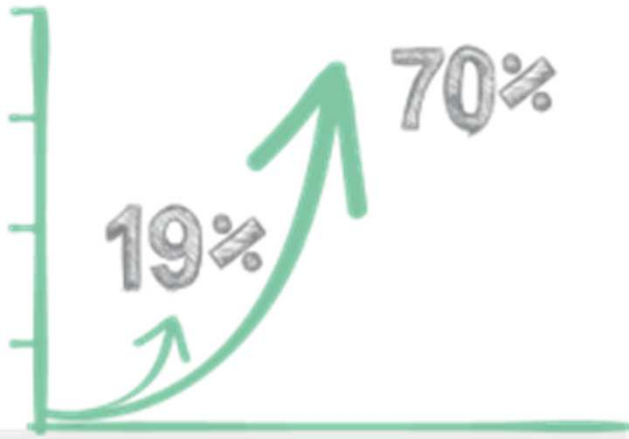


How to integrate soil into territorial strategies?

Cécile Grand (ADEME), Marie-Caroline Brichler (SOLTIS), Florence Baptist (SOLTIS)

Land Use in France: Trends and Challenges

- In France, an average of **23 000 hectares** of natural and agricultural land* is consumed every year.
- Land take has increased by **70%** since 1981, while the population has increased by **19%**



The equivalent of
the **area** of
Luxembourg

or

The equivalent
of the **23 x**
Paris area



Land Use in France: Trends and Challenges

Soil formation
 Carbon sequestration

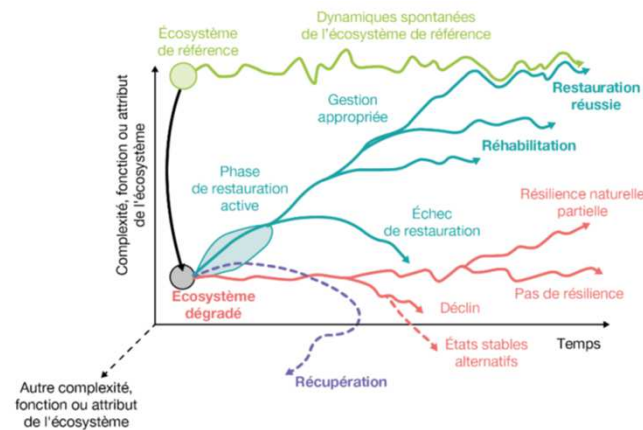
From decades to centuries



Soil artificialization
 Soil loss, compaction
 Carbon soil mineralization

From days to decades

(Tiré de Jaunatre 2012 d'après
 Aronson et al. 1993; buisson 2011)



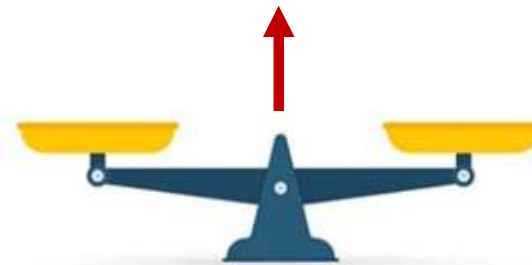
- Temporal asymmetry between soil formation and its destruction
- Essential to prioritize Avoidance and Reduction over Compensation

France's Ambitious Goal: Achieving No Net Land Take by 2050

The Climate and Resilience Law (2021)

Net land take : “difference between artificialisation and restoration observed in a given area and period”.

Long-term
degradation of
ecological soil
functions



Soil's functionality
restoration or
improvement

1 area, 1 period

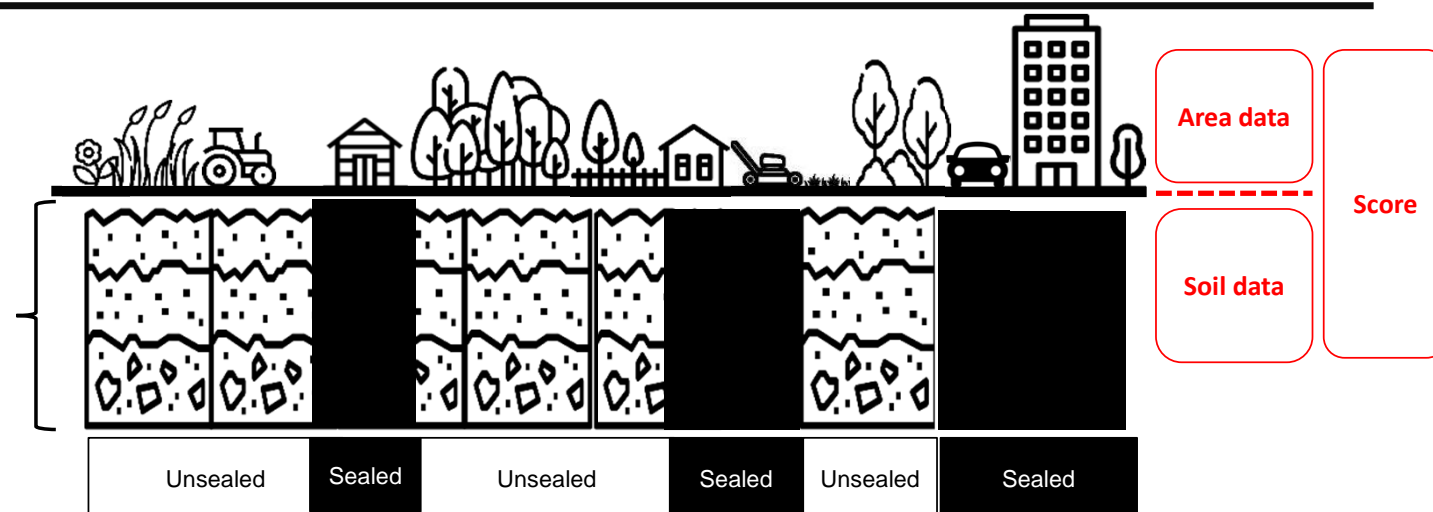
France's Ambitious Goal: Achieving No Net Land Take by 2050

Approach based on consumption of space by area, in 2D

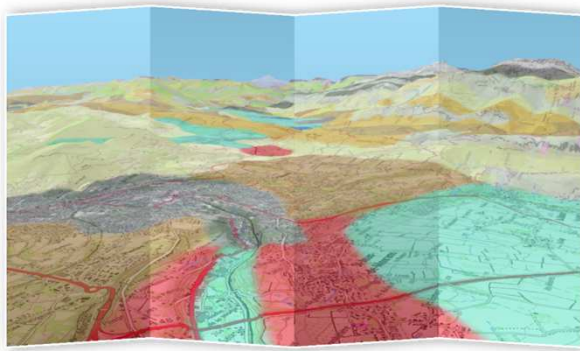


Balance between
artificialisation and
restoration

Approach based on the ecological functions of the soil, in 3D



How to integrate soil in territorial strategies at different scales ?

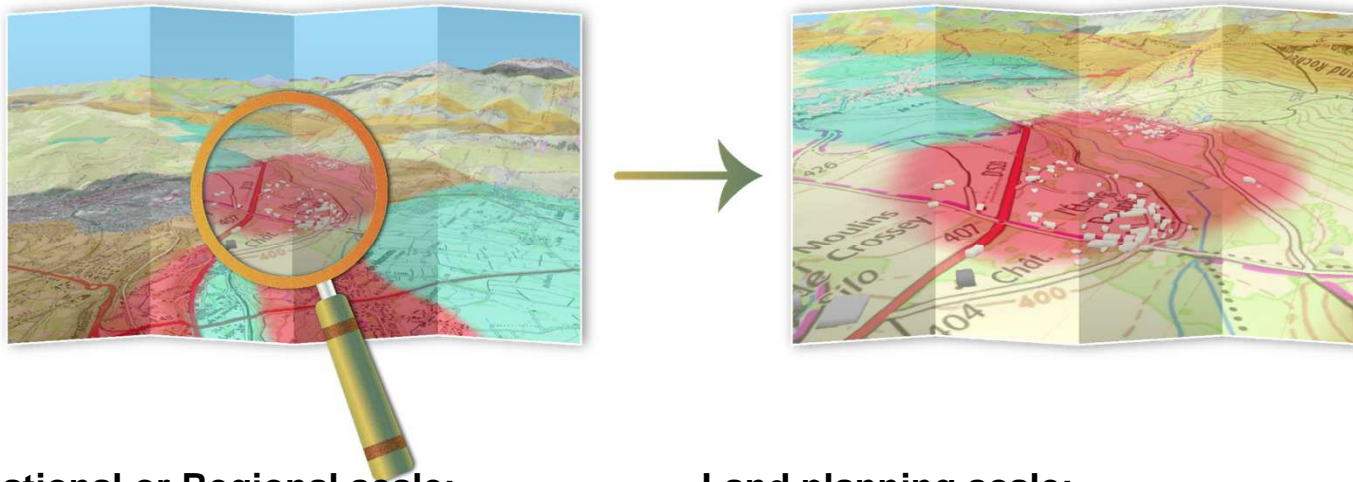


National or Regional scale:

- Map of soil artificialisation (OCS-GE)
- Map of functional issues
- Gain/loss of soil functions on a large temporal and spatial scale

→ **Large-scale assessment of soil function degradation**

How to integrate soil in territorial strategies at different scales ?



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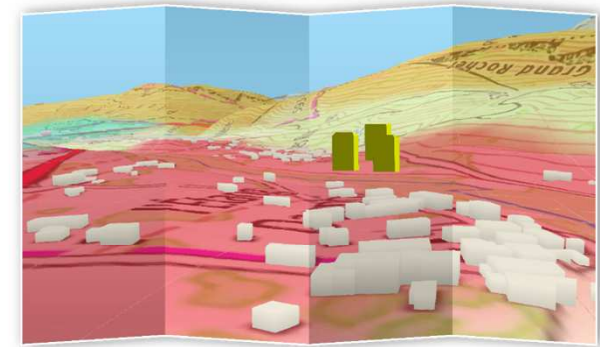
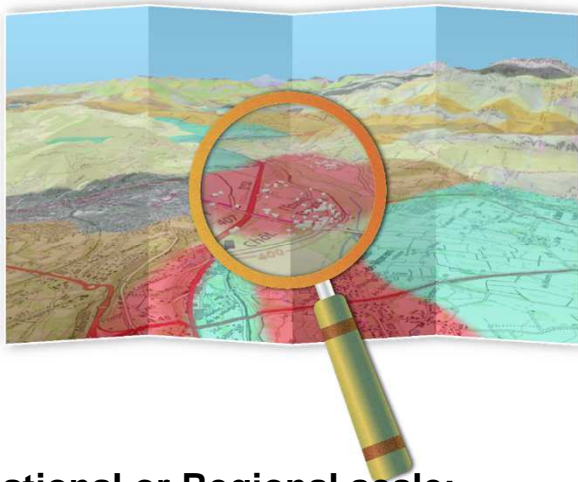
→ Large-scale assessment of soil function degradation

Land planning scale:

- Agro-pedological soil diagnosis
- Assessment of soil functions on specific area
- Soil data into land use planning

→ Integration of soil function in land use planning (renaturation strategies, priority areas, etc.)

How to integrate soil in territorial strategies at different scales ?



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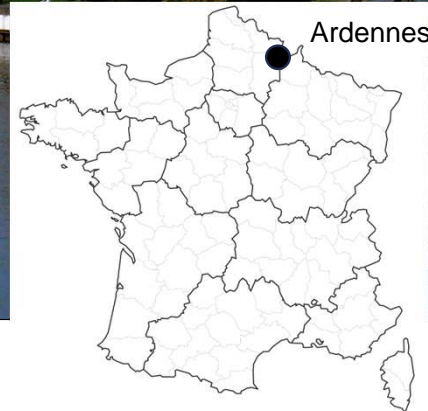
Project scale :

- Agro-pedological soil diagnosis
- Monitoring indicators for soil refunctionalisation

→ Restoration of fertile soils from *in situ* excavated materials

→ Soil restoration and design project

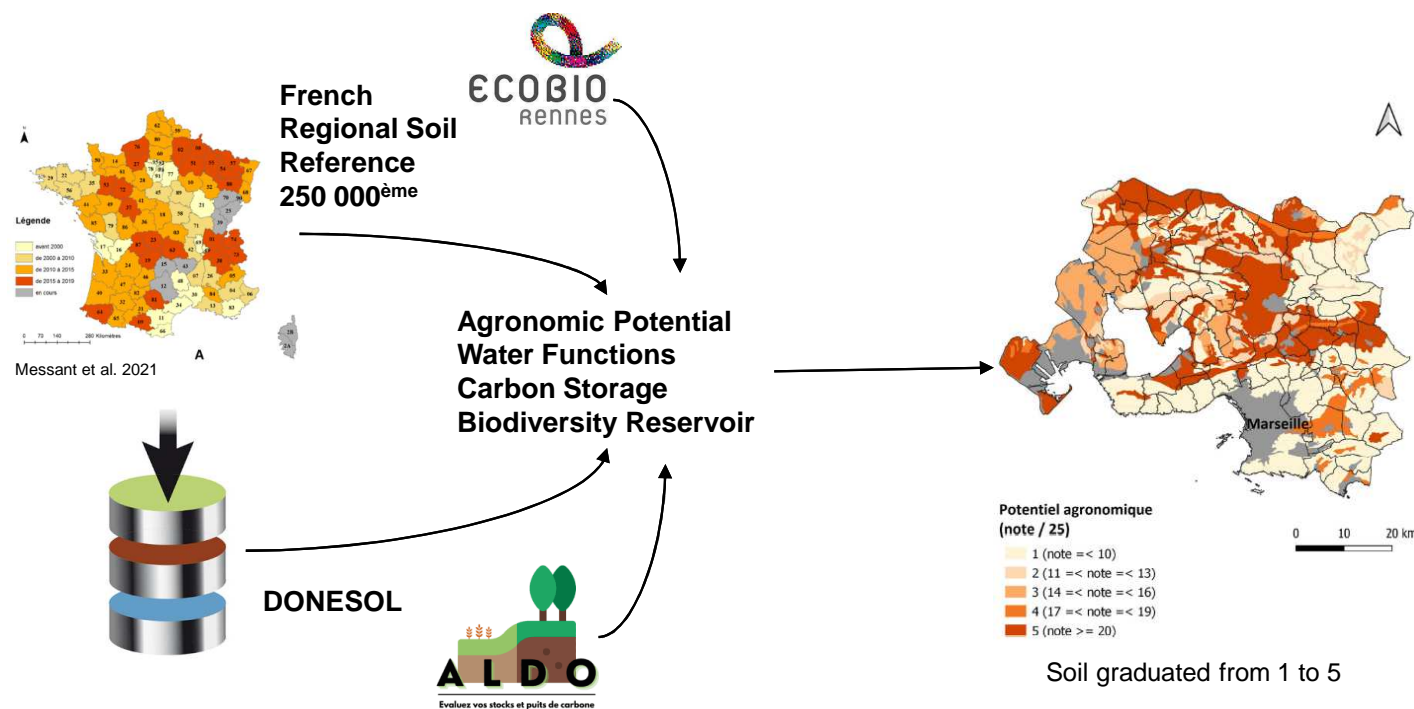
Case studies: Eastern region of France (les Ardennes)



Case study : Eastern region of France – Les Ardennes

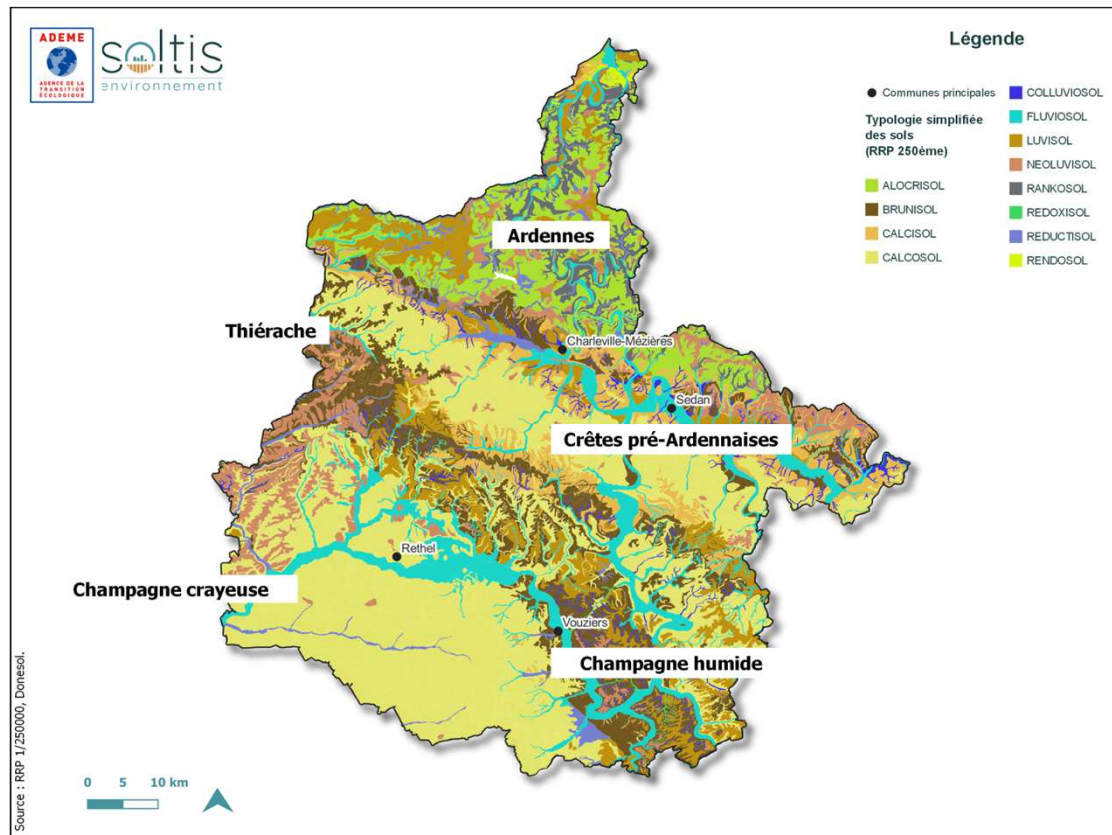
The issue ? Large-scale assessment of soil function degradation

Case study : Eastern region of France – Les Ardennes



Case study : Eastern region of France – Les Ardennes

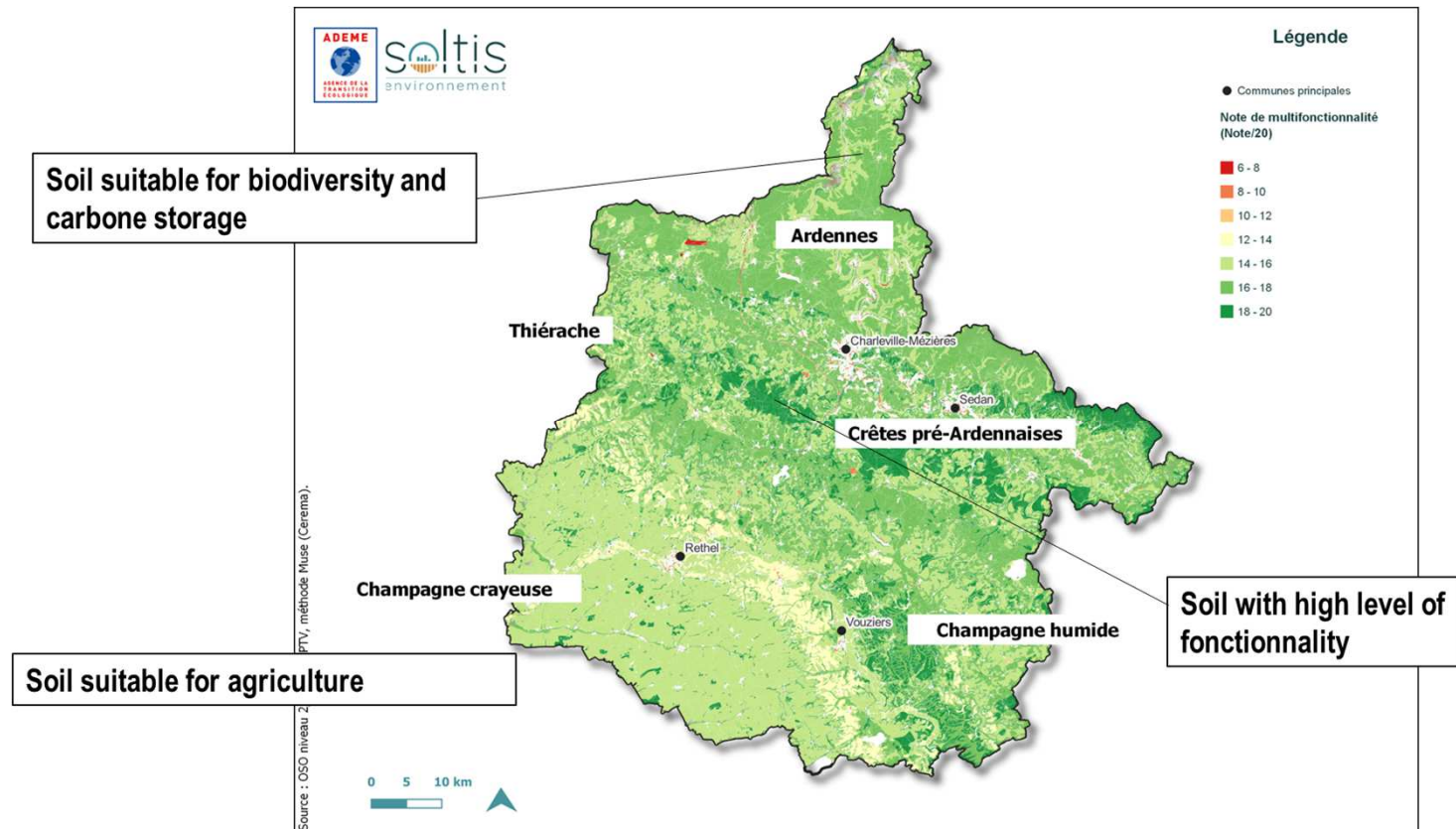
Pedological nature of soils



Case study : Eastern region of France – Les Ardennes

Soil Multifunctionality Map

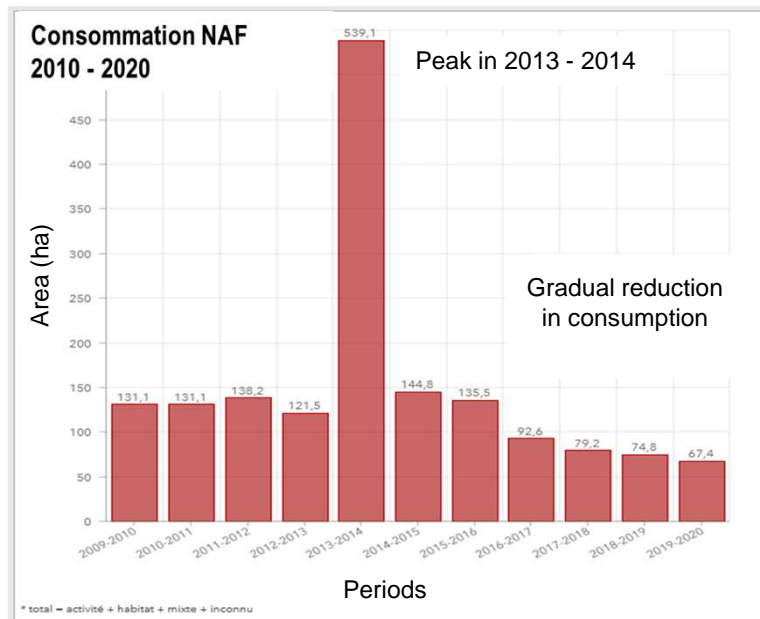
Agronomic potential, infiltration, biodiversity, soil carbon



Case study : Eastern region of France – Les Ardennes

Natural, Agricultural and Forest
consumption 2010 – 2020

1 524 ha



75% of land with high agronomic potential (score 5/5)

6% of land with high infiltration potential (score 5/5)

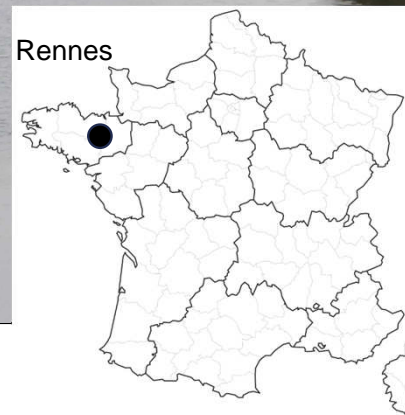
13% within ecological corridors
7% of biodiversity hotspots

→ Land use assessment and loss of potential soil
functionality

→ Strategic orientation for land planning based on this
analysis

Case study: Rennes metropolis

Rennes



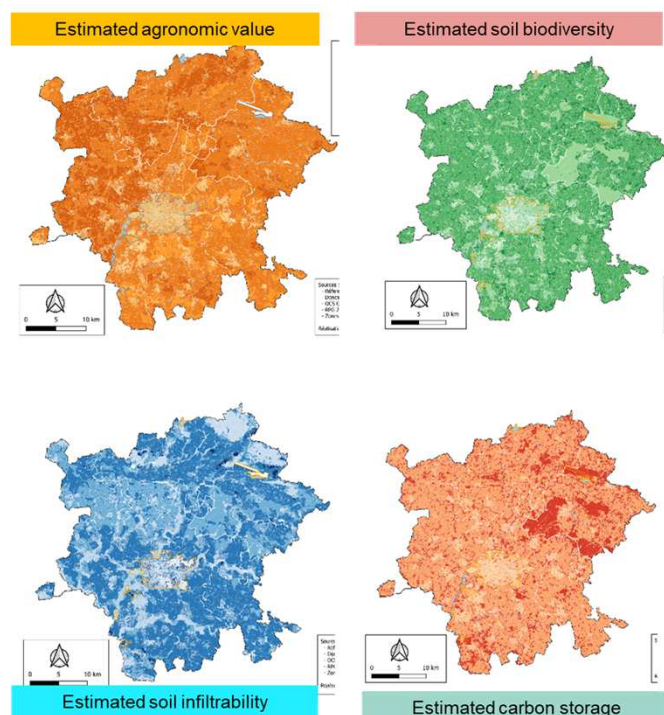
Case study : Rennes metropolis

The issue ? Integration of soil function in land use planning

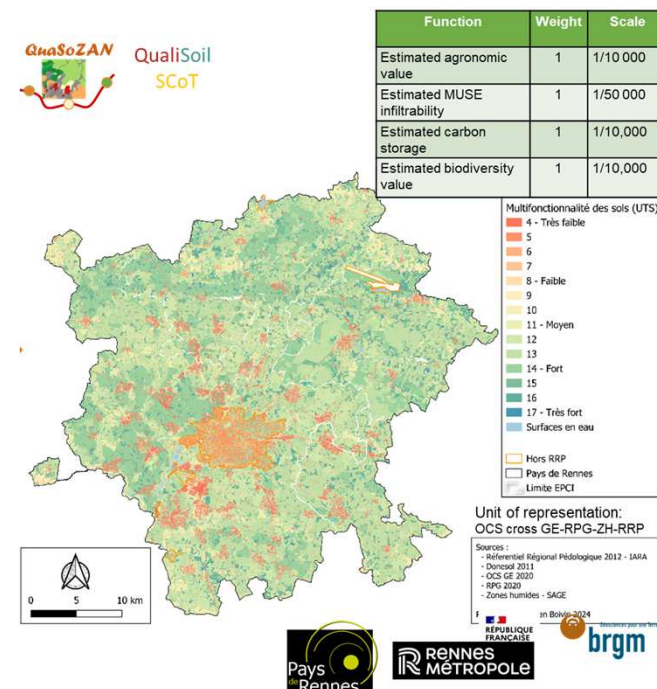
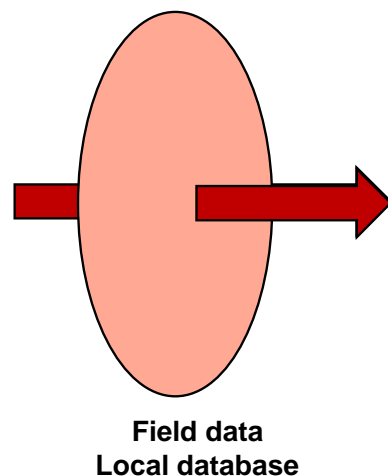
- To select areas to be preserved
- To select areas to be managed
- To select areas to be restored

Case study : Rennes metropolis

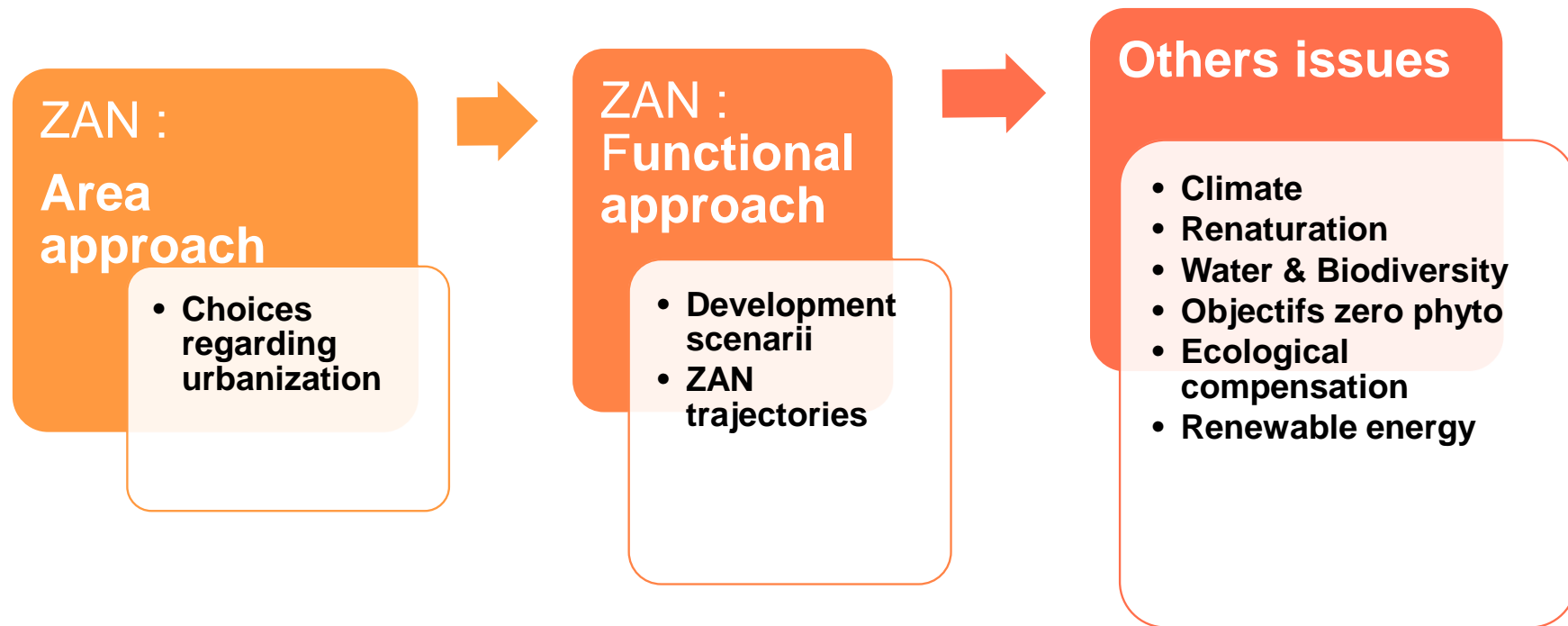
From maps built with MUSE



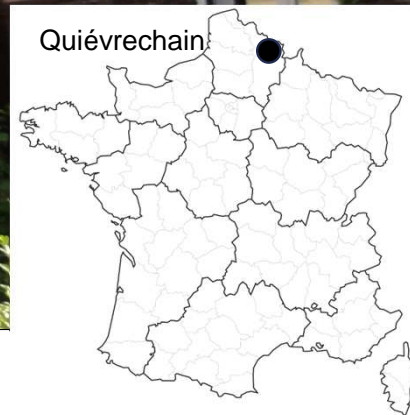
To maps adapted to the right scale thanks to local data



Case study : Rennes metropolis



Quiévreachain 's renaturation project



Case study : Quievrechain 's renaturation project

The issues ?

- Restoration of fertile soils from *in situ* excavated materials
- Soil restoration and design project

Case study : Quievrechain's renaturation project



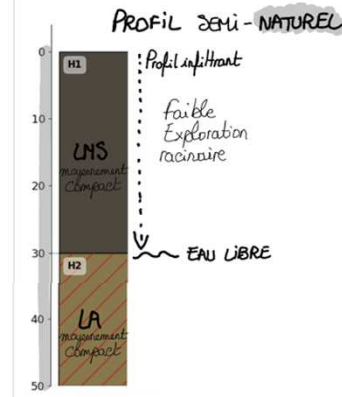
How can this former industrial site be renatured while making the best use of one-site materials?

Case study : Quievrechain's renaturation project

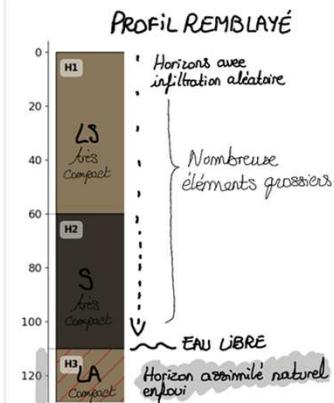
ANTHROPOSOL TRANSFORMÉ

Sol de référence
agricole
P02 uniquement

Profil de référence P02



Profil de référence P03



Historical and
documentary study

1



2

Field study

3

Agropedological
analysis

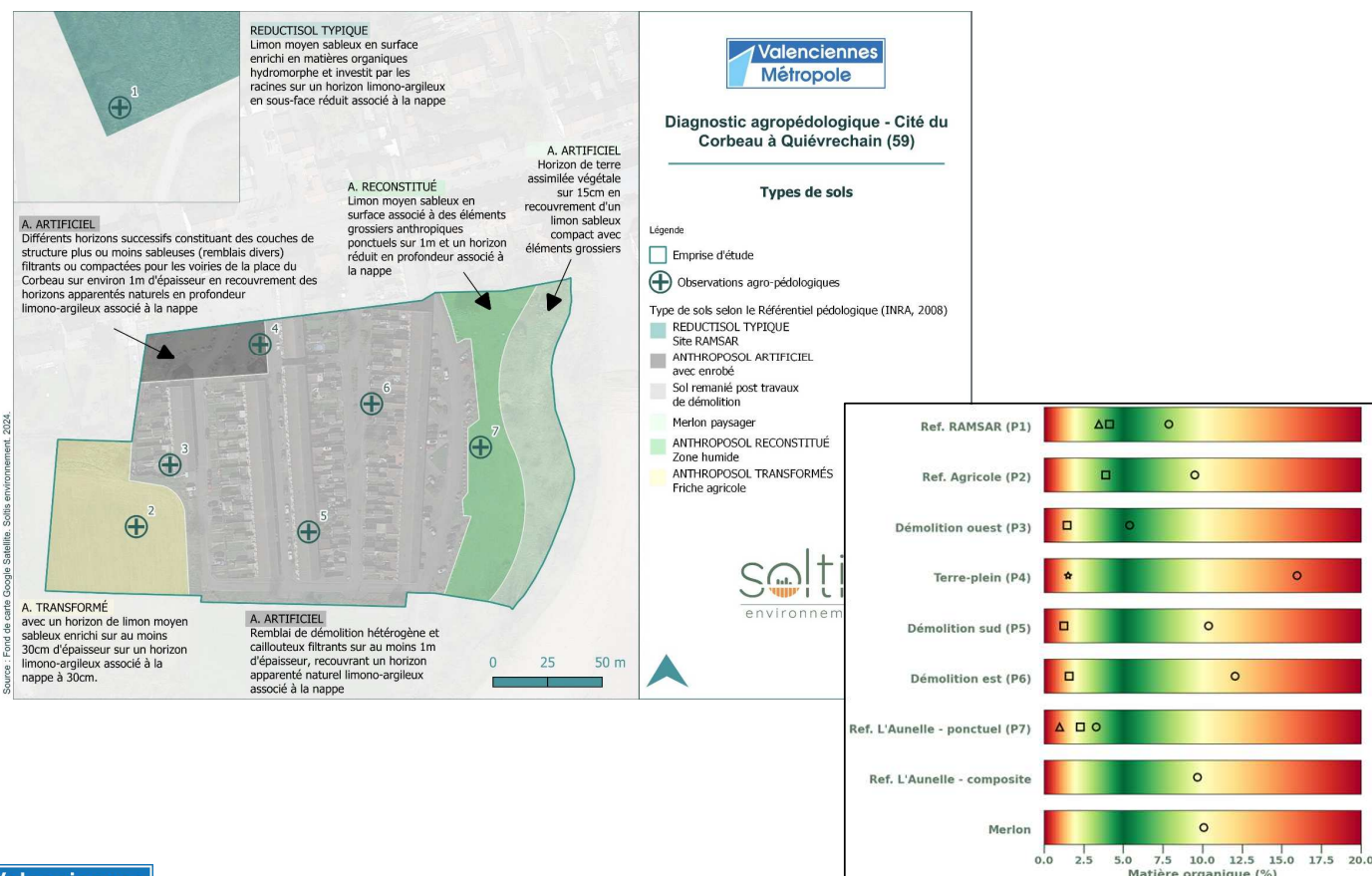


4

Synthesis,
preconisations



Case study : Quievrechain's renaturation project



Historical and
documentary study

1

Field study

2

Agropedological
analysis

3

Synthesis,
preconisations

4

Quiévreachain's renaturation project

Historical and
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2



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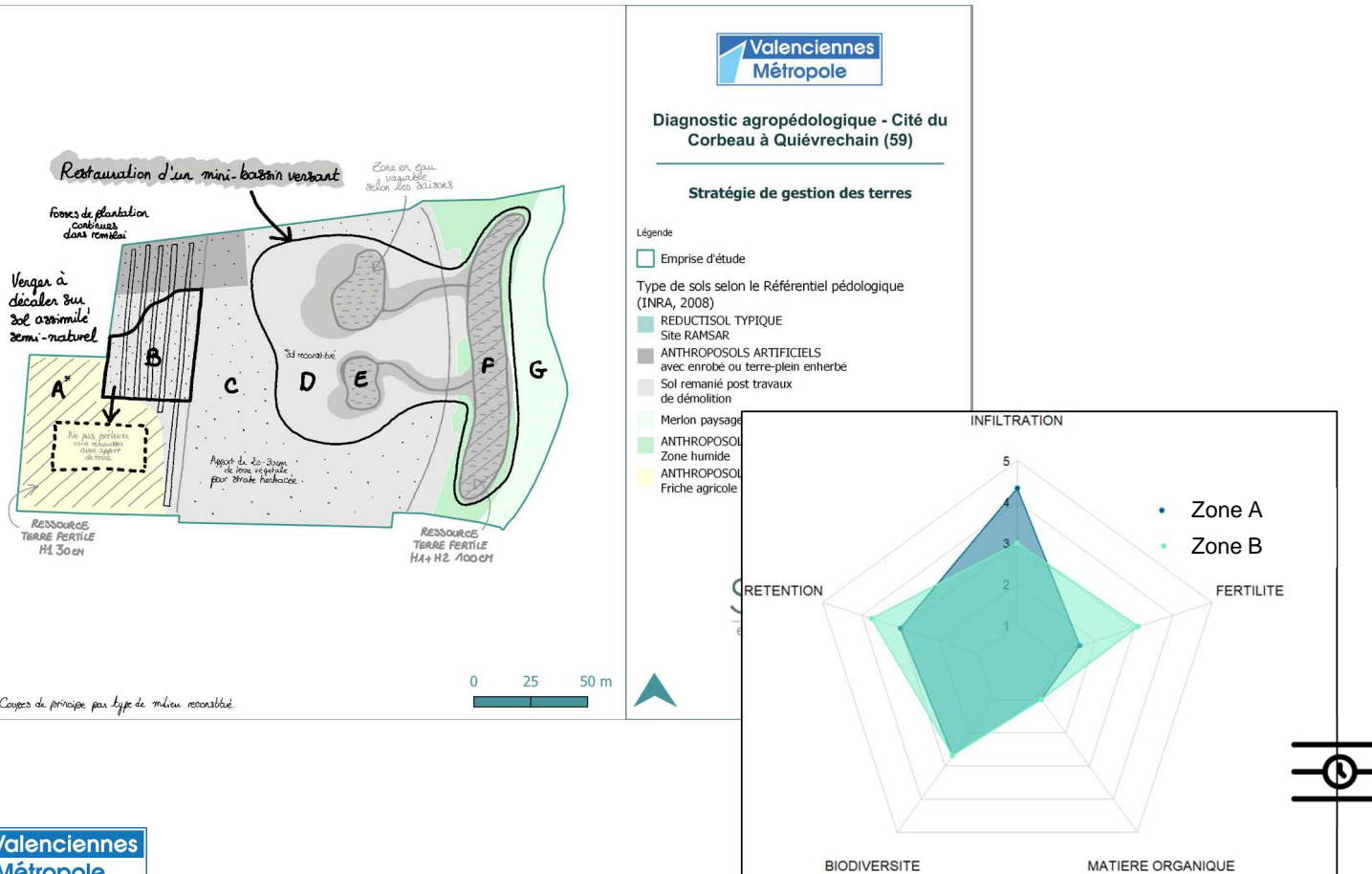
Synthesis,
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4

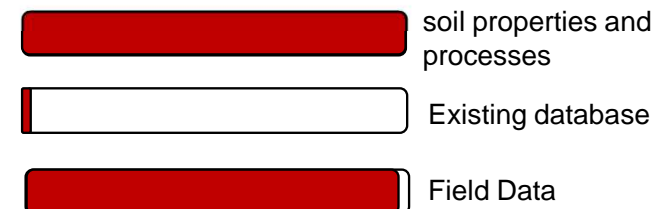
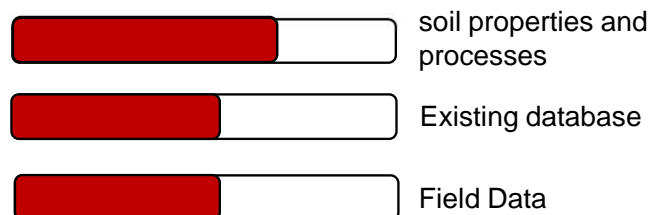
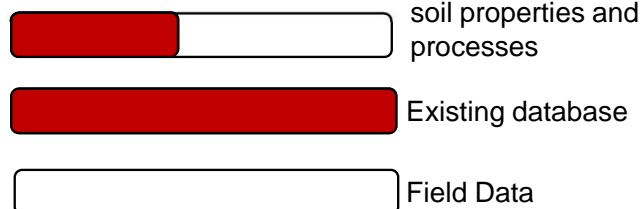
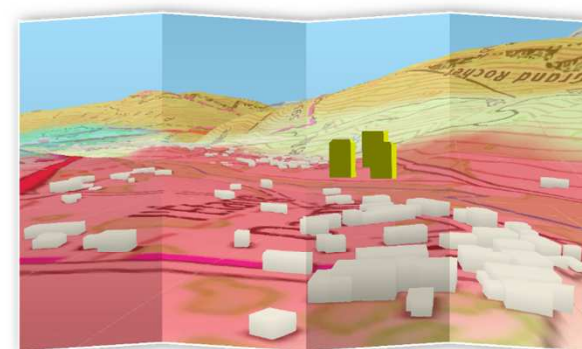
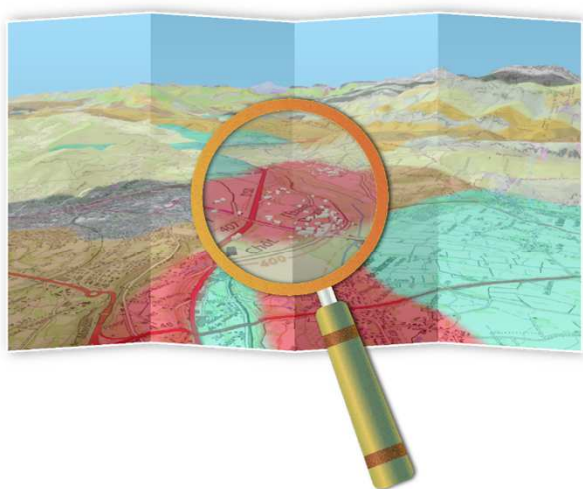


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09/12/2024



CONCLUSIONS



Spatial accuracy

CONCLUSIONS

- Different methodologies have been developed by researchers in order to introduce **soil functions into land planning or project development**
- **The MUSE tool promotes national databases** and provides **an initial assessment of soil multifunctionality** on a large scale.
- **Additional field** data may be required to design actions at the appropriate scale.
- **A guide** is in progress in order to help land planners to integrate soils into territorial strategies



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09/12/2024



**RÉPUBLIQUE
FRANÇAISE**

*Liberté
Égalité
Fraternité*



Thank you for your attention

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