















Defining and Mapping soil based ecosystem services at different scales: a flexible methodological approach at multiple governance levels

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LIFE Programme 2014-2020 (Call 2015)

Title: Save Our Soil for LIFE

Acronym: **SOS4LIFE**

Sector: Resource Efficiency

Start: **01/07/2016**

End: **31/10/2019**

Total budget : **€ 1.788.749,00**

EU Contribution : **€ 1.060.551,00**





Save our Soil for Life - SOS4LIFE



- Evaluate ecosystems services provided by urban and peri-urban soils and quantify costs and impacts caused by land take and soil sealing
- Define a viable regulation framework and operational tools to achieve, at the municipal level, the no net land take target and promote urban regeneration
- Promote and practice de-sealing interventions as a way to compensate newly urbanized areas and improve the urban resilience
- Develop a **Urban and Soil Decision Support System** to be adopted by municipalities and regions for monitoring land use change, soil-sealed areas, urban regeneration processes, soil ecosystem services
- Raising awareness on the need to save our soils among decision makers, technicians, citizenship.



ESs: underpinning soil functions, indicators and data



Soil Indicator Soil functiona (soil processes) (output of processes) Soil properties Soil stocks - SNC Potential habitat **Biodiversity** pool for soil organism Storing, filtering and **Bulk density** CEC transforming Capability class Soil reaction nutrients, substances Clay content Rooting depth Storing, filtering and CFC Soil evaporation transforming nutrients, substances potential Depth C stock K sat Carbon pool C sequestr. Pot. Organic C Land capability Biomass production Peat laver map Physical and cultural рН Soil bearing environment **RETC** capacity Storing, filtering and Infiltration Sand content transforming nutrients, substances and water capacity Storing, filtering and WC@FC Land Use Presence of WT transforming Avg GW depth nutrients, substances

JUJTH

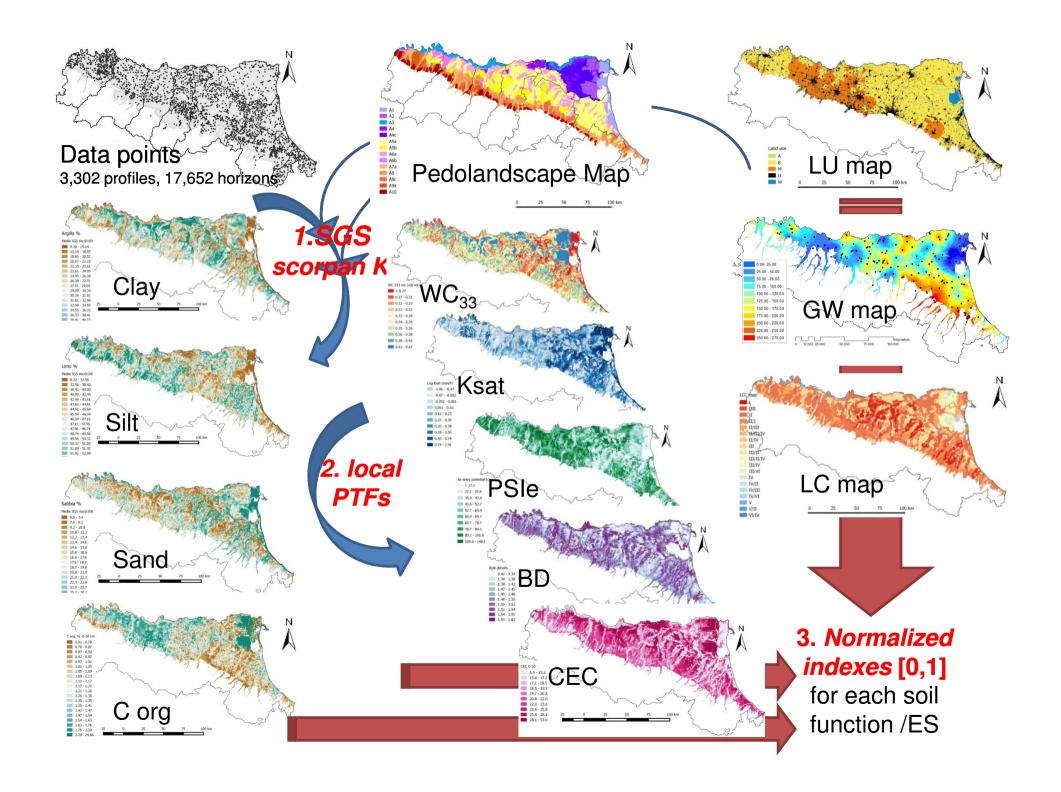
ESs Soil contribution to ESsb categoriesc Habitat **1.BIO** for soil organisms **Supporting** 2.BUF Nutrient and pollutant Regulating retention and release: Natural attenuation 3.CLI Microclimate Regulating regulation 4.CST & CSP Regulating C stock (actual) C sequestration (pot.) 5.PRO Provisioning Food provision 6.SUP Supporting human **Provisioning** activities and **Supporting** infrastructure 7.WAR Water regulation Regulating Runoff/flood control 8.WAS Water regulation Regulating Water storage **Provisioning**

and water



Regional scale





NORMALISED INDEXES FOR EACH SOIL FUNCTION



Provision

Biomass production (PRO)

Regulation

Soil buffer capacity (BUF),

Microclimate regulation (CLI)

Water storage (WAS),

Water infiltration (WAR),

Carbon sink actual and potential (CST, CSP),

Support

Suport to infrastructures (SUP)

Support to biodiversity (BIO)

Based on existing data and maps, definition of indicators

• Calculation, normalisation (**0-1**) and **mapping** (value 0 indicates the relative minimum for each indicator)

0.0 - 0.1		0.0 -	0.1
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0.1 - 0.2

0.2 - 0.3

0.3 - 0.4

0.4 - 0.5

0.5 - 0.6

0.6 - 0.7

0.0 - 0./

0.7 - 0.8

0.8 - 0.9

0.9 - 1.0

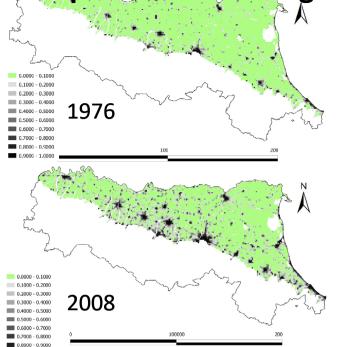




Mapping the potential contribution of soils to ES at regional scale binet BIO_QBS 0.0 - 0.1 0.1 - 0.2 0.2 - 0.3 0.3 - 0.4 0.4 - 0.5 0.5 - 0.6 0.6 - 0.7 0.7 - 0.8 0.0 - 0.1 0.1 - 0.2 0.2 - 0.3 0.3 - 0.4 0.0 - 0.1 0.3 - 0.4 0.4 - 0.5 0.5 - 0.6 BIO **WAS** WAR 0.4 - 0.5 0.5 - 0.6 0.6 - 0.7 0.0 - 0.1 0.1 - 0.2 0.2 - 0.3 0.3 - 0.4 0.2 - 0.3 0.3 - 0.4 0.4 - 0.5 0.5 - 0.6 0.3 - 0.4 0.4 - 0.5 0.5 - 0.6 0.6 - 0.7 0.7 - 0.8 0.8 - 0.9 0.9 - 1.0 0.5 - 0.6 0.6 - 0.7 0.7 - 0.8 0.8 - 0.9 0.9 - 1.0 **BUF PRO** WAR 0.8 WAS CLI Unit A1 - Coarse Unit A2 - Fine textured textured soils of coastal soils, with organic layers plain and peat of recently reclaimed area of Po BUF BIO river delta plain Unit A5a - Loamy textured soils of the Unit A6a - Fine levee areas of the textured soils of the Apennines recent **CSP** PRO depressions of the alluvial plain Apennines recent alluvial plain SUP

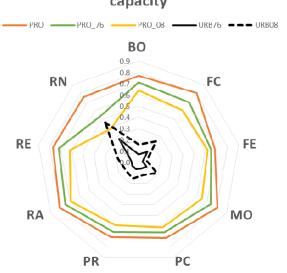
Impact of soil sealing on Ess at regional scale



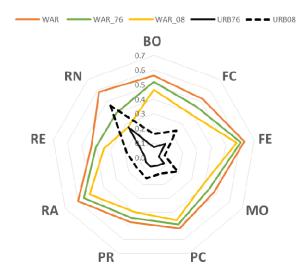


	1976	2008	diff.
PRO	0.693	0.628	-9.4%
BUF	0.515	0.435	-15.5%
WAS	0.425	0.388	-8.6%
WAR	0.504	0.459	-9.1%
CSP	0.306	0.277	-9.5%
SUP	0.389	0.36	-8.1%
CLI	0.414	0.383	-7.6%
URB	0.067	0.149	122.4%

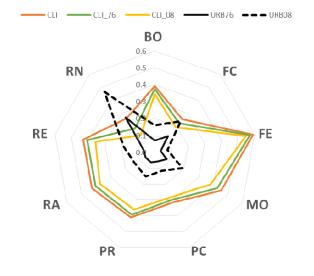
Soil sealing impact on production capacity



Soil sealing impact on water infiltration

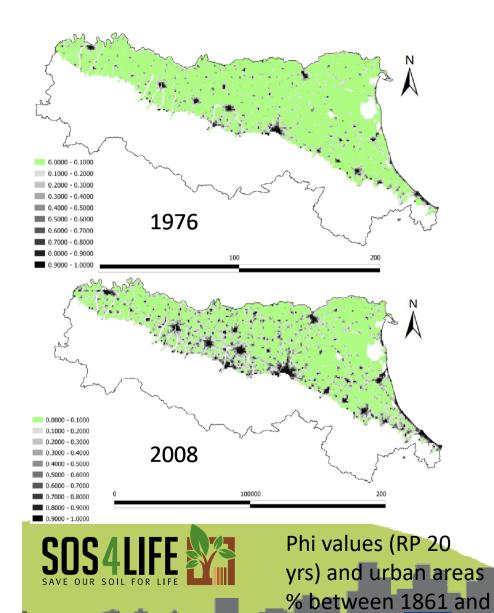


Soil sealing impact on microclimate regulation

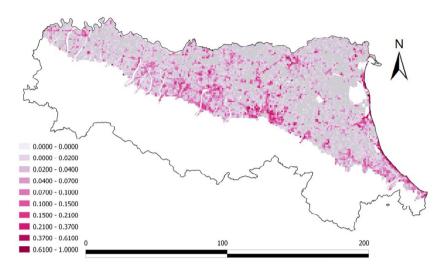


Impact of soil sealing on runoff

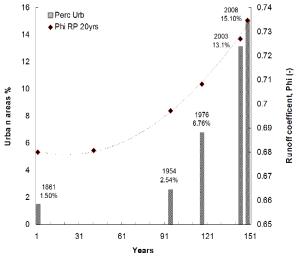




2008



Difference between the Phi values at 1976 and 2008 (20-years RP)





Municipal scale



Ecosystem Services at municipal scale and soil sealing impacts

Consiglio Nazionale delle Ricerche

Potential productivity

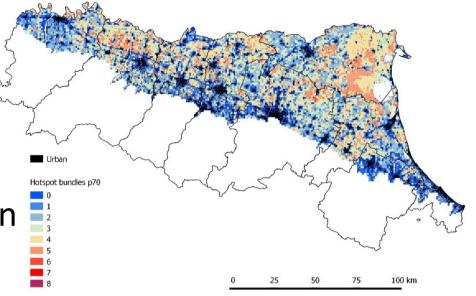
Water regulation

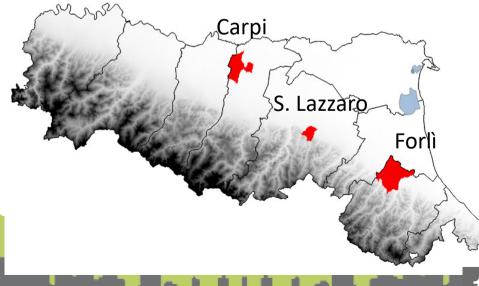
Microclimate regulation

Support to biodiversity

Soil Carbon Stock

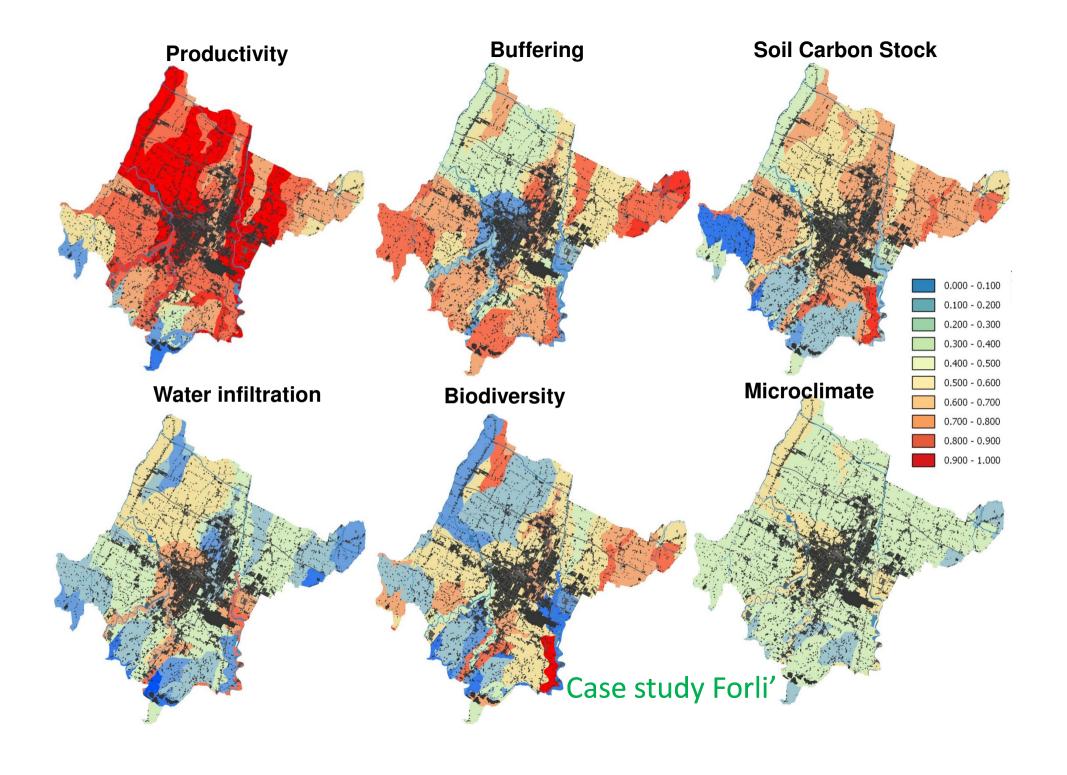
Buffering











Soil quality assessment to support compensation

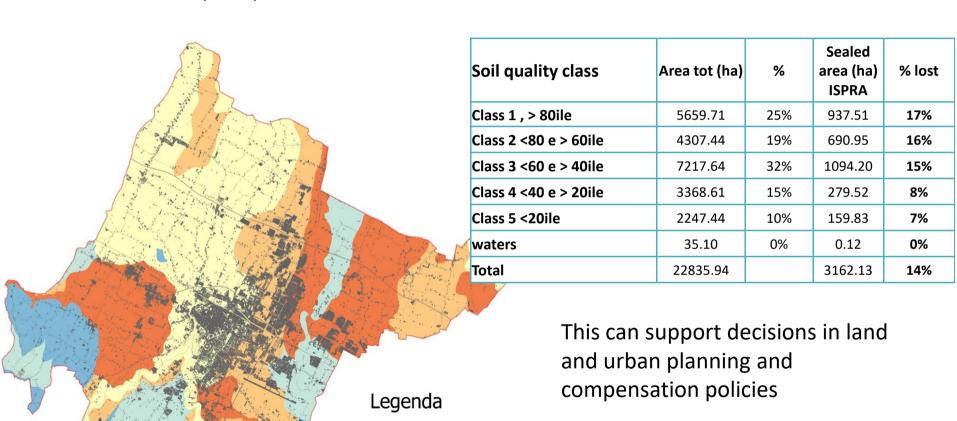


Overall soil quality can be then assessed as the sum of indicator values, then scaled 1-0. Soil quality classes are defined based on centiles of the distribution.

Qualita' del suolo

5 - Bassa

1 - Molto alta
 2 - Alta
 3 - Medio alta
 4 - Medio bassa





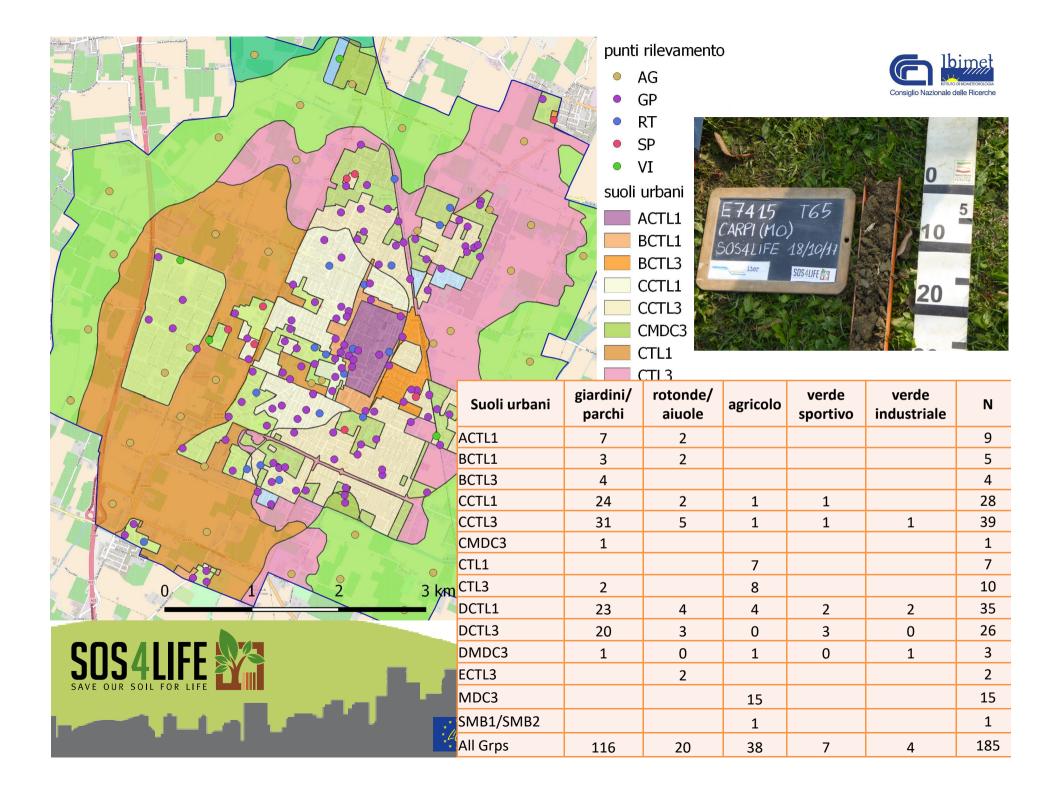


Urban scale



Soil ESs assessment at urban level: Carpi case study 6. Urban soil survey 5. Urban soil units 1. Urban typology 2. Soil map 3. Land use SOS4LIFE SAVE OUR SOIL FOR LIFE 4. Aerial photos

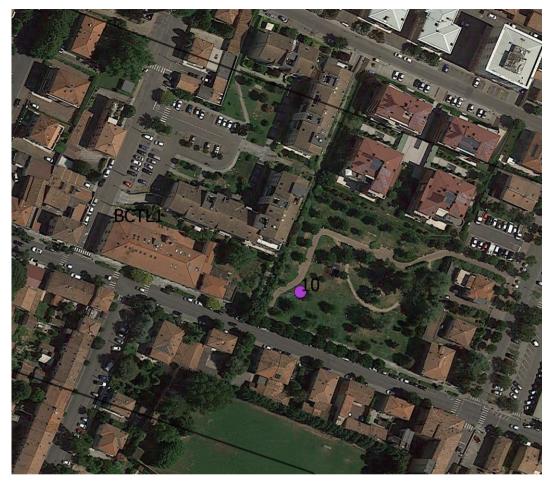
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ESs in urban areas

BCTL1, public green area, about 10000 mq

- c.a. 74 Mg of C = 271.13 T CO₂
- c.a. 8000 m³ of water infiltration
- c.a. 1500 m³ of available water for plants and ET
- recreational value







www.sos4life.it/en/ www.facebook.com/saveoursoilforlife/

