SOIL MONITORING IN BRUSSEL

RESULTS AND KEY INSIGHTS

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BACKGROUND



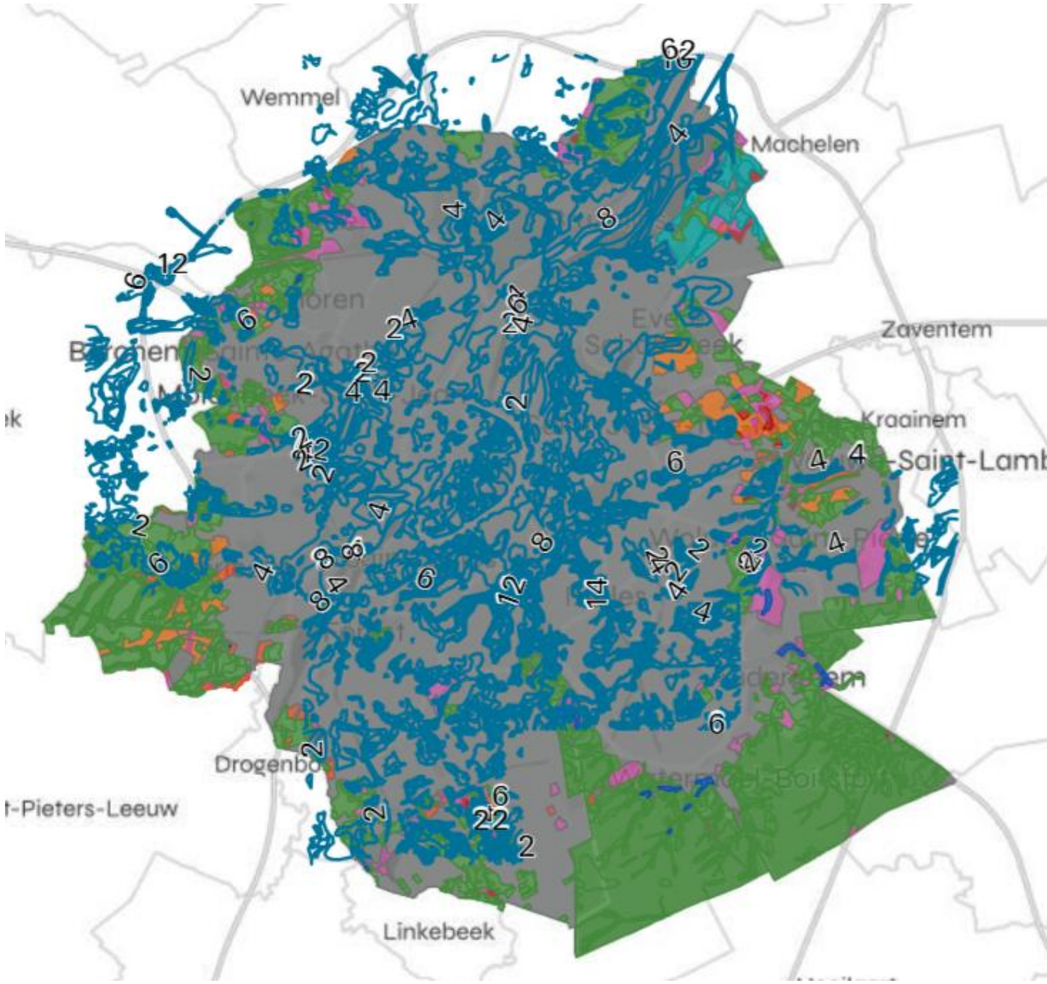


162 km²

19 communes

1.241.175
habitants et habitantes

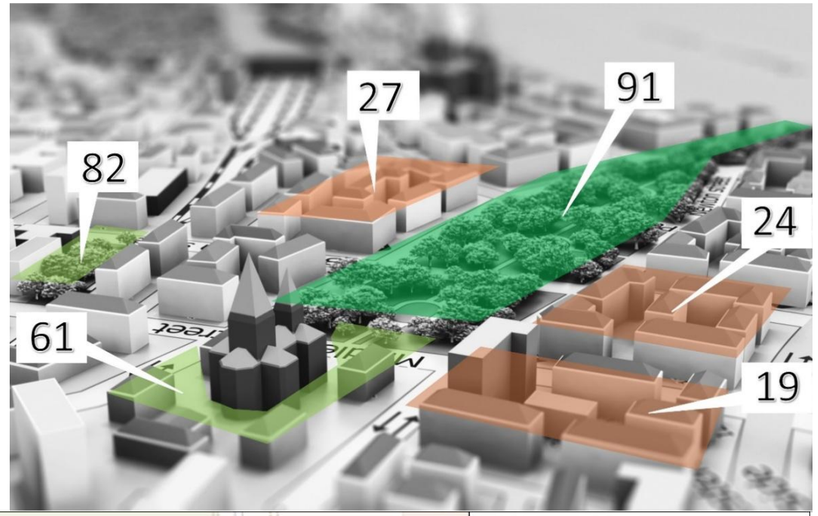
+9 % en 10 ans[1]

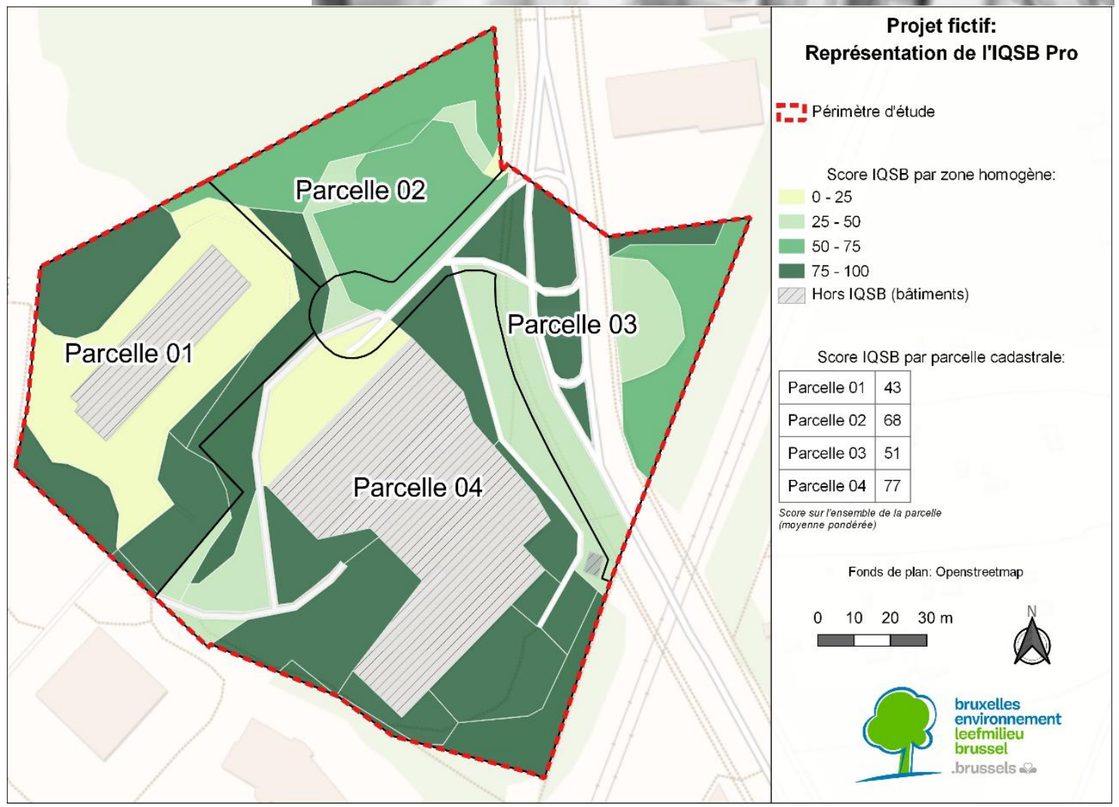


BACKGROUND

Why an BSQ(H)I?

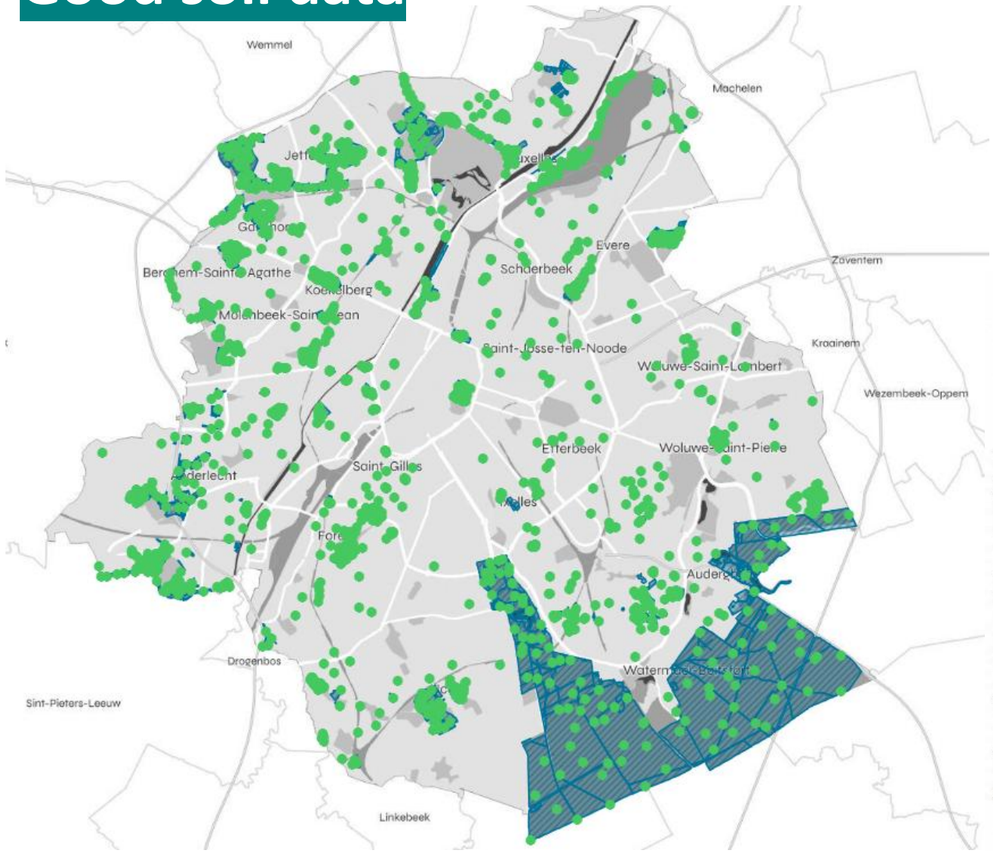
- Developing soil knowledge
- Raising awareness among soil stakeholders
- Decision-making support upstream of projects
  - What soil quality at which point in the project
  - Matching land use with quality
  - What actions? What management?





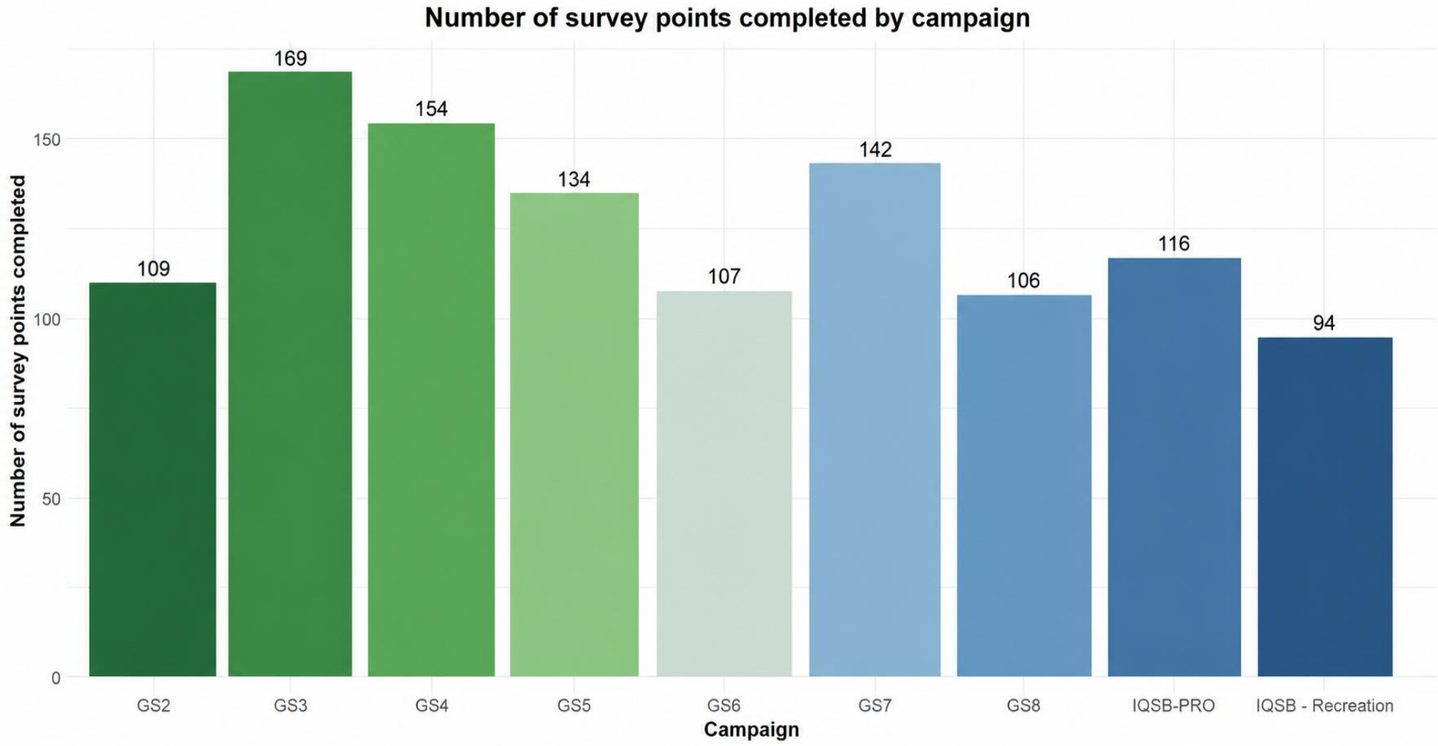
BACKGROUND

Good soil data



Data analysis

- 1131 survey points
- 22 Settings
- Goodsoil campaigns from 2 to 8
- BSQ(H)I pro
- BSQ(H)I Recreation



OBJECTIVES OF THE STUDY



A – Data compilation

A1*.
Familiarization with the existing database and descriptive statistics

A2*.
Data compilation: existing database + additional data

B – Data analysis

B1.
Critical analysis of raw data collected

B2.
Critical analysis of data and selection of parameters with regard to soil quality

B3.
Establishment of meteorological/ seasonal factors affecting the values of soil parameters measured

B4.
Analysis and determination of insights from living organism data (eDNA)

C – Adaptation and recommendations

C1.
Assessment of soil quality by typology

C2.
Review of general thresholds and establishment of thresholds/standards by typology

C3.
Recommendations

Alfresco » IN_20260205__Analyse and processing of soil quality data in the Bruxelloise_EODD_050226.pdf Region

QUALITY OF THE DATA COLLECTED



- **Quality control** of raw data OK



- **Reliability and practicability** to be reviewed for certain indicators:
  - Methodology (e.g. Vess test)
  - Seasonal effects (e.g., compaction, microbial biomass, aggregate stability)
  - Upper and lower Limits (TOC)



- **Choice of indicators** :
  - Redundant indicators (e.g. hydraulic conductivity)
  - 9 most measured indicators must be kept

ADAPTATION OF THE BSQ(H)I

BSQ(H)I by typology of use

General BSQ(H)I, though…



≠



≠



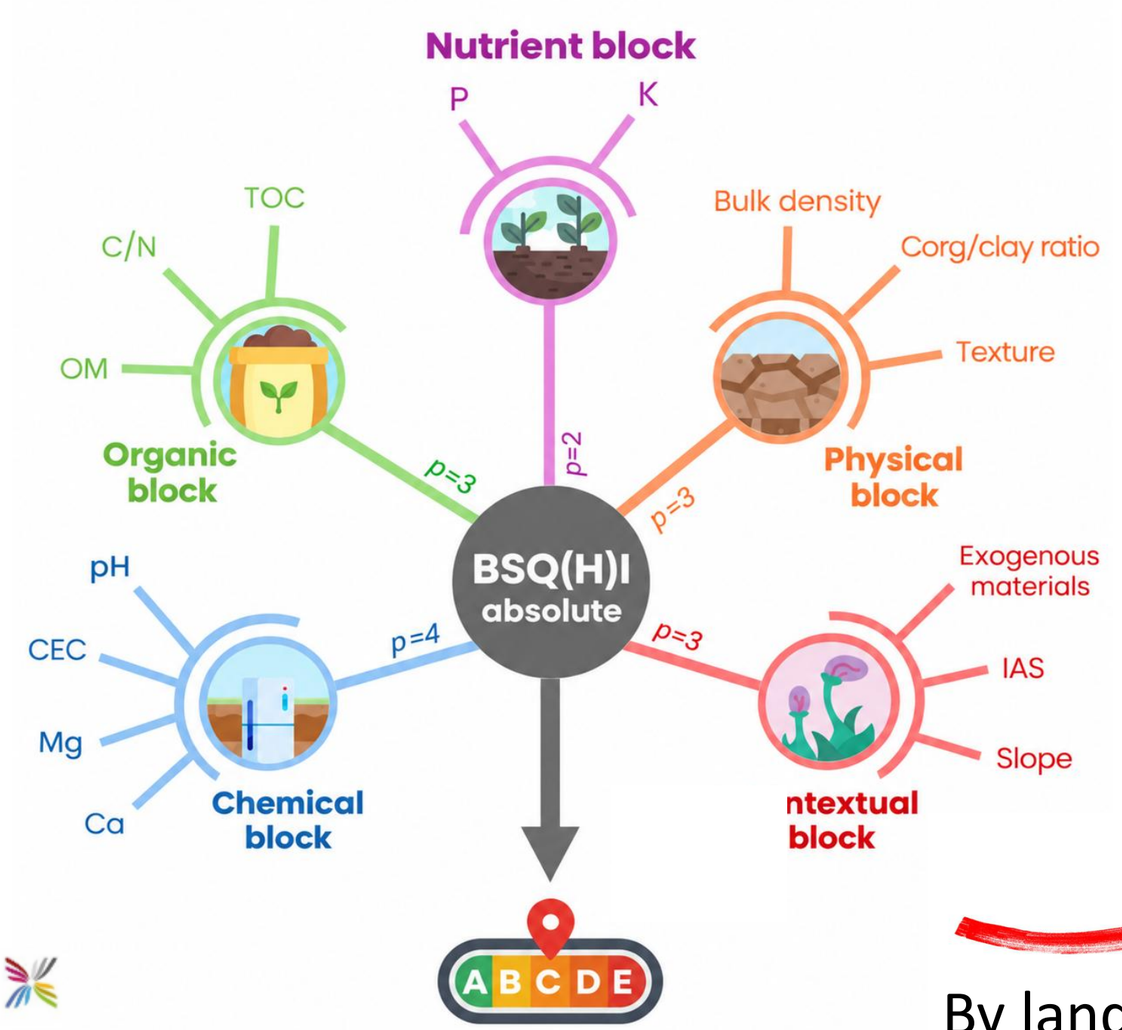
Upper and lower limits ?



FEEDBACK:
Difficulty in developing a general-purpose index that ensures degraded soils receive a low BSQ(H)I score, while accounting for land-use typologies with different expected soil quality levels.

ADAPTATION OF THE BSQ(H)I

Absolute BSQ(H)I



By land uses

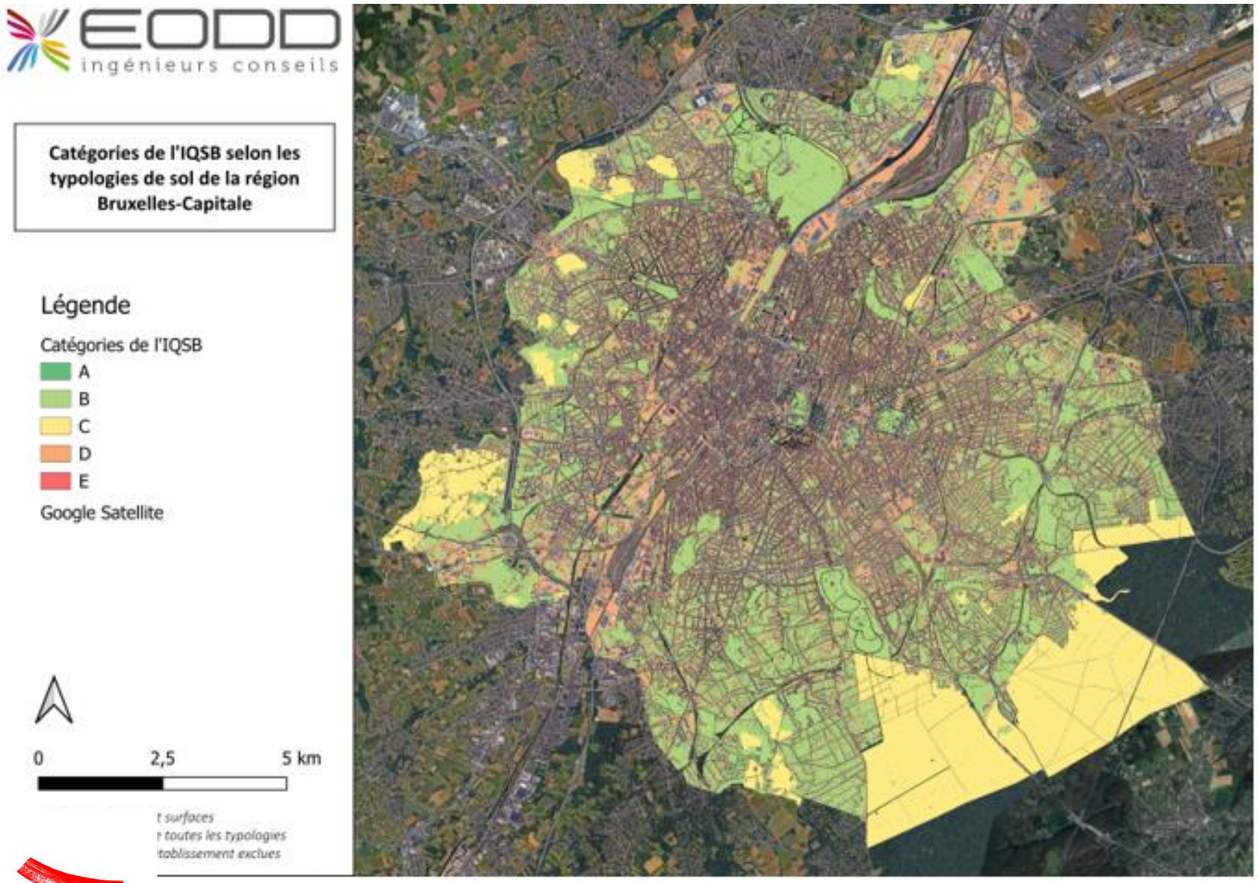
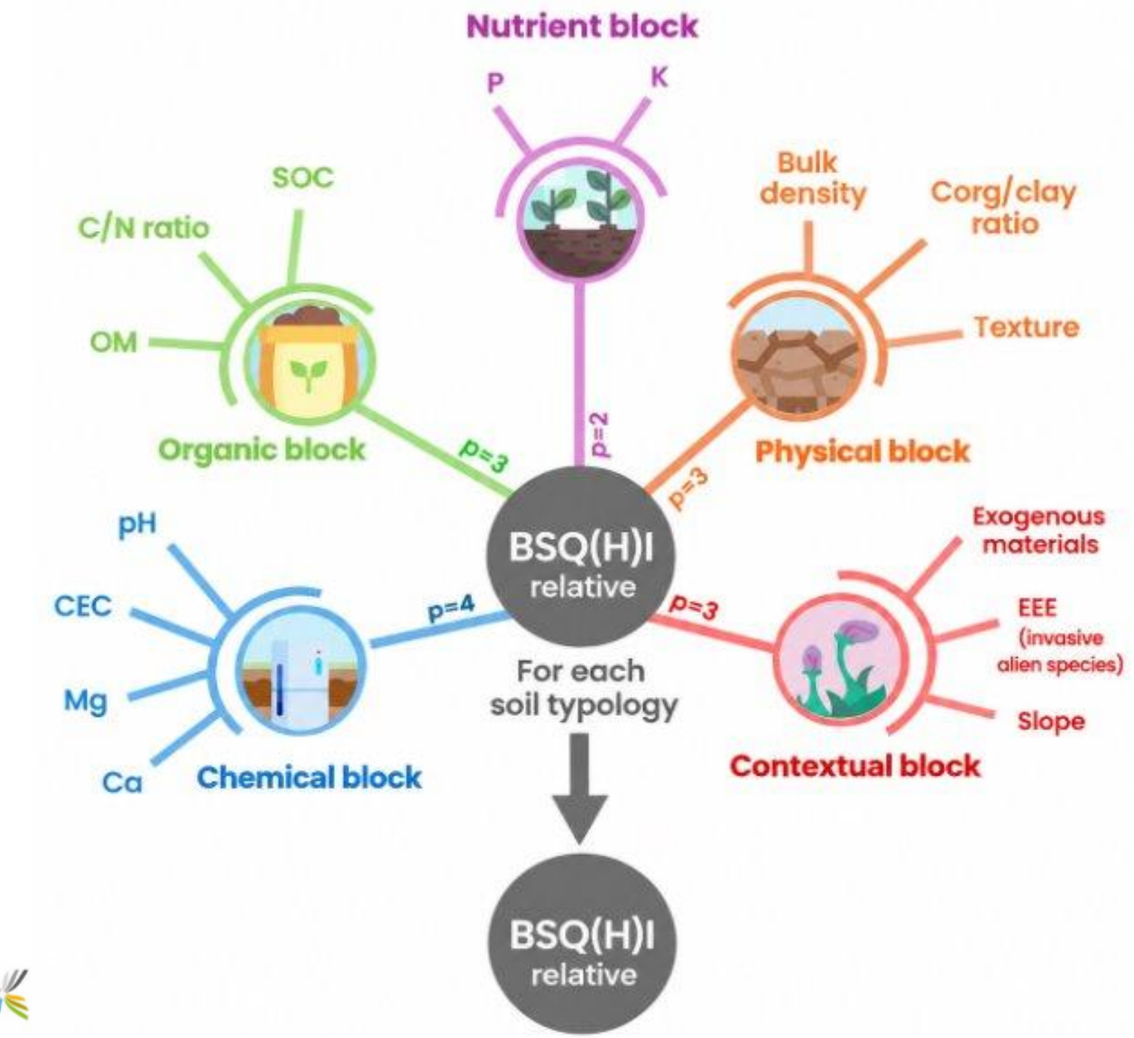


Figure 52: Cartographie du nouvel IQSB à l'échelle de la région Bruxelles-Capitale (catégories)

ADAPTATION OF THE BSQ(H)I

Related BSQ(H)I



BSQ(H)I par land use

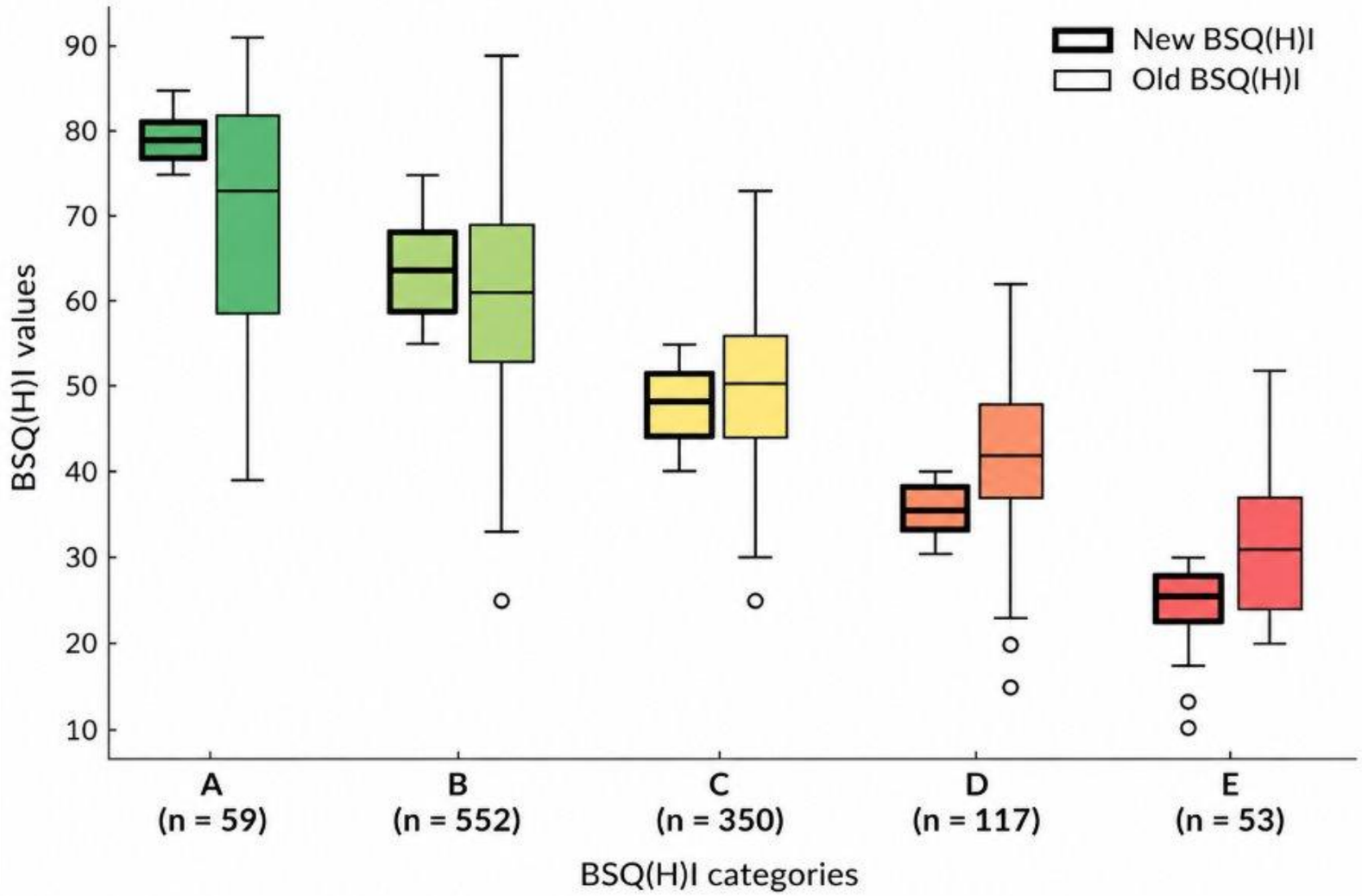
- Agricultural soil
- Forest floor
- Soil wetland
- Soil park
- Soil grassland
- Soil establishment (garden and vegetable garden)
- Soil Establishment (Other)
- Establishment land (wasteland)
- Establishment floor (waterproofed)

ADAPTATION OF THE BSQ(H)I

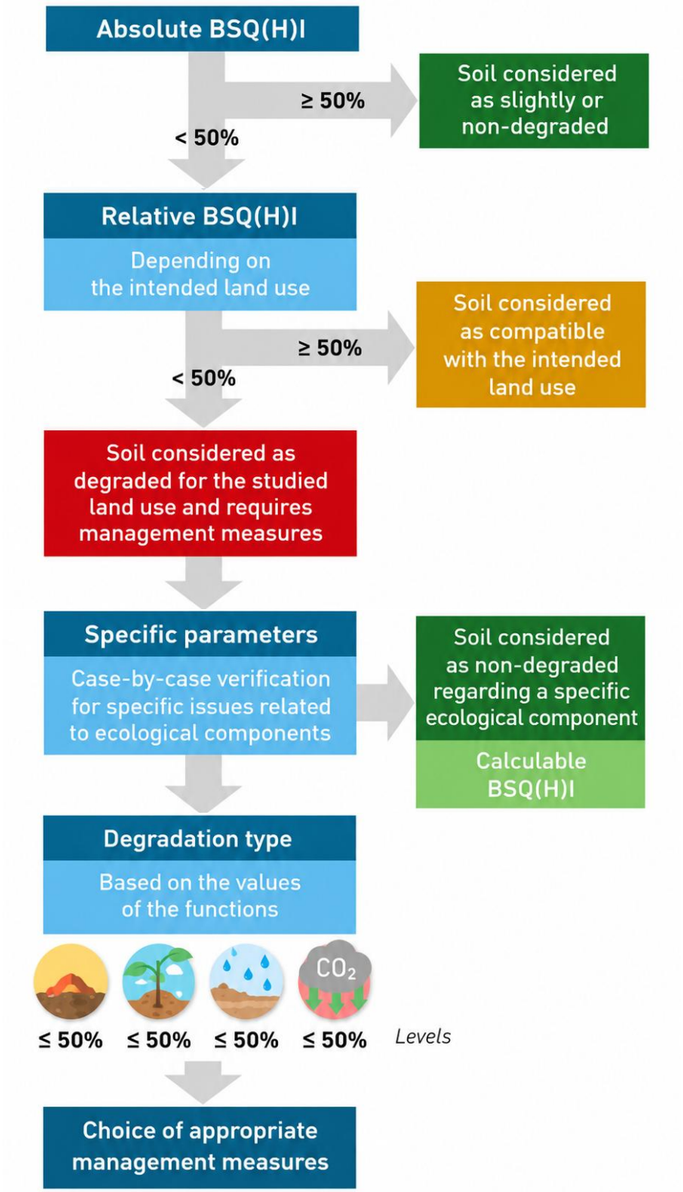
Comparaison between old and new BSQ(H)I

- Clearer separation between degradation classes.
- Lower variability with the new BSQ(H)I.

FEEDBACK:
First trial of the new BSQ(H)I calculation appears to be more precise than the previous version.



SOIL DEGRADATION LEVEL CLASSIFICATION



- **Start with the absolute BSQ(H)I** to identify globally degraded soils.
- **If BSQ(H)I ≥ 50%**, the soil is considered slightly or non-degraded.
- **If BSQ(H)I < 50%**, assess the **relative BSQ(H)I** according to the intended land use.

- **If relative BSQ(H)I ≥ 50%**, the soil remains compatible with the intended use.
- **If relative BSQ(H)I < 50%**, the soil is considered degraded for that specific use.

- **Specific ecological parameters are then checked** to identify particular constraints.
- **Degraded functions are identified** to determine the type and level of degradation.
- **Management measures are selected accordingly**, targeting the functions that require improvement

DIAGNOSIS OF BRUSSELS SOILS

100% (1,131 surveys)
Absolute BSQ(H)I

≥ 50%

66% (748 surveys)
Soils considered as slightly or non-degraded

< 50%

34% (383 surveys)
Relative BSQ(H)I
Depending on the intended land use

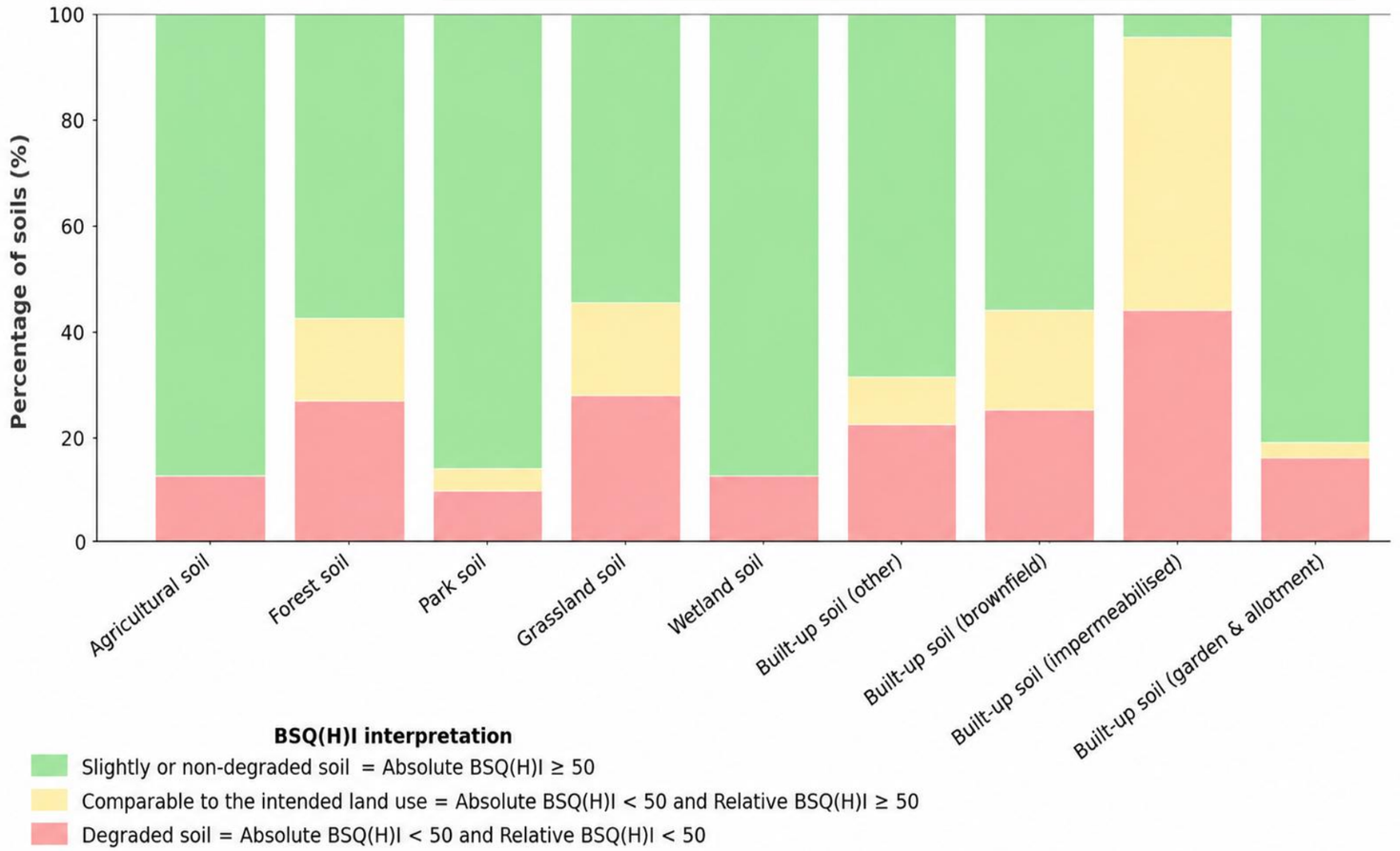
≥ 50%

13% total (142 surveys)
– 37% of the previous 34%
Soils considered as compatible with the intended land use

< 50%

21% total (241 surveys)
– 63% of the previous 34%
Soils considered as degraded in absolute terms and for the intended land use

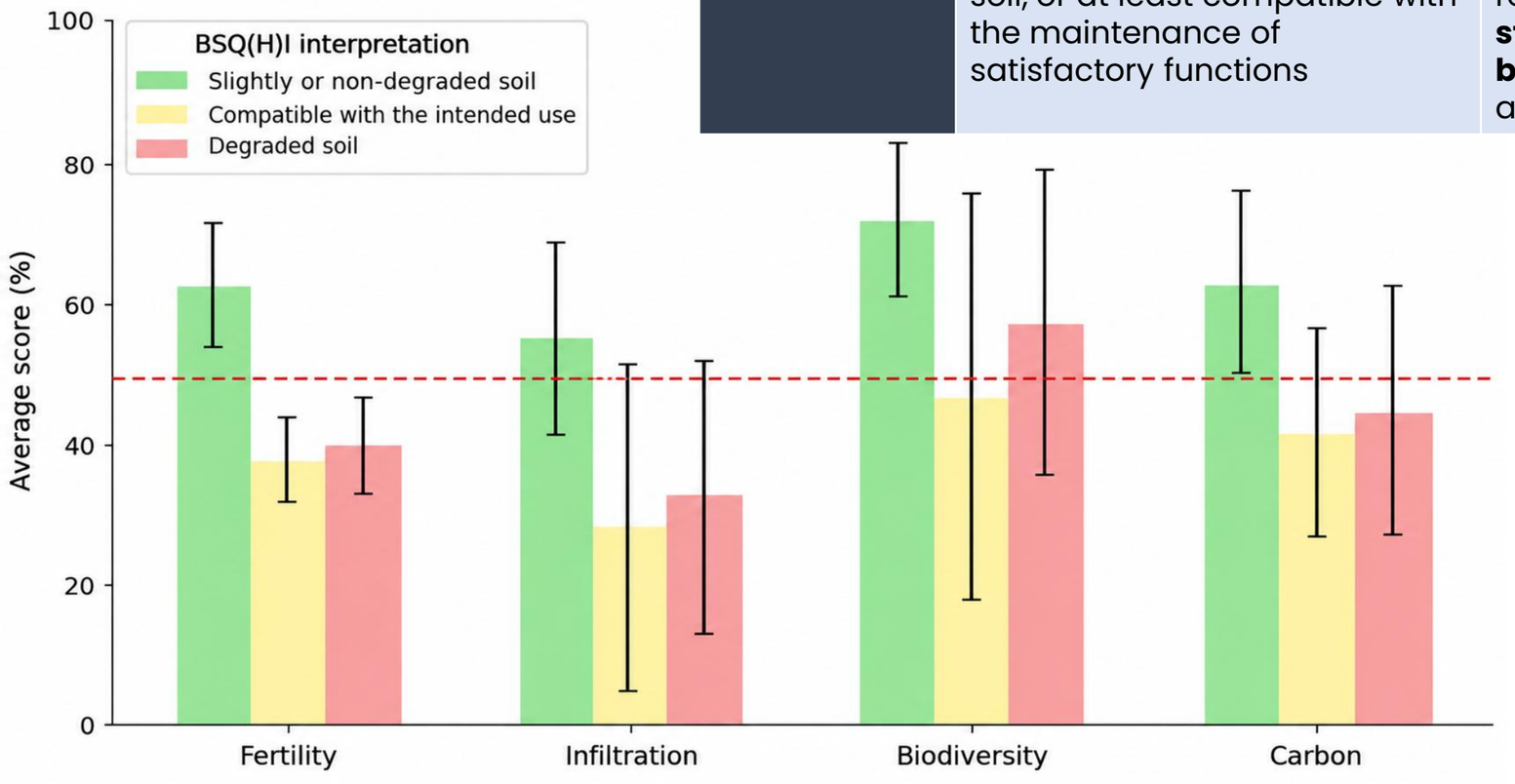
FEEDBACK:
A 50% threshold provides results consistent with the observed proportion of degraded soils, while also supporting the definition of a soil restoration strategy.



DIAGNOSIS OF BRUSSELS SOILS

Identification of types of degradation

	Soils with little or no degradation (66%)	Soils comparable to expected use (17%)	Degraded soils (21%)
Typology	Forest soils, grassland soils, (agricultural soils and garden/vegetable garden establishments)	Settlement soils (impermeable), forest soils and grasslands	Forest soils, impermeable establishment soils, grassland soils, garden/vegetable garden establishment soils
Interpretation	uses **that are generally favourable** to the quality of the soil, or at least compatible with the maintenance of satisfactory functions	The quality of the soil is limited in absolute terms but remains **consistent with the strong constraints imposed by use**, particularly in an artificialised urban context	This **diversity** underlines that situations of **degradation are not exclusively linked to a specific use** and that treatments can therefore be applied to many different uses



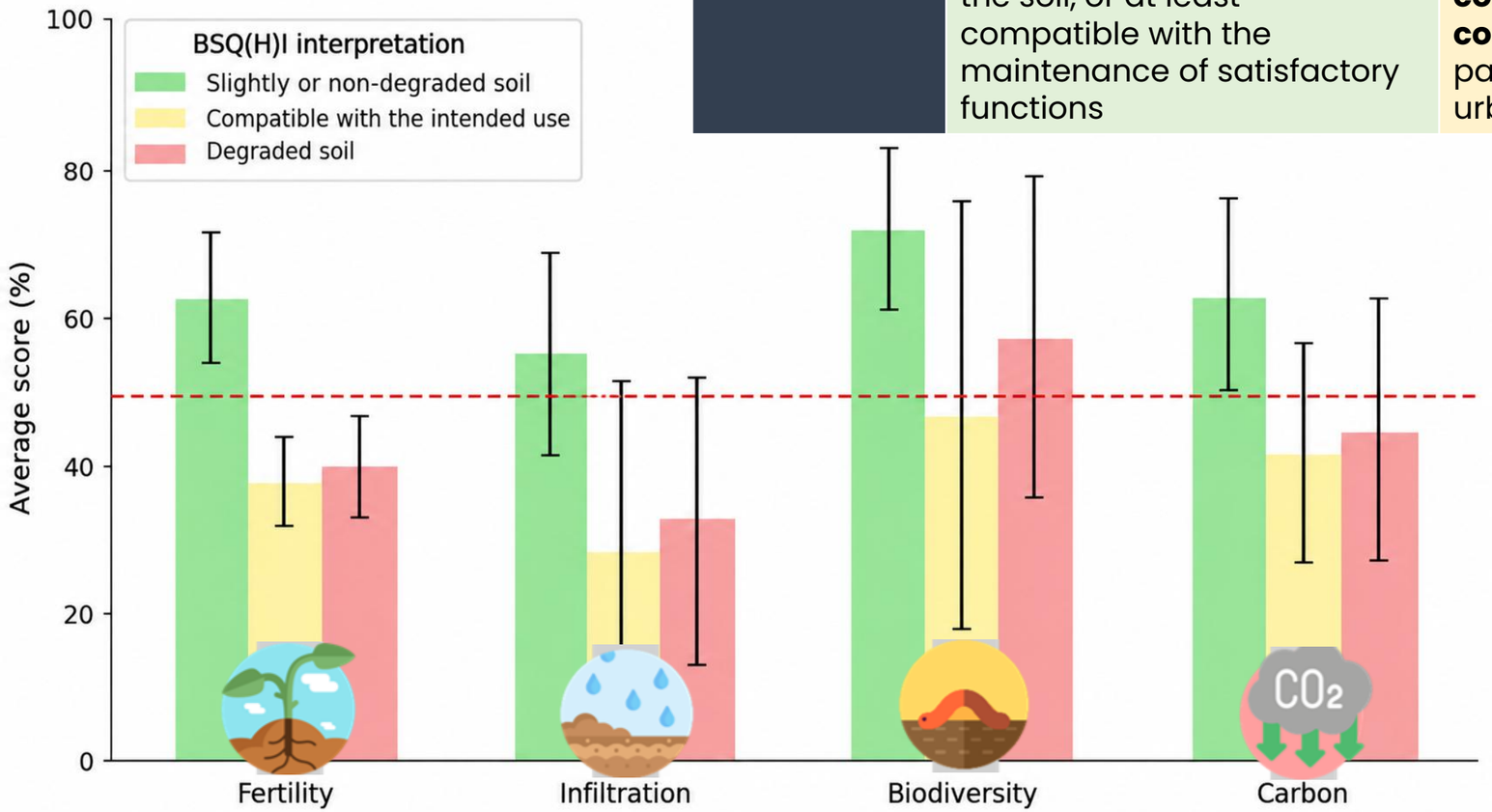
- Most Brussels soils are slightly or non-degraded, but a substantial share remains constrained by land use or degradation.

- Degradation is function-specific, with infiltration and carbon generally more limiting than fertility and biodiversity.

DIAGNOSIS OF BRUSSELS SOILS

Identification of types of degradation

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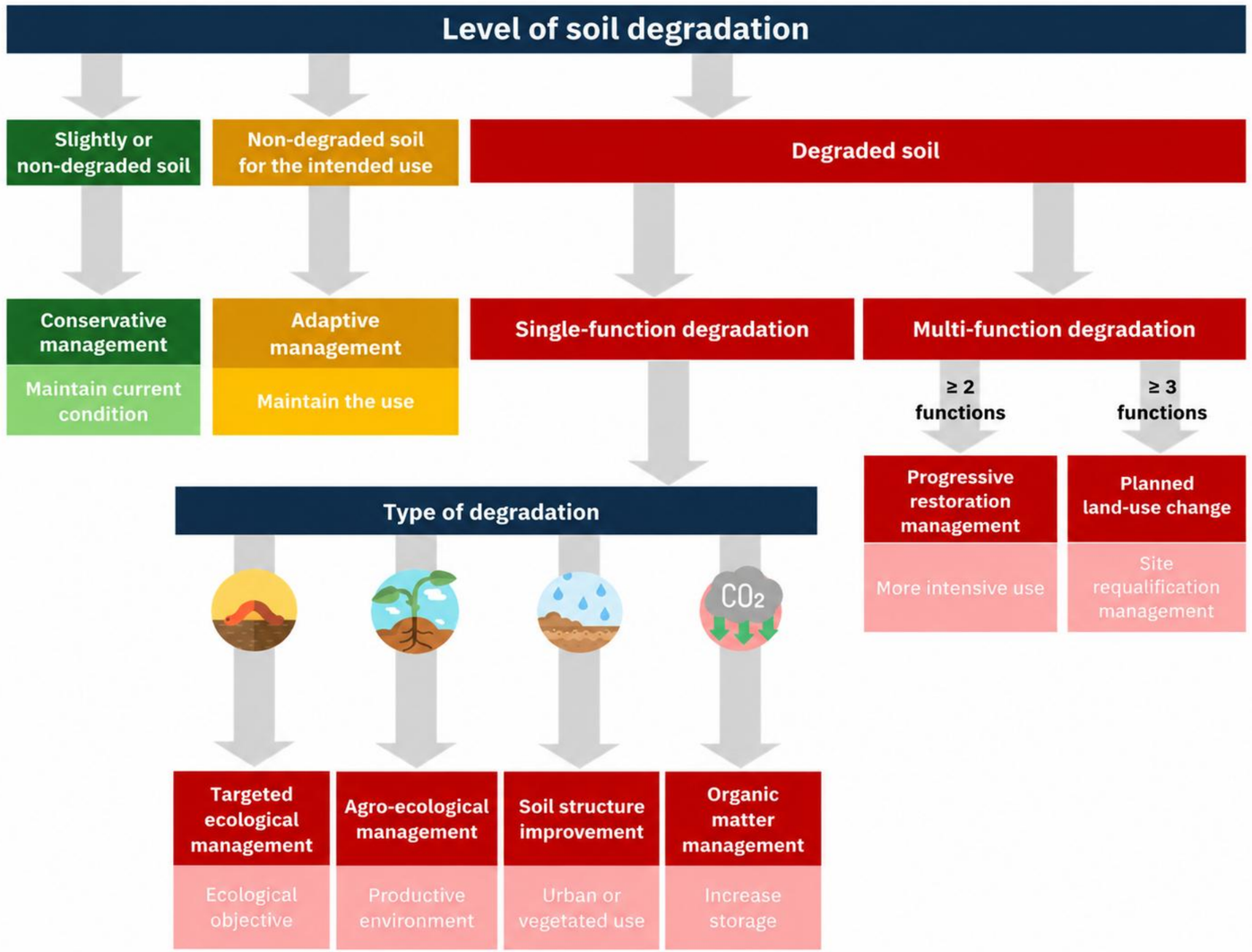


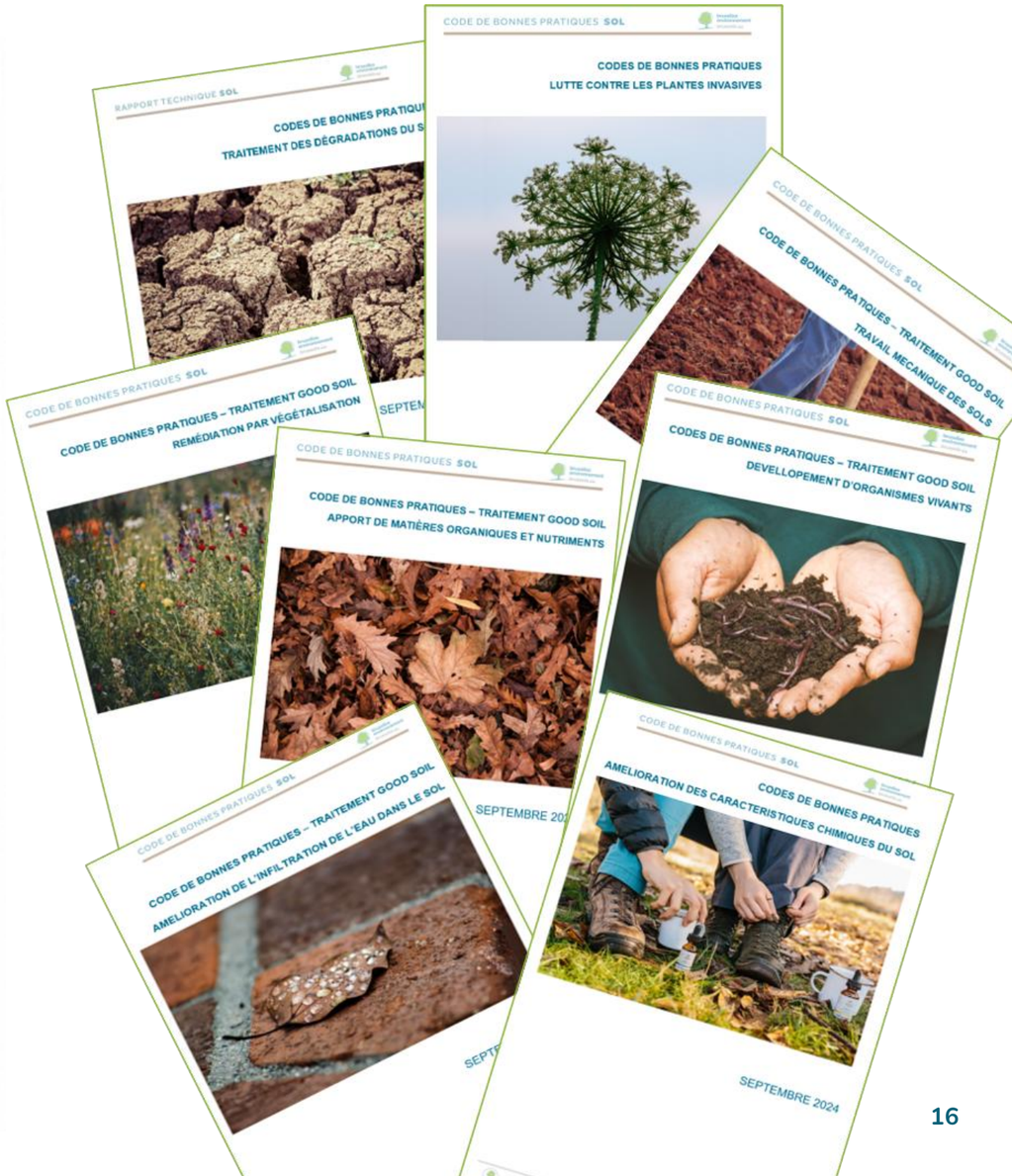
FEEDBACK:
Biodiversity is the least discriminating function, as it is represented by the largest number of proxies, highlighting the need to include more precise biological indicators.

RECOMMENDATIONS

https://environnement.brussels/pro/reglementation-et-inspection/obligations-et-autorisations/codes-de-bonnes-pratiques-pour-letude-et-le-traitement-des-sols-pollues

Identification of management methods





CONCLUSIONS

OPPORTUNITIES

- **Construction of a sustainable urban soil reference system**
  - Complementary tool to the Soil Monitoring Framework (sampling, measurements)
- **Operational tool adapted to the urban context**
  - Rationalization of parameters (less but better measured).
  - Systematic integration of low-cost key parameters (bulk density, depth, coarse elements).
  - Taking into account the urban context
- **Rise of the soil health approach**
  - Transition from a "quality" diagnosis to a logic of "the soil's ability to provide services".
  - Decision support tool for:
    - development,
    - de-sealing,
    - ecological restoration, *etc*.
    - complementary to Art. 12 of the Soil Directive: mitigation of land artificialisation)
- **Cartographic and strategic enhancement**
  - Identification of areas with little or no degradation vs. degraded areas.
  - Prioritization of regional response priorities.
- **Expansion of the use of targeted biological indicators to the study**
  - Future extension of eDNA to uses other than forests.
  - Coupling with indicators of real functioning (respiration, enzymatic activity).

QUESTIONS ?

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