along with the EU Territorial Agenda for 2030

  => *local authorities have 6 years to develop their « centralities » through their Local Development Schemes otherwise the centralities of the SDT apply (regional map)*

- **Concept of « open ground coefficient »** (link to soil sealing)



- ✓ no construction (including in subsoil)
- ✓ no artificial material
- ✓ allowing soil to ensure its functions & ecosystem services

=> Open door between 2D (*soil surface*) 3D (*soil quality*) vision

Open ground coefficient for project > 0,5 ha		
In centralities	Border of centralities	Out of centralities
≥ 30% ≥ initial area	If sites/areas to be redeveloped: ≥ 70% or ≥ 30% Otherwise criteria from SDT	≥ 70% ≥ initial area
and		
If not possible, take alternative measures : - water management - biodiversity enhancement - regulation of heat areas in cities		

Soil management and Land planning

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- "soil quality" assessment used for soil management is mainly based the following data (map + soil analyses if relevant):
  - ✓ *Site existance in the Soil Status Database of (potentially) contaminated sites*
  - ✓ *History of land use*
  - ✓ *Soil type according to the soil map*
  - ✓ *Soil characteristics according to various parameters:*
    - *water erosion potential (diffuse erosion risk + run-off axes)*
    - *soil organic carbon (concentration, stocks, SOC/clay, …),*
    - *soil texture, rock fragments, pH, CEC, N, P, …*

Soil pollution management

Environmental Impact assessments, agricultural land consolidation procedures, CAP (conditionality, agrienvironmental and climatic measure), RED (sustainable criteria for biomass), forest species choice, private vegetable gardening, …

=> Individual triggers for sectoral policies but no real integrated assessment and management of SH yet

Which tools/ instruments are available?

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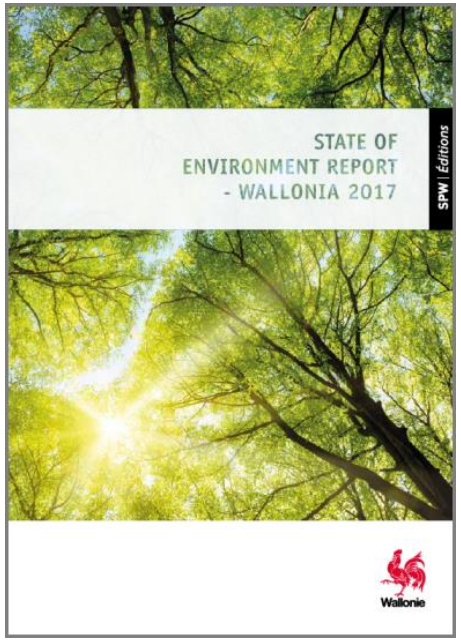
- **State of the Environment Report (SOER) for Wallonia** (since 1993)



- ✓ Structured information
- ✓ Quality, constraints and limits
- ✓ Status and trend assessment where relevant
  - Legal target
  - International target
  - Scientific threshold
- ✓ Continuous update

http://etat.environnement.wallonie.be/home.html

- Soil types
- Main land uses
- Land take
- Landscape fragmentation
- Atmospheric deposits of dust and trace elements
- Organic matter in agricultural soils
- Water erosion of soils
- N and P fluxes from agricultural soils
- Soil sealing
- Compaction of agricultural and forest soils
- Soil biological quality
- Contaminated sites management
- Fertilisers consumption in agriculture
- Health status of forests

Which tools/ instruments are available?

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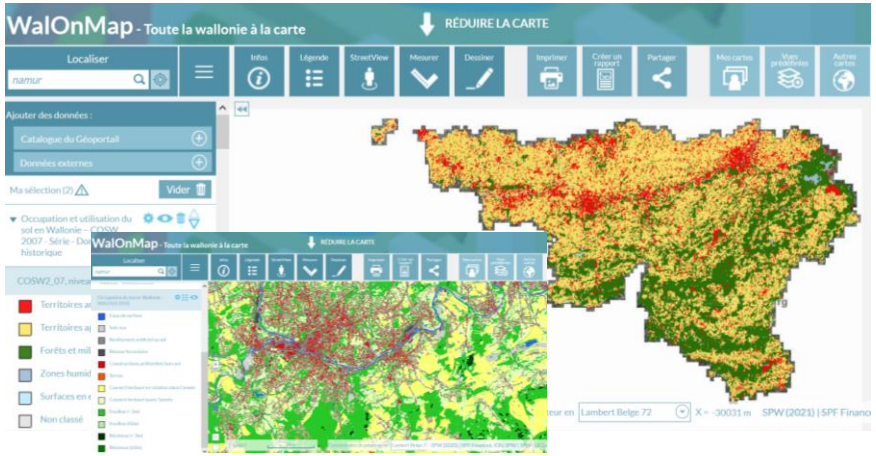
- **Geoportal (INSPIRE directive)**
  - ➢ Catalog of available datas and maps
  - ➢ Different public providers
  - ➢ Nature & Environment (**including soils**)
  - ➢ Land planning & Housing (a.o. sites to be redeveloped)
  - ➢ Mobility

https://geoportail.wallonie.be

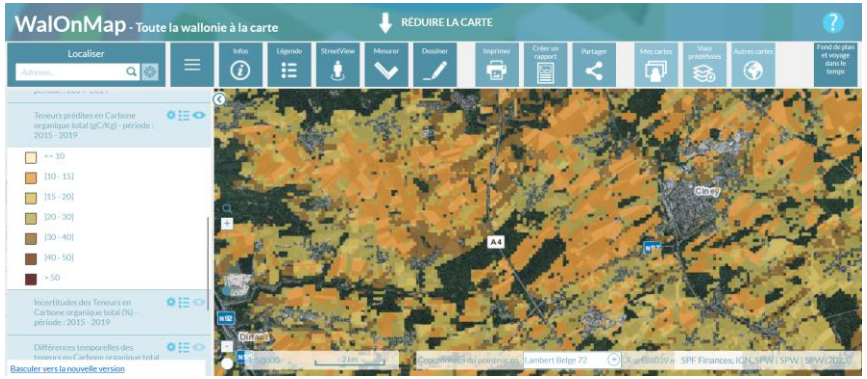
Land use / land cover



⇒ Use of high resolution remote sensing layers, 1m resolution

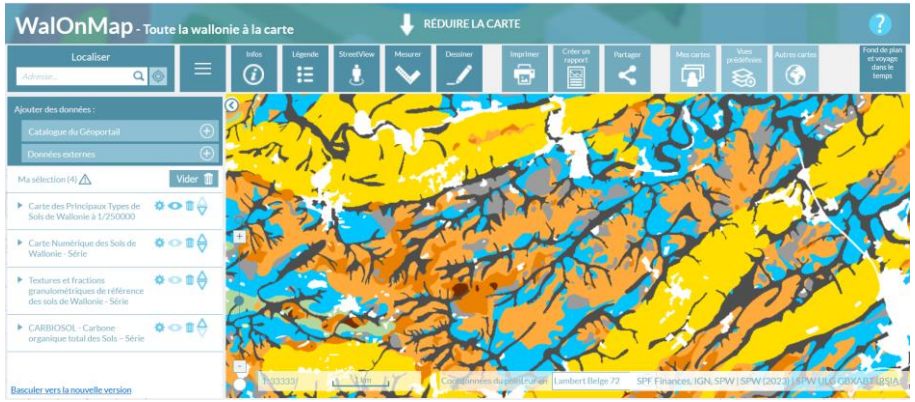
⇒ Further improvement needed (in line with typology defined for Wallonia)

Soil organic carbon *(concentration and stocks)*



⇒ Combination of BE soil map, research project CARBIOSOL (re-sampling + geoprocessing procedure) and soil routine analyses (REQUASUD), 90x90m

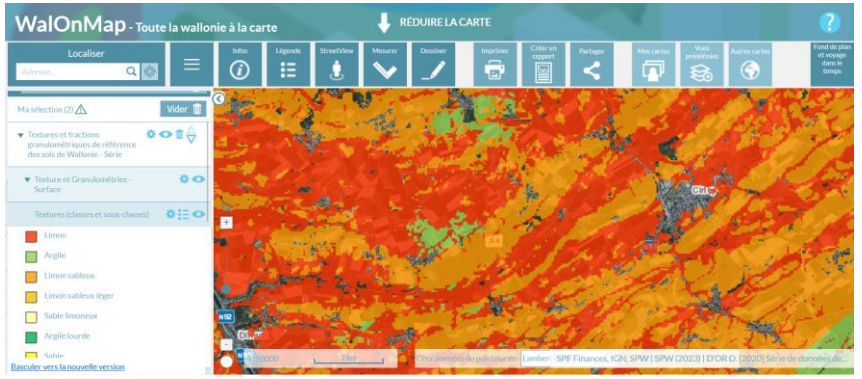
Soil types



⇒ Belgian soil map (1947 – 1991, 1/20 000, from 1 to 2,5 observ/ha)

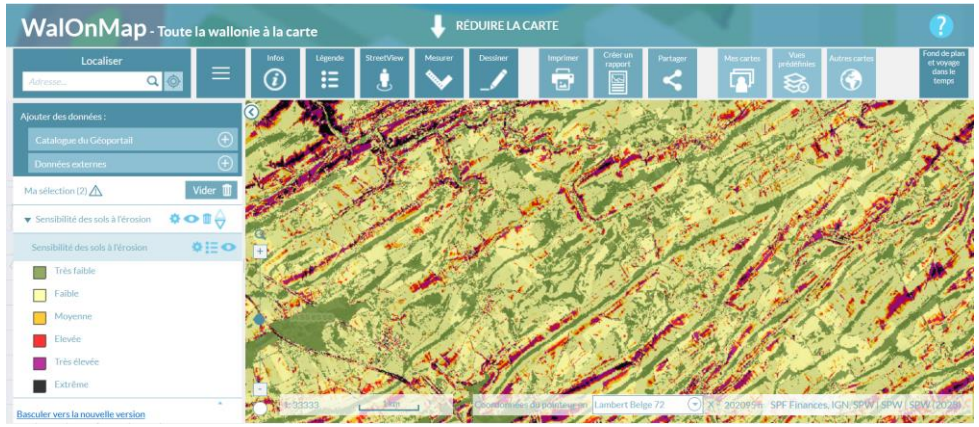
⇒ 15.000 georeferenced soil profiles, physico-chemical parameters

Soil texture



⇒ Textural fraction in topsoil and subsoil, based on BE soil map, research project, used to derivate and map other soil characteristics, 50x50m

Soil erosion potential



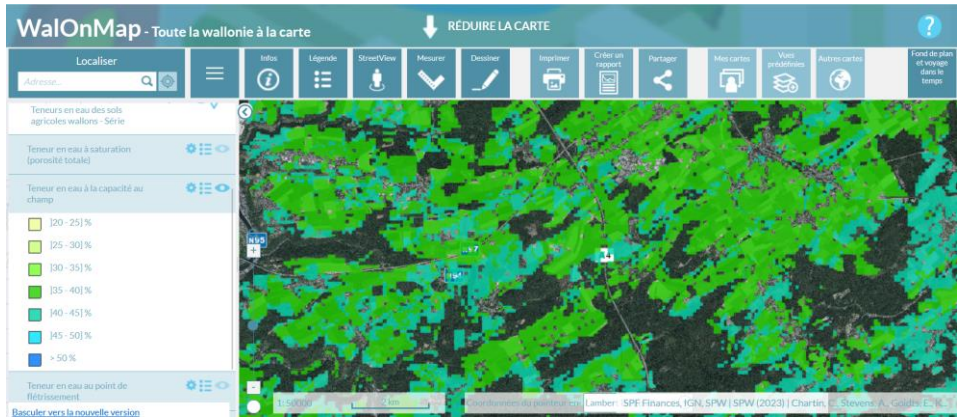
⇒ Based on RUSLE equation, 10 x 10 m resolution, useful for CAP measures targeting erosion issues

Run-off axes (LIDAXES)

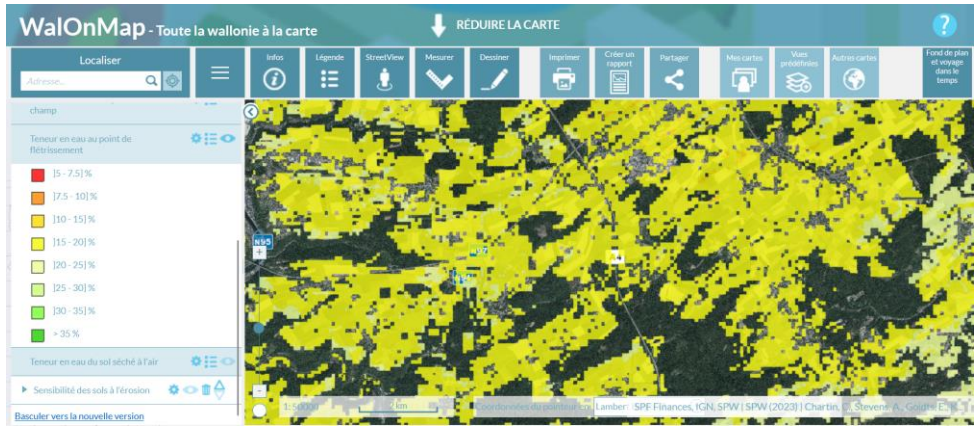
⇒ Use of accurate remote topographical data, legally binding consultation when delivering urbanism permits

Soil water retention

Field capacity



Wilting point



=> Based on pedotransfer functions (soil texture, organic carbon, bulk density), useful for water cycle analyses

Urban soils

Soil Status Database (BDES)

bdes.spw.wallonie.be

- Soil investigations by experts (Soil decree & previous legal bases)
- Permit delivered for potentially polluting activities
- Soil pollution reports from controls
- Historical information
- (Backfilled locations)
- Suspected pollution

78.263 parcels out of 3,8 M are colored in BDES (*around 20% of artificial areas)*

Agricultural soils

Agri-environmental and climatic measure result-based with *Soil Organic Carbon/Clay*

https://agriculture.wallonie.be/maec-sol

⇒ **Objective** : *maintenance or increase of soil carbon in cropland and grassland*

⇒ **Indicator** : ratio between total organic carbon content and clay content, assessed in first year (*initial report, t1*) and final year (*final report, t5*)

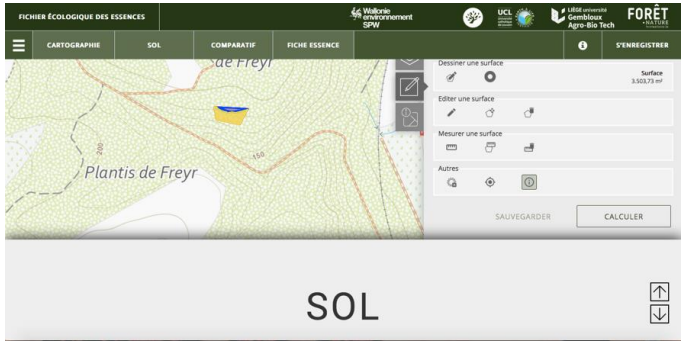
Soil type (% clay)	Unfavorable situation (0€/ha)	Transition situation (max 80€/ha)	Favorable situation (max 150€/ha)
Light (<12%)	< 14%	14 – 17%	> 17%
Mean (12-19%)	< 8%	8 - 10%	> 10%
Heavy (>19%)	< 6%	6 – 9%	> 9%

Sampling design for the farm based on « homogeneous zones » *(soil type x land use x organic matter input*) to be sampled randomly and on minimum criteria of representativity

Forest soils

Ecological file of forest species

https://www.fichierecologique.be



=> Webtool indicating compatibility between soil and forest species for new plantations

What research has been done or has been planned?

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- Recovery Plan for Wallonia – soil projects (9,25 Mo€ ; 2022 – 2026)
  - Project 115 : **Soil quality**
    - *Activity 1: **Monitor** soil quality and improve knowledge **biological soil quality***
    - *Activity 2: Develop an **integrated soil quality indicator (IQSW)***
    - *Activity 3: Strenghtening analysis and advisory sectors*
  - Project 116 : **Time series acquisition of soil data through IT**
  - Project 114 : **Carbon Stocks**
  - Project 117 : **Strengthening advisory sector**
  - Project 118 : **Reinforcement of subsidy system for soil analyses**

  soil quality, advisory system and incentives

  - Project 119 : **Complementary development, mapping and analysis of land take and soil sealing**
  - Project 120 : **Technical implementation of soil sealing limitation on test areas**

  Land take & soil sealing

- Research project focusing on soil pollution (running)
  - *emerging contaminants (recommendations for soil investigations and soil analyses)*
  - *diffuse pollution (background concentration, recovery of fertilisers)*
  - *risk assessment, environment & health approaches (linking soil pollution and HBM)*

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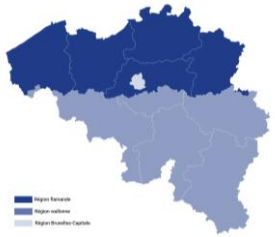
➢ Development of the Soil health (SH) monitoring according to the SML concept

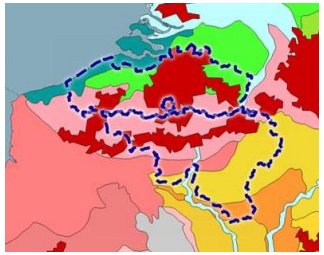
✓ soil unit = ***soil district*** x ***EU soil regions*** x ***land use***



Flanders

Brussels

Wallonia



Land use classes close to LULUCF
Forests
Cropland
Grassland
Green space in urban fabric
Wetlands
Other

=> BE: around 60 soil units to be characterised by ±1500 sampling sites

=> Wallonia refinement: 11 soil types instead of 5 EU soil regions, around 1000 sampling sites to be monitored

❑ integration and adaptation of existing monitoring networks (forest, agriculture, urban soils)

❑ complementary soil campaign and analyses to cover all SH parameters as foreseen by SML

Electrical conductivity, bulk density, saturated hydraulic conductivity, water curve, soil biodiversity & biological activity

What research has been done or has been planned?

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- Development of an integrated “Soil Quality Index” for Wallonia “IQSW” reflecting SH concept (https://www.iqsw.be/)

  - ✓ Awareness raising for the general public (“Citizen IQSW”)
    - Synthetic information on the soil health of a citizen’s soil (observatory criteria and available maps)
    - Advises to preserve or restore soil health

  - ✓ SH tool assessment for land/project managers (“Professional IQSW”)
    - Detailed information on the soil health (laboratory soil analyses)
    - Improved environmental impact assessment and targeted recommandations for soil use and restoration within projects

What research has been done or has been planned?

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ALL4SOIL – Horizon Europe project (Coordinated by ULiège, Belgium):

Living Labs dedicated to Nature-based Solutions to accelerate the regeneration of contaminated lands

(4 LLs, incl. a Living lab in Wallonia) - submitted, evaluation expected in January 2025

URBAN SOIL – Interreg NWE project (Coordinated by University of Louvain La Neuve, Belgium)

Urban Soils, a resource for mitigating climate change - under development, will be submitted in January 2025

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What are the main challenges to be addressed?

- Linking soil health to land planning decisions
  Concepts of Soil Health and IQSW as supporting tool
- Assessment of soil health and their ecosystem services at the appropriate scale to allow effective prevention and restoration measures
  Maps are useful but indicative, validation by field soil data is required for soil management at parcel level by the land manager
- Management of contaminated sites taking into account soil health
  Should risk-based management of soil contamination be the only target? How to move forward?
- Limits of circular economy when pollution is part of the circle
  How far can material be circulated when containing pollutants? How to ensure healthy soils when soil is the last compartment being taken into account?

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Questions / Remarks?

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