CIPRA
LIVING IN THE ALPS

GROUND:BREAKING WEBINARS

Unsealing to improve Soil, Climate and Biodiversity

Monday, 29 April

Bianca Rompato

about.me

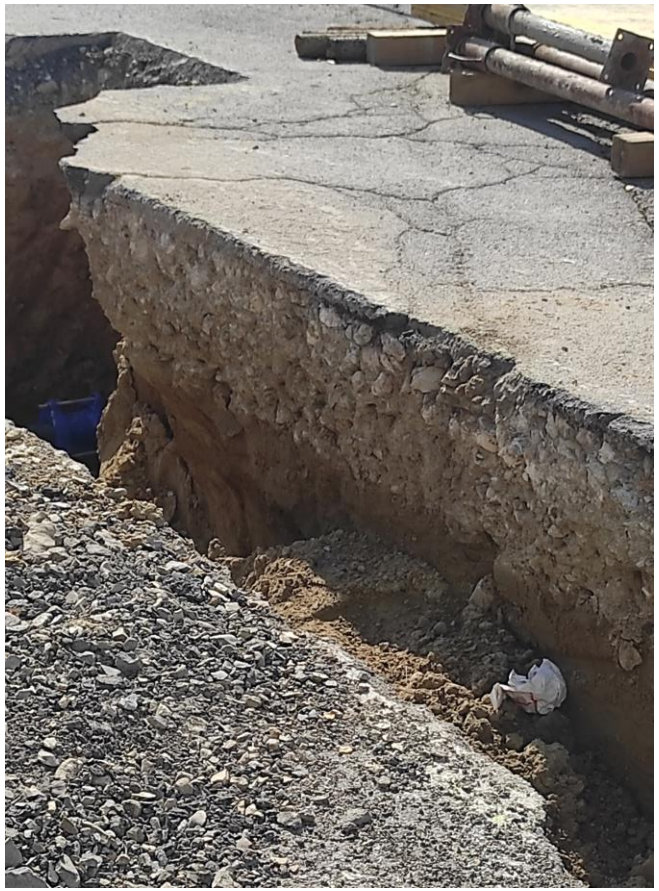
Master's degree in Forestry Sciences at the University of Florence.
"Green infrastructures and urban soils. An exploratory investigation regarding thermal comfort in the municipality of Florence"

Ph.D. student in Agricultural and Environmental Sciences at the University of Florence.
"Study and design urban soils to improve ecosystem services in smart cities"

Urban soil

"a soil material having a non-agricultural, man-made surface layer more than 50 cm thick that has been produced by mixing, filling, or by contamination of land surface in urban and suburban areas."

Found mostly but not only in urban areas.



URBAN SOILS

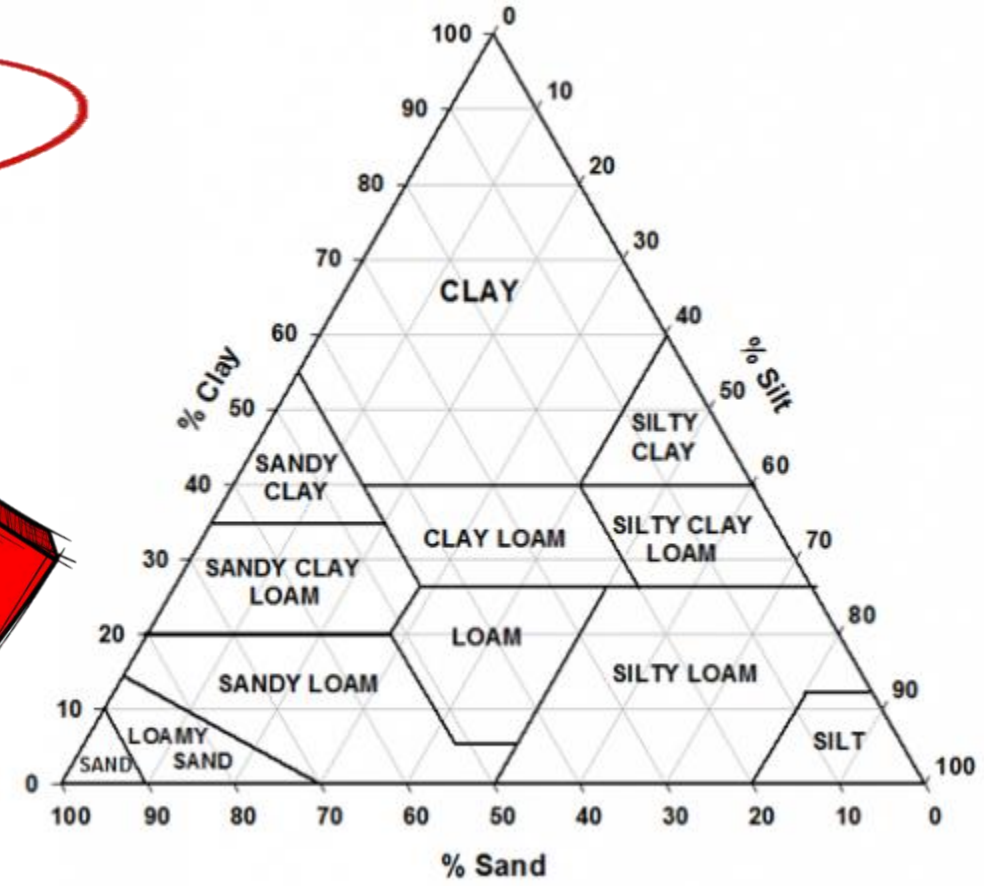
J L Morel, C Schwartz, and L Florentin,
Laboratoire Sols et Environnement ENSAIA-INPL/INRA, France
C de Kimpe, Agriculture and Agri-Food Canada, Ottawa, ON, Canada

https://doi.org/10.1016/B0-12-348530-4/00305-2Get

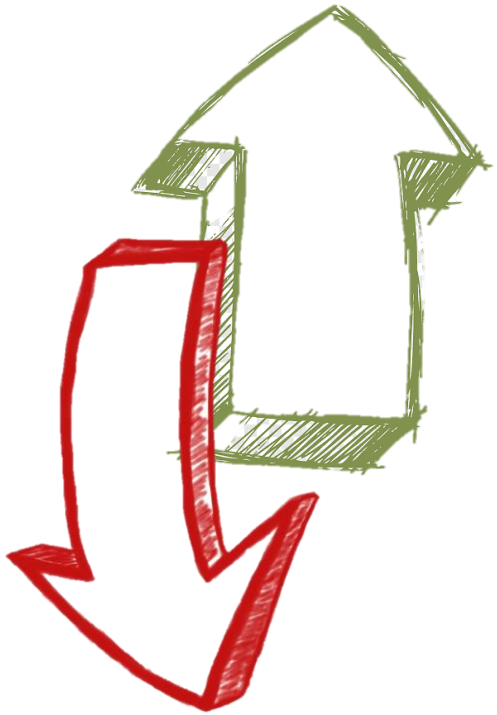
- soils in parks and gardens that are closer to agricultural soils but offer different composition, use, and management than agricultural soils;
- soils that result from various construction activities in urban areas and that are often sealed.

URBAN SOIL CHARACTERISTICS

- Physical
  - Coarse fragments
  - Compaction and sealing
  - Degradation of soil structure
- Chemical
- Biological



- Water run-off
- Pollutants
- Soil temperature
- UHI



- Gas exchange
- Water infiltration
- Soil biota activity

URBAN SOIL CHARACTERISTICS

- Physical
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  - Coarse fragments
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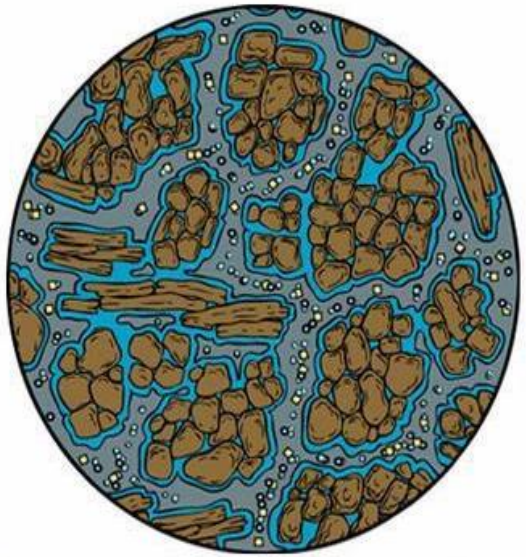
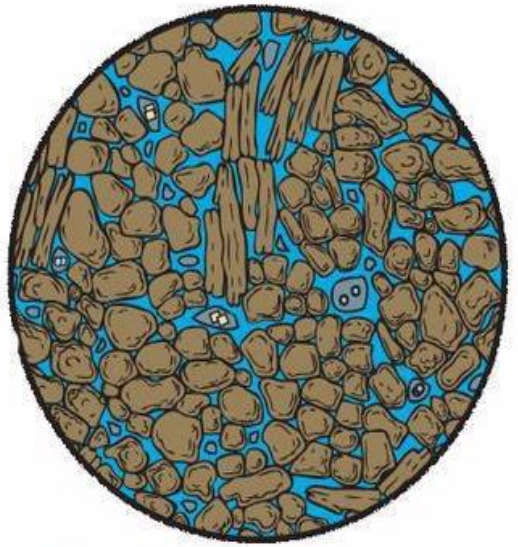


Lower bulk density
Lower weight
More pore space



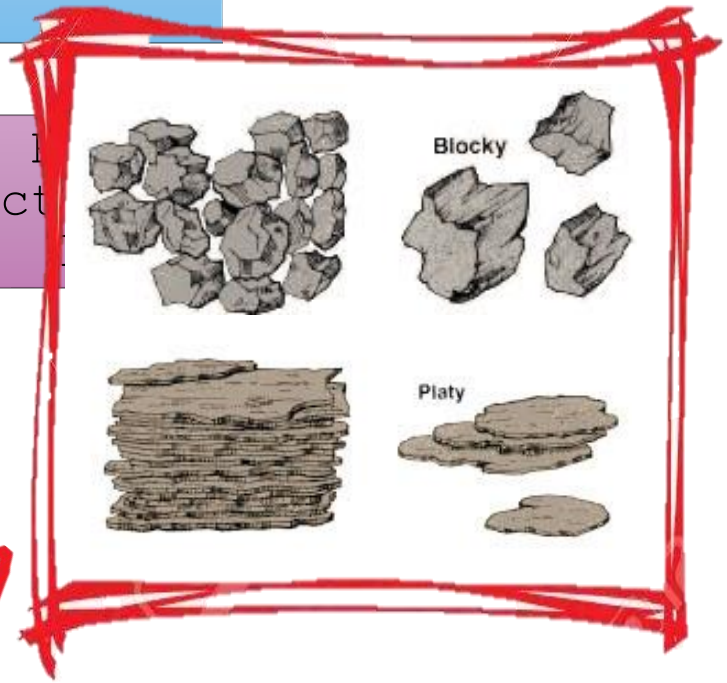
Higher bulk density
Higher weight
Less pore space

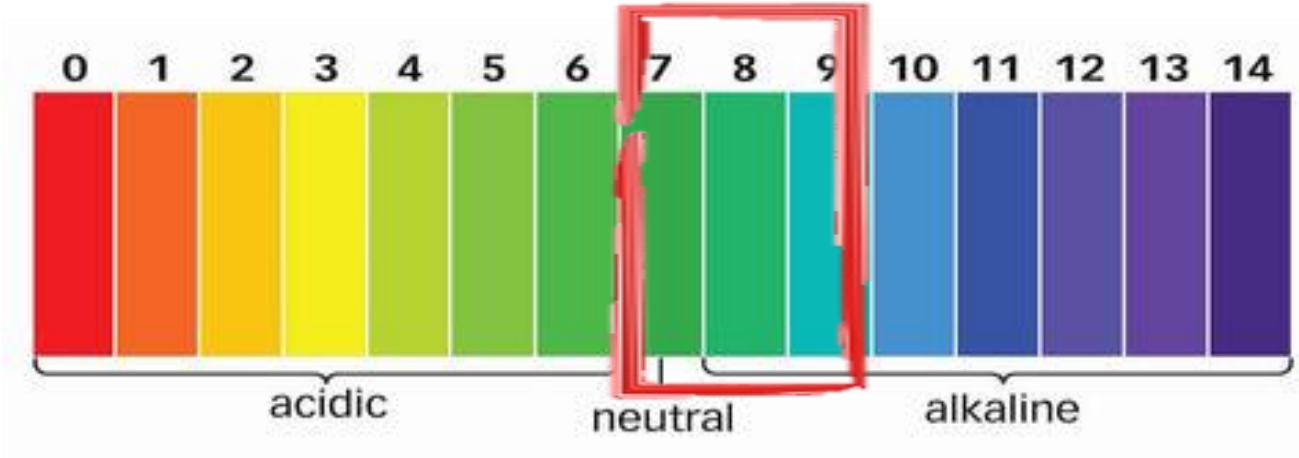
$$\rho = \frac{m}{V}$$

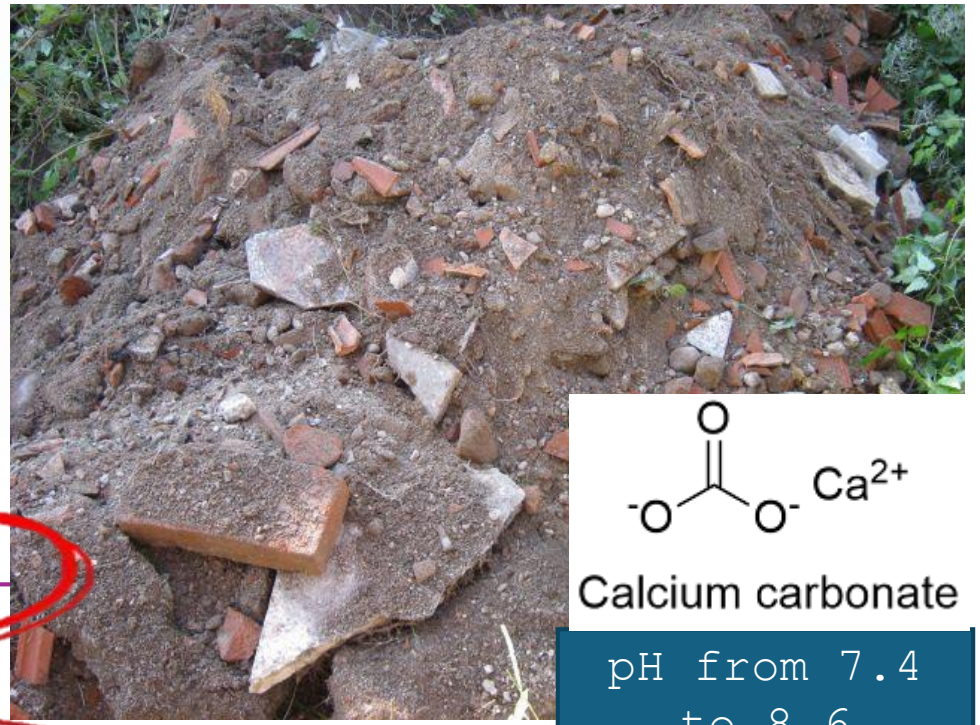
Urban soil 1.4–1.6 Mg/m^3

URBAN SOIL CHARACTERISTICS

- Physical
  - Coarse fragments
  - Compaction and sealing
  - Degradation of soil structure
- Chemical
  - Alkaline pH
  - Organic and inorganic pollutants
  - Heav… …tals
- Biological
  - l… act…







Calcium carbonate

pH from 7.4 to 8.6

Coarse fragments

Alkaline pH

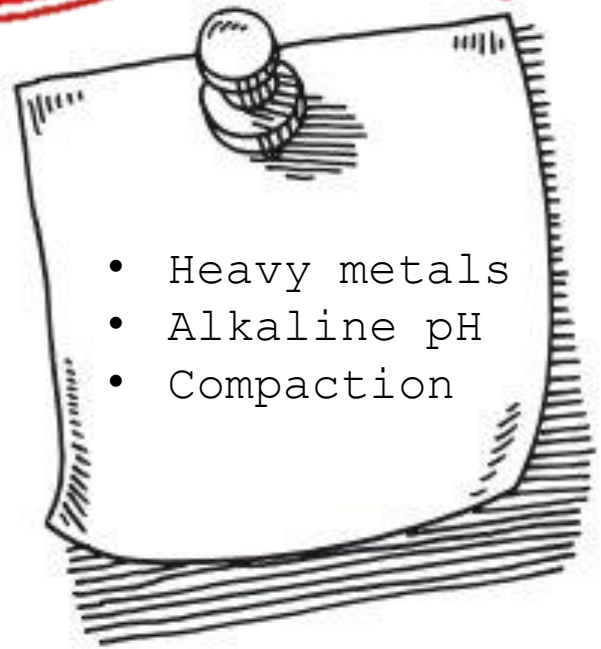
Organic and inorganic pollutants

Heavy metals

!!! Anthropogenic origin

URBAN SOIL CHARACTERISTICS

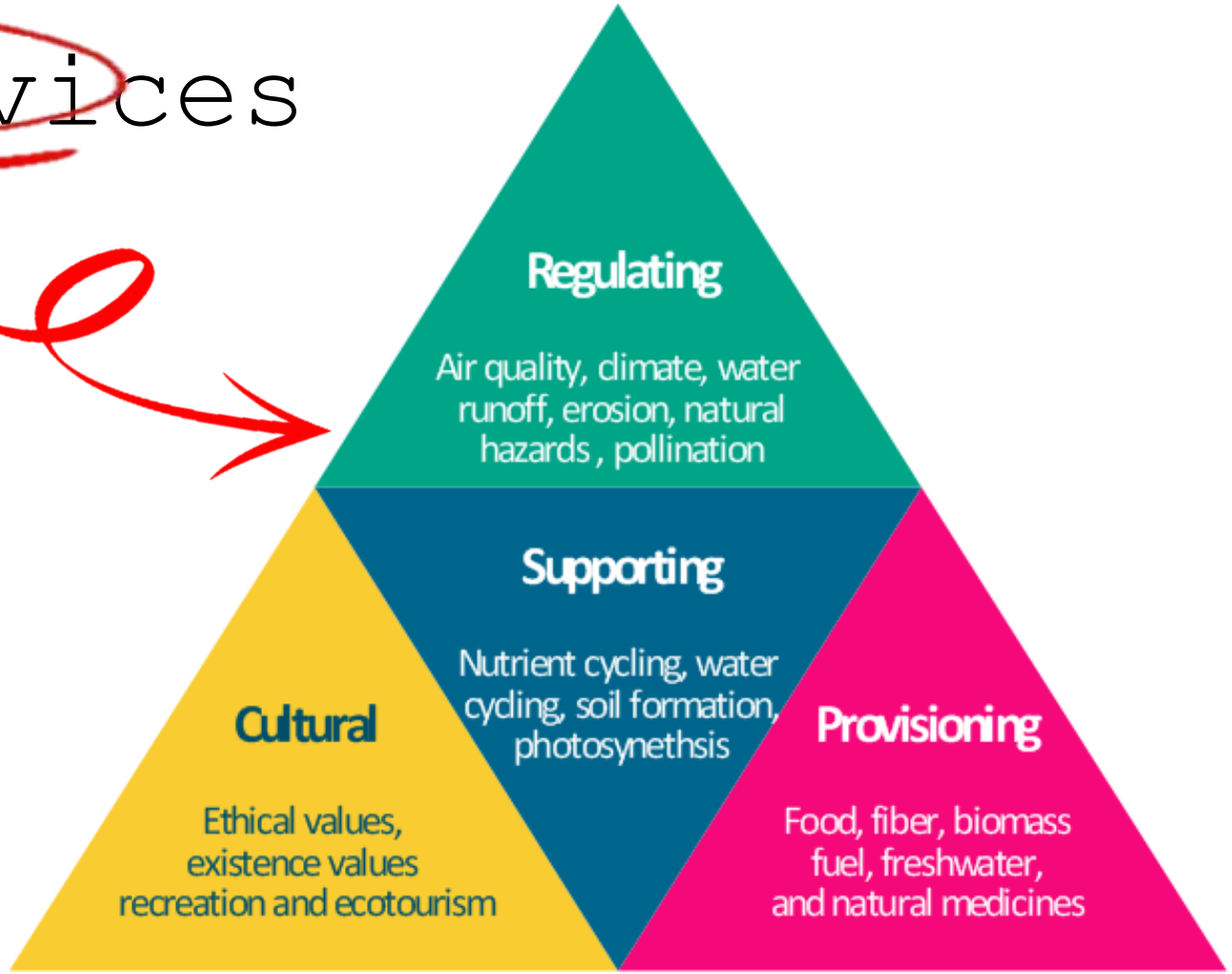
- Physical
  - Coarse fragments
  - Compaction and sealing
  - Degradation of soil structure
- Chemical
  - Alkaline pH
  - Organic and inorganic pollutants
  - Heavy metals
- Biological
  - Reduced activity of biota



Ecosystem services

are the many and varied benefits to humans provided by the natural environment and from healthy ecosystem.

(The Millennium Ecosystem Assessment)

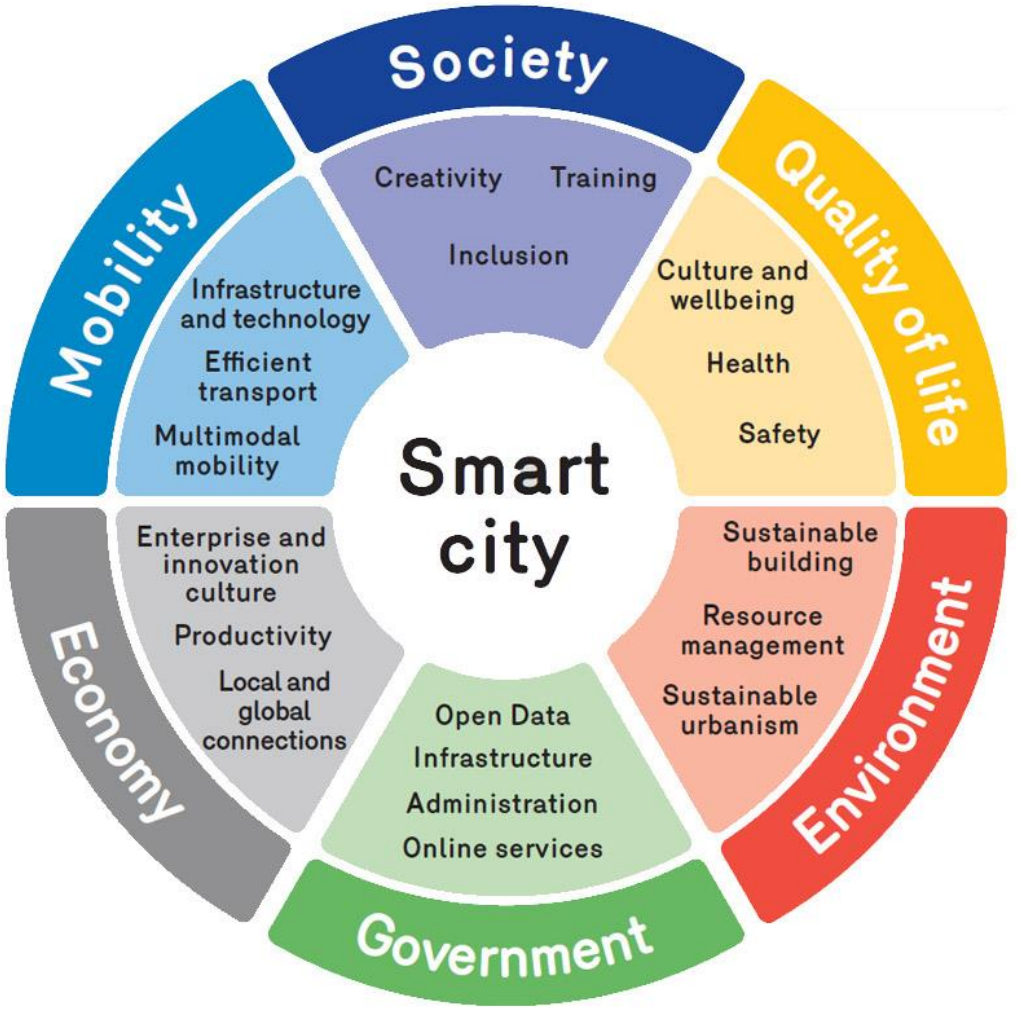


PROPERTIES → FUNCTIONS → ECOSYSTEM SERVICES → HUMAN WELL-BEING

Smart cities

*"an **innovative** city that uses ICTs (Information and Communications Technologies) and other means to **improve quality of life**, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of **present and future generations** with respect to economic, social, environmental as well as cultural aspects"*

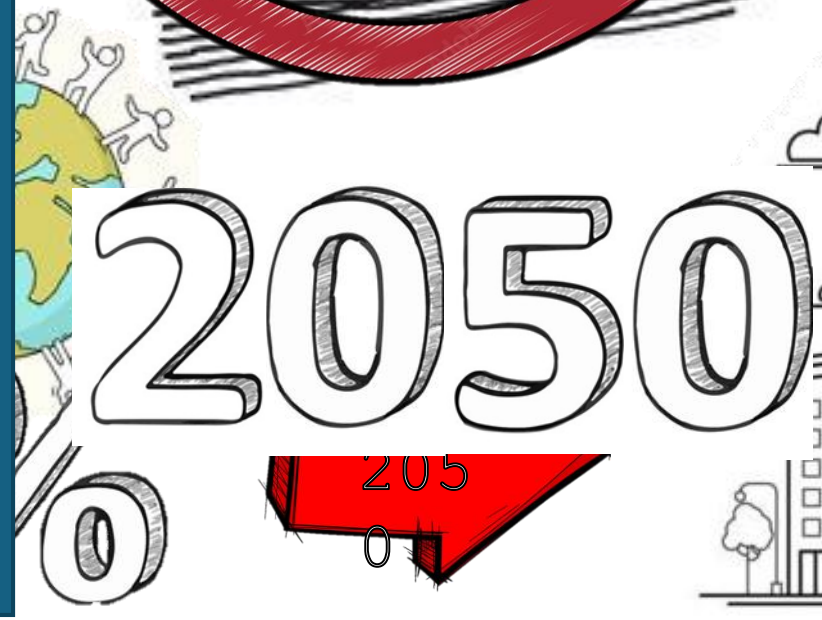
(United Nations. Sustainable Development Goal. 2019)

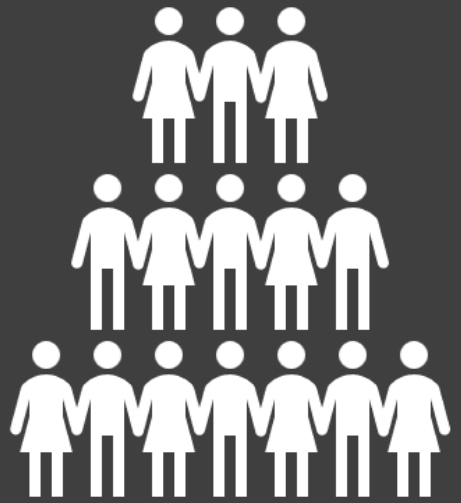


- The research focuses on increasing or improving the permeable surface of the urban environment to enhance soil ecosystem services, such as contrasting extreme weather events, mitigating urban temperature, and stocking pollutants.
- De-sealing to recover the soil functionality in Prato municipality in a circular economy vision.
- Soil remediation to minimize negative impacts from compaction, using organic urban waste as soil amendment.

Promote compensatory action land use activities:

- De-sealing
- Remediation soil





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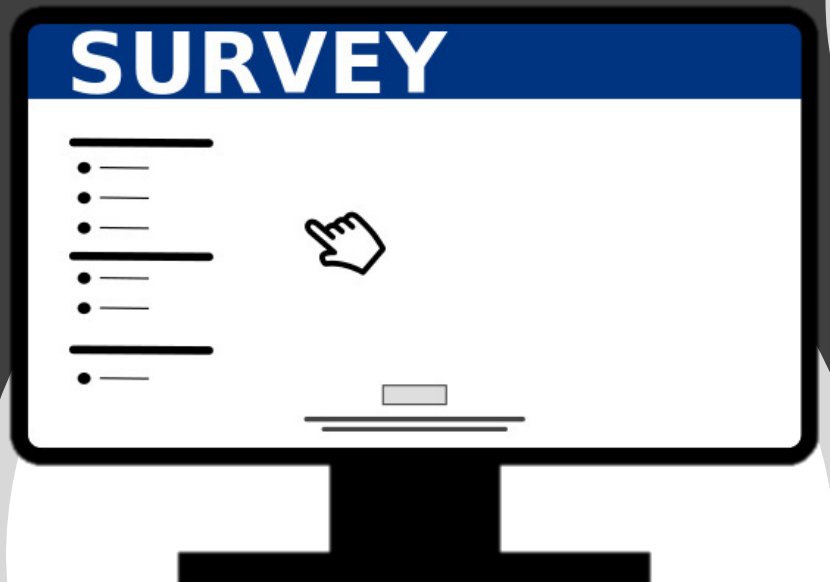
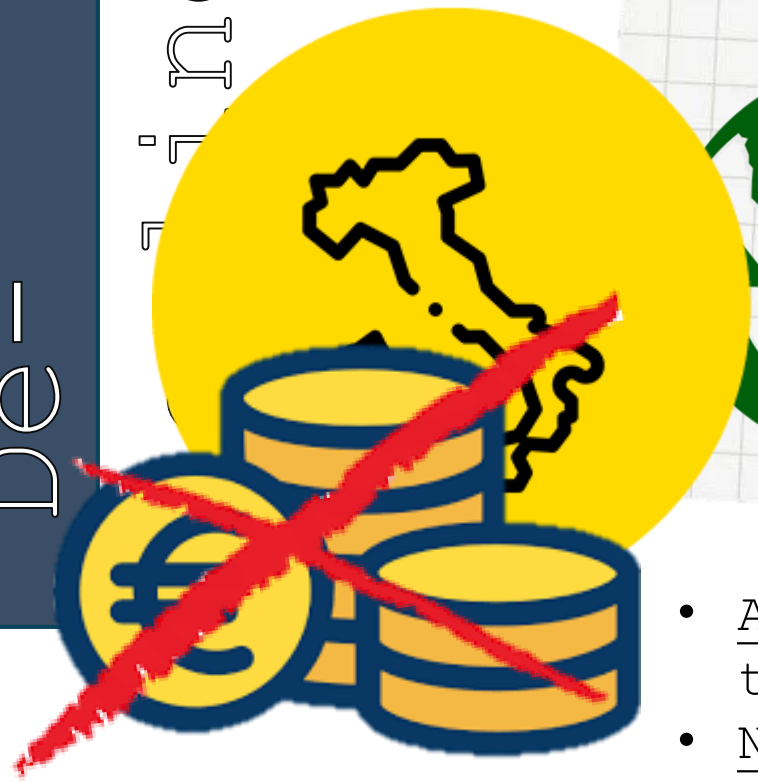


RE SOIL FOUNDATION

Regeneration for a clean and healthy soil

De-

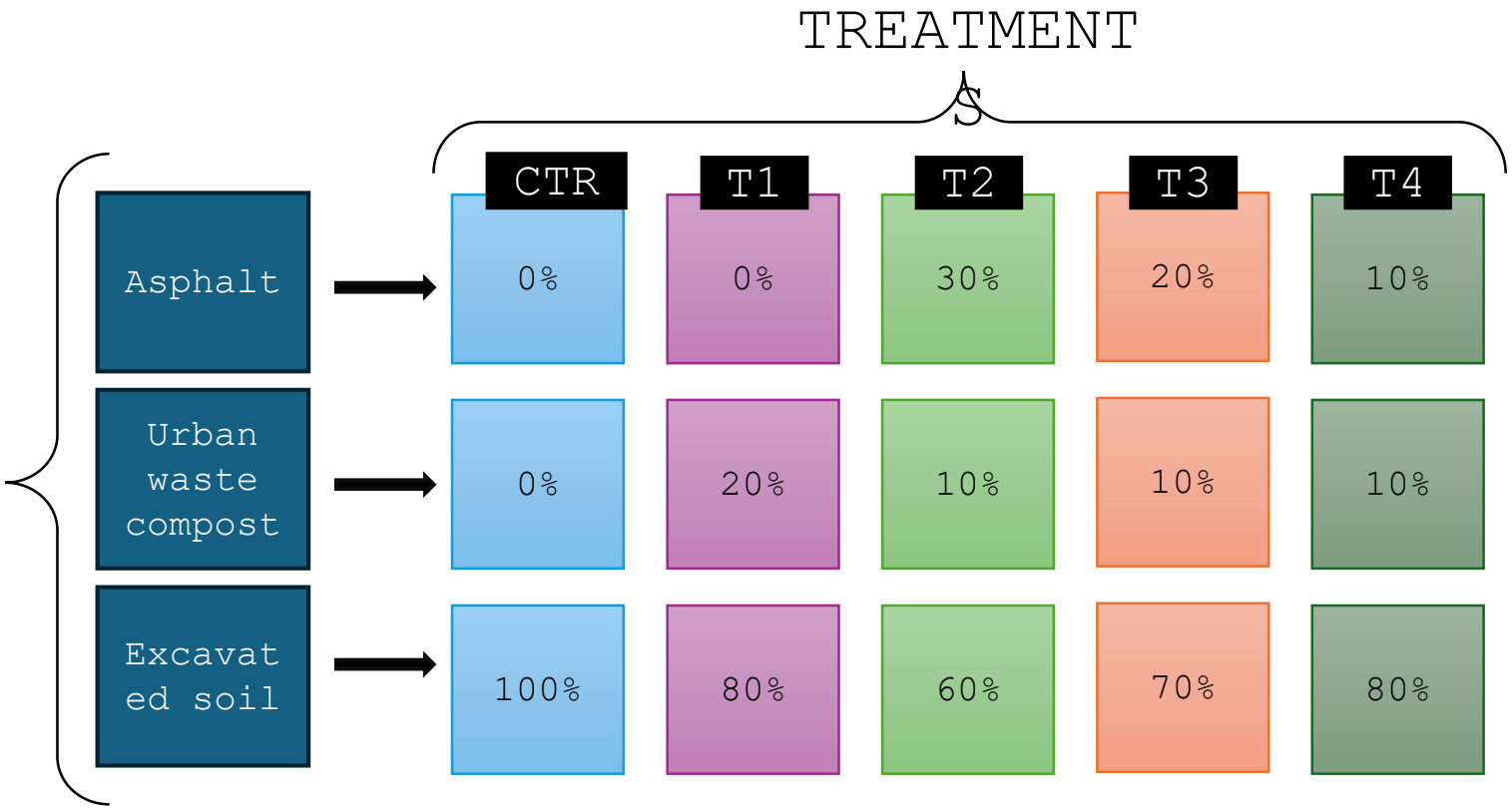
GRIND ASPHALT
+
URBAN WASTE COMPOST
+
URBAN SOIL



- Asphalt removing = from 13 to 18 €/t
- New topsoil = from 5 to 25

Method

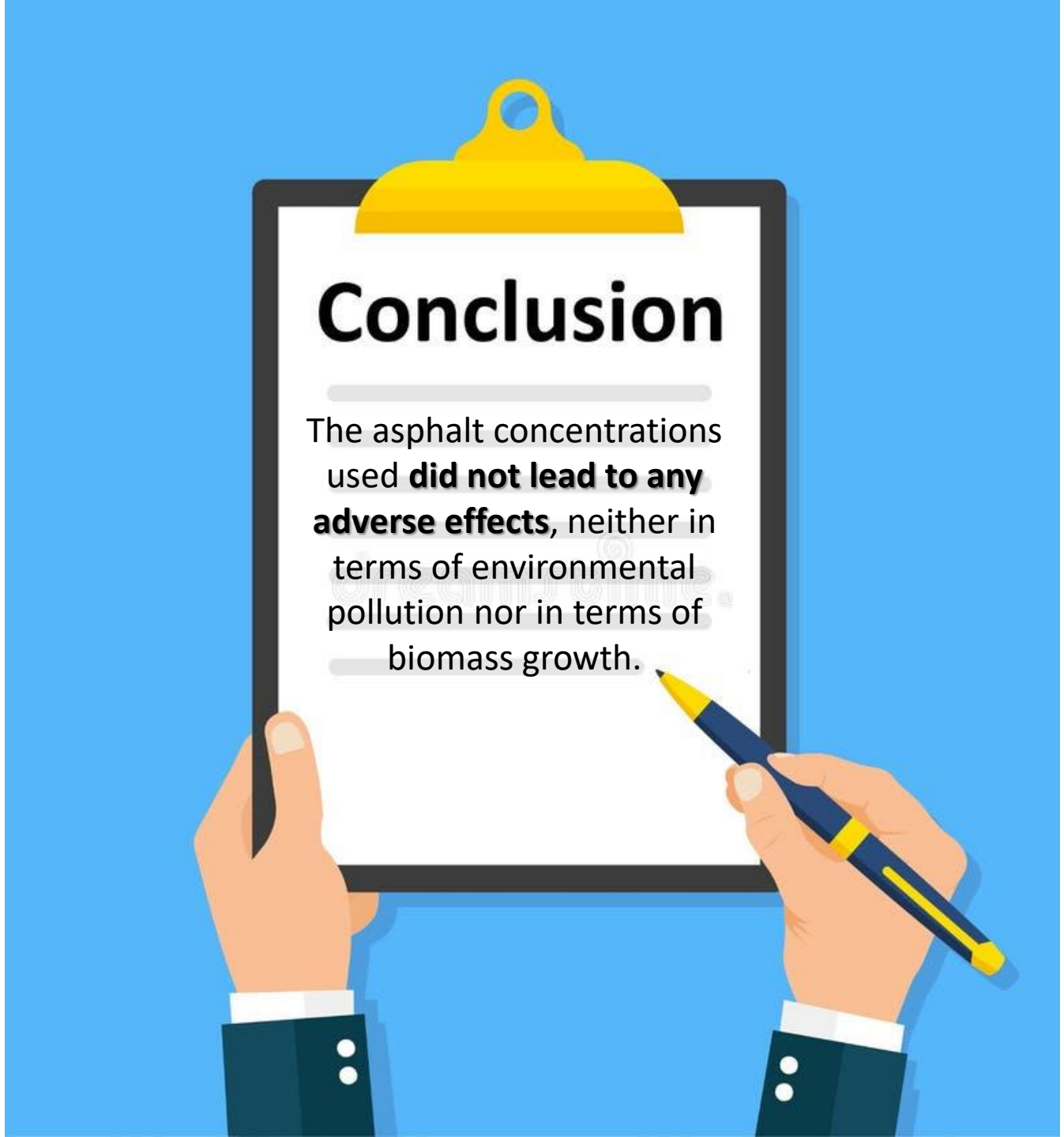
The study's **purpose** is to recover soil after long sealing, with a view to the circular economy by the new soil constructed. The **aim** is to amortize the de-sealing cost, early reusing the asphalt into the urban soil to recover.



Pots test
5 treatments, 3 replicates

Conclusi

on


Conclusion
The asphalt concentrations used did not lead to any adverse effects, neither in terms of environmental pollution nor in terms of biomass growth.

Prato

Green la

Field

People Who Don't Give Up

Women in science