intersoil'2022
International Conference on Soils, Sediments and Water
What Strategy for European Soils in 2030 ?
October 5&6, 2022, Brussels

Desealing urban soils : Where ? How ? Introduction to the tools being developed within the DésiVille project (France)

C. Le Guern, T. Leduc, M. Musy, C. Bruhat, E. Dufrasnes, F. Prézeau, B. Clozel, A. Rodler, S. Tasca-Guernouti, B. Béchet, C. Recknagel, A. Monnot, A. Lefranc

5 octobre 2022

Context

Soils as a resource

- **Limit artificialisation rate**
- ‘No Net Land Take’ by 2050
- French law : Climate and Resilience (08/2021)
- **Desealing**
  - 1 of disartificialisation levers
  - 1st step towards renaturation

Issues of desealing

- Water cycle
  - Resources
  - Flooding risks
- Biodiversity
  - Nature based solution

  => renaturation
- Climate
  - Adaptation to climate change
    - Urban heat islands => freshness islands
- Well being

Desealing: Definition and feedback

Partially restore the old soil profile and an effective link with the natural subsoil *(UE, 2012)*

- by removing sealed layers (e.g. asphalt or concrete)
- by loosening the underlying soil
- by removing foreign matter and restructuring the soil profile

Contributes to the restoration of soil functions (infiltration capacity, carbon storage, biodiversity, etc.)

Rem: Deconstruction, depollution if necessary, rehabilitation of functional soils, (+/- renaturation)

- Large desealing operations
  - EUROPE (Berlin, Italy)
  - North America (USA, Canada)
  - France
- Opportunities : development
- Rare territorial strategies
  - Berlin (D)
  - Angoulême, Narbonne (F), Renens (CH)
  - No stabilised methodology

Objectives

Where and how should we deseal ?

Need of **decision aid tools**

- **Methodological guide** for mapping the **potential of desealing** by integrating the benefits and constraints

  Urban territory + quarter scale

→ **Urban Planning**

- **Catalog of solutions** with evaluation of impacts and recommendations

→ **Redevelopment**

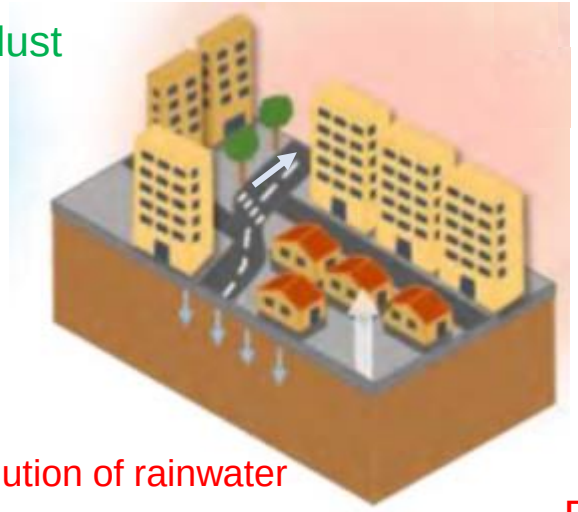
Base of the approach

Sealing

Urban heat island

Mud and dust

Travel



Pollution of rainwater

Desealing

Fresh islands

Purification of infiltrated water

© C. Le Guern

Dessin SUEZ Consulting

Runoff/Infiltration

↗ Flooding ↘

↘ Groundwater recharge ↗ Rise of groundwater table

Confinement Pollutions of soils Remobilization

↘ Functions/Multifunctionality of soils ↗

↘ Eg. Stock of carbon ↗

↘ Biodiversity ↗

Benefits and constraints of (de)sealing

Findings and assumptions

Gathering existing studies

Main relevant studies

- Berlin (D)
- Narbonne (F)
- Renens (CH)

Comparison of criteria

- Common : Soil infiltration
- Not common but interesting
  - Contamination
  - Soil property (public/private)

Any study to share ?

Guide: Methodological consolidation

State of the art
List of thematics
Associated criteria
Multicriteria analysis

Co-construction with operational actors

Mapping ***approach***

Available data

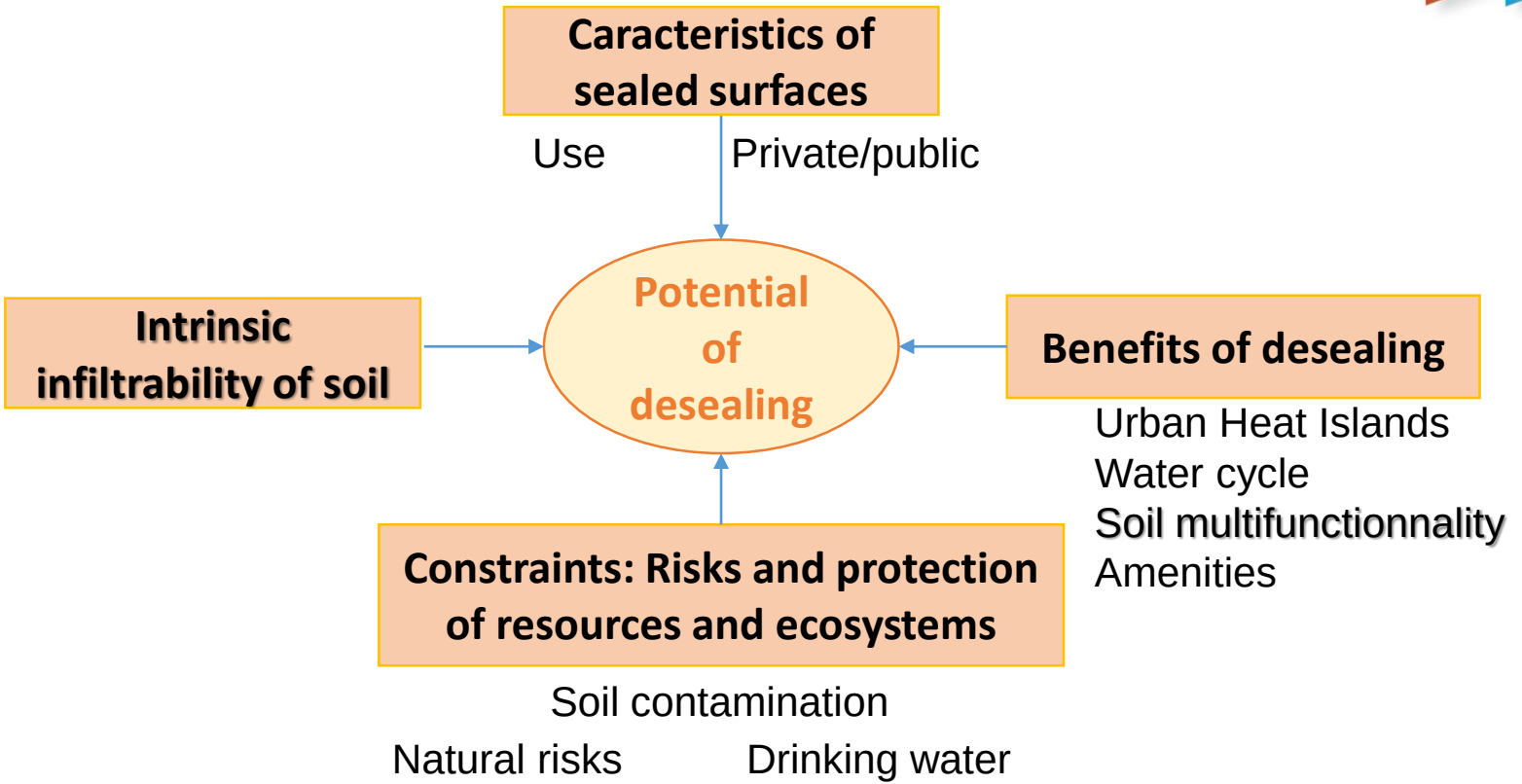
nationally → ***Generic***

locally → ***Specific***

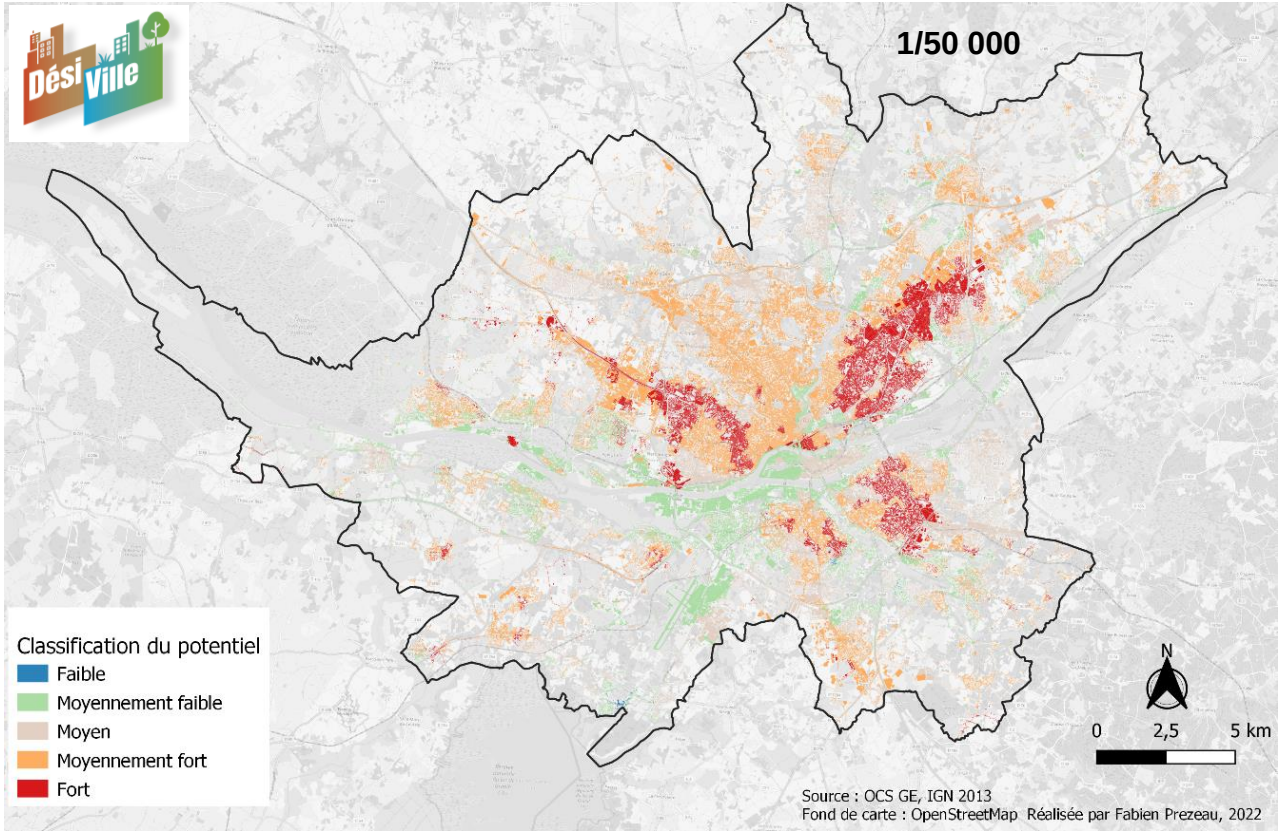
Territorial + local scales

First case study : Nantes Métropole (F)

Thematics


Caracteristics of sealed surfaces
Use
Private/public
Intrinsic infiltrability of soil
Potential of desealing
Benefits of desealing
Urban Heat Islands
Water cycle
Soil multifunctionnality
Amenities
Constraints: Risks and protection of resources and ecosystems
Soil contamination
Natural risks
Drinking water

Potential to infiltrate rainwater

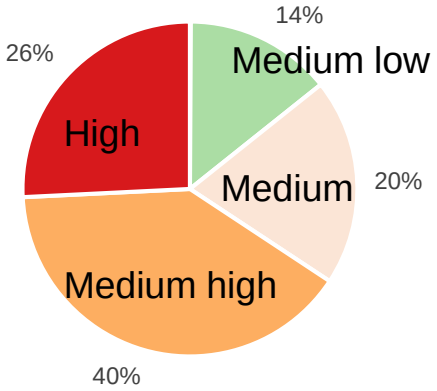


Specific approach

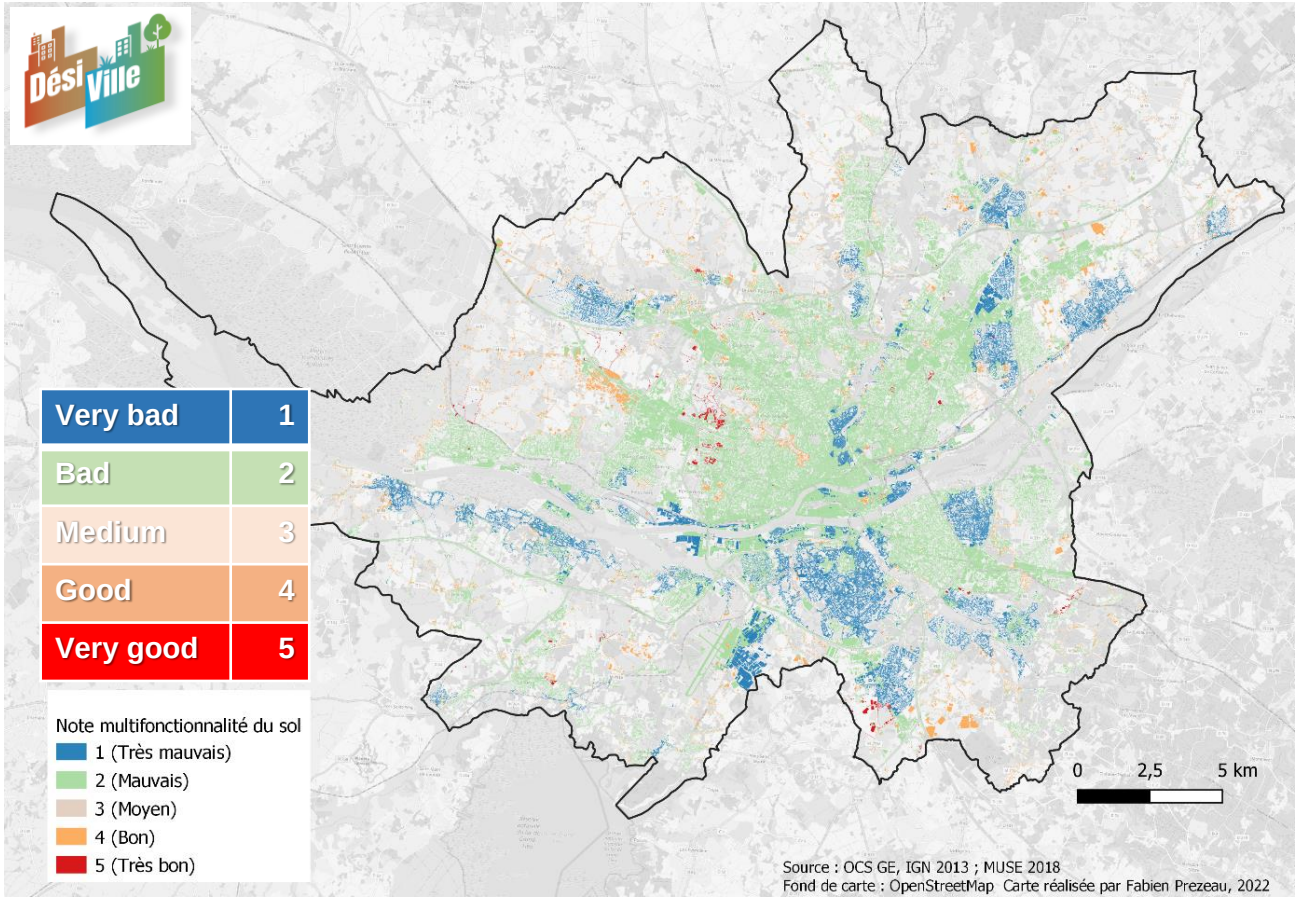
- IDPR
- Depth of groundwater table
- Hydromorphy of soils
- Clays
- Pedo-geological units
- Slope

Conil and Plat, 2015

- Endoreic zones



Multifonctionnality of soils



Specific approach

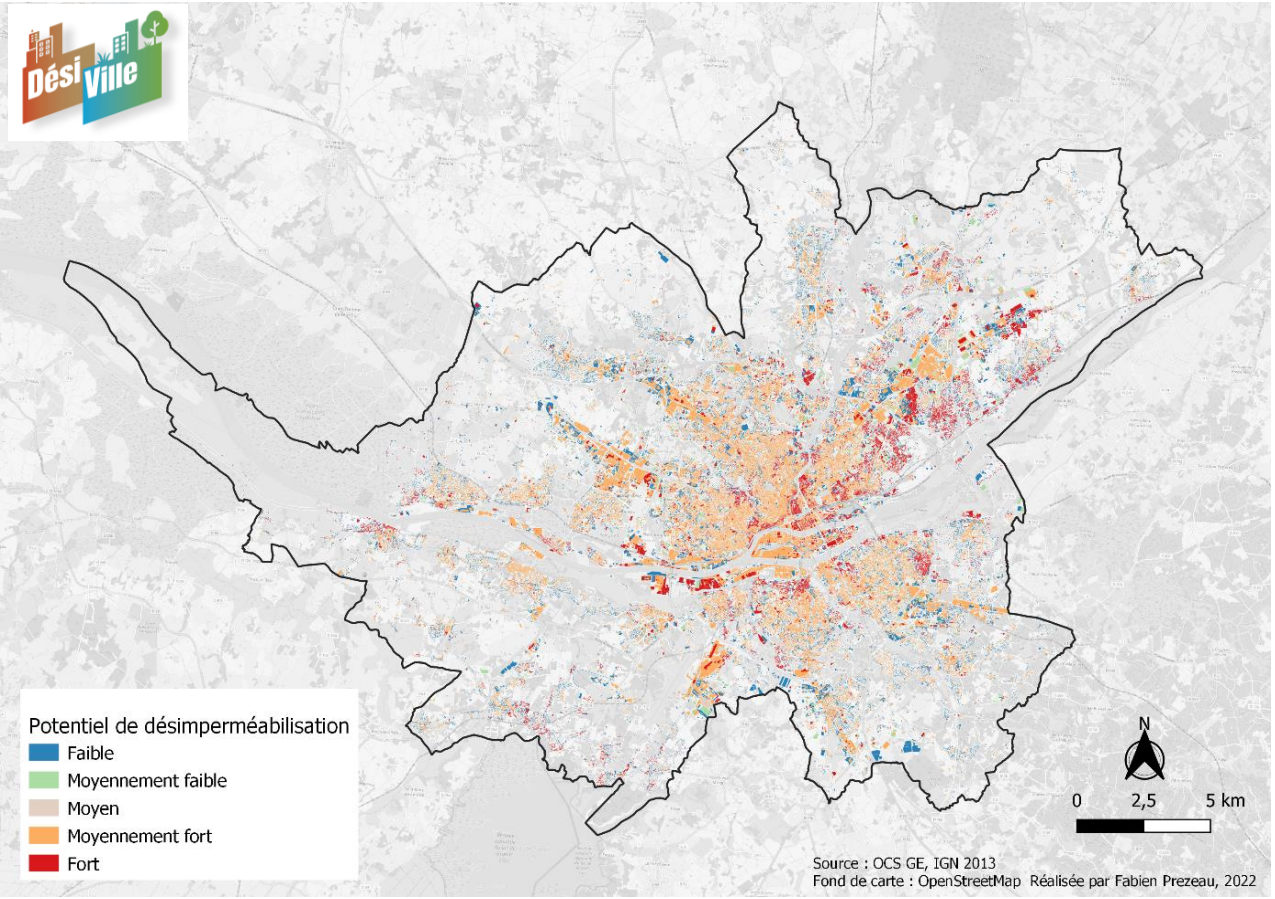
Adaptation of
the methodology
for rural zones

Extension to urban zone
- Capacity of infiltration
- Carbon Storage
- Biodiversity

crossed
with sealed soils

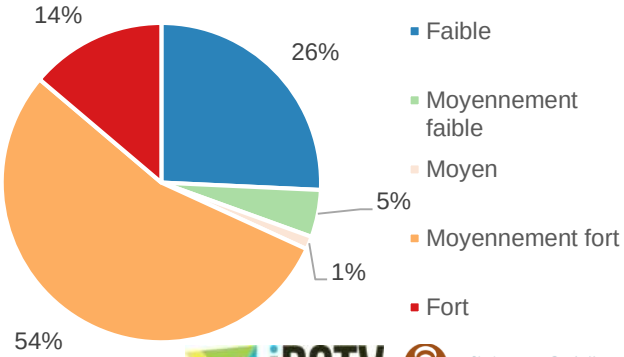
test

Desealing potential



Specific approach

Thematic	Resolution	Format	Weight
Sealed surfaces	1/5 000	vecteur	1
Infiltration potential	1/50 000	vecteur	1
Risks and resources	1/50 000	vecteur	1
Benefits	1/50 000 to 1/100 000	vecteur	1



Catalog of desealing solutions

Small to larger scale

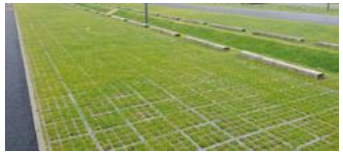
Existing guides/catalogs

- N4C
- Water infiltration solutions
- Rainwater management solutions

Any suggestion?

Grey infrastructures

- Porous asphalt
- Mix ground-stone
- Permeable cobblestone/cells
- Infiltration trench / well



Nature Based Solutions

- Valleys/pits
- Rain garden
- Street trees
- Vegetated strips
- Flooding plains
- Marshes and riparian forest
- Urban green spaces

Catalogue of desealing solutions: comparing solutions

Criteria of evaluation

- Implementation
- Rain water management
- Soil multifonctionnality
- Pollution of water and soils
- Biodiversity
- Climate change: adaptation and attenuation
- Amenities
- Socio-economic aspects

Scoring

- Objectives of the solution
- Co-benefits
- Not concerned
- Negative impacts

in progress

=> Synthetic table

Gestion de l'eau pluviale	Infiltration
	Rétention
	Transport du surplus
Moyenne	
Multifonctionnalité des sols	Cycle de l'eau naturel (stockage et infiltration)
	Cycle naturel du carbone
	Cycle Nutriments
	Support de végétation
	Biodiversité des sols
Moyenne	
Mise en œuvre	Echelle de fonctionnement
	Flexibilité
	Contraintes de dimensionnement/mise en œuvre
	Contraintes de fonctionnement/gestion
Moyenne	

Catalog of desealing solutions: descriptives sheets

Description

- General
- Functioning
- Technical aspects
- Standards

Keys for sizing

- Water cycle
- Scale
- Regulation
- Materials/life cycle
- Economic aspects : implementation/maintenance
- Involved actors

Points of attention

- Pollution
- Groundwater flooding
- Maintenance

Recommendations

Conclusions and perspectives

Mapping the potential of desealing

- Still looking for existing studies to feed the guide
- Proposal of a generic/specific methodology at territorial/local scales
- Many criteria
- Poor scale of some data

- **Catalogue of solutions**
  - Grey and green ones
  - Any reference advised?
  - Any suggestion on format?
    - Report
    - Decision tree
    - Interactive

Source : LIFE15 ENV/IT/000225 ACTION A1.3 REPORT

Sous le bitume…
Crédit photo : V. Baudouin, BRGM

A French objective within DésiVille

Wider perspectives possible by joining a European consortium

Thanks for your attention !

Any question ?

Contact :

c.leguern@brgm.fr

Photo : C. Le Guern
Œuvre de Jean Julien ‘the desealer’