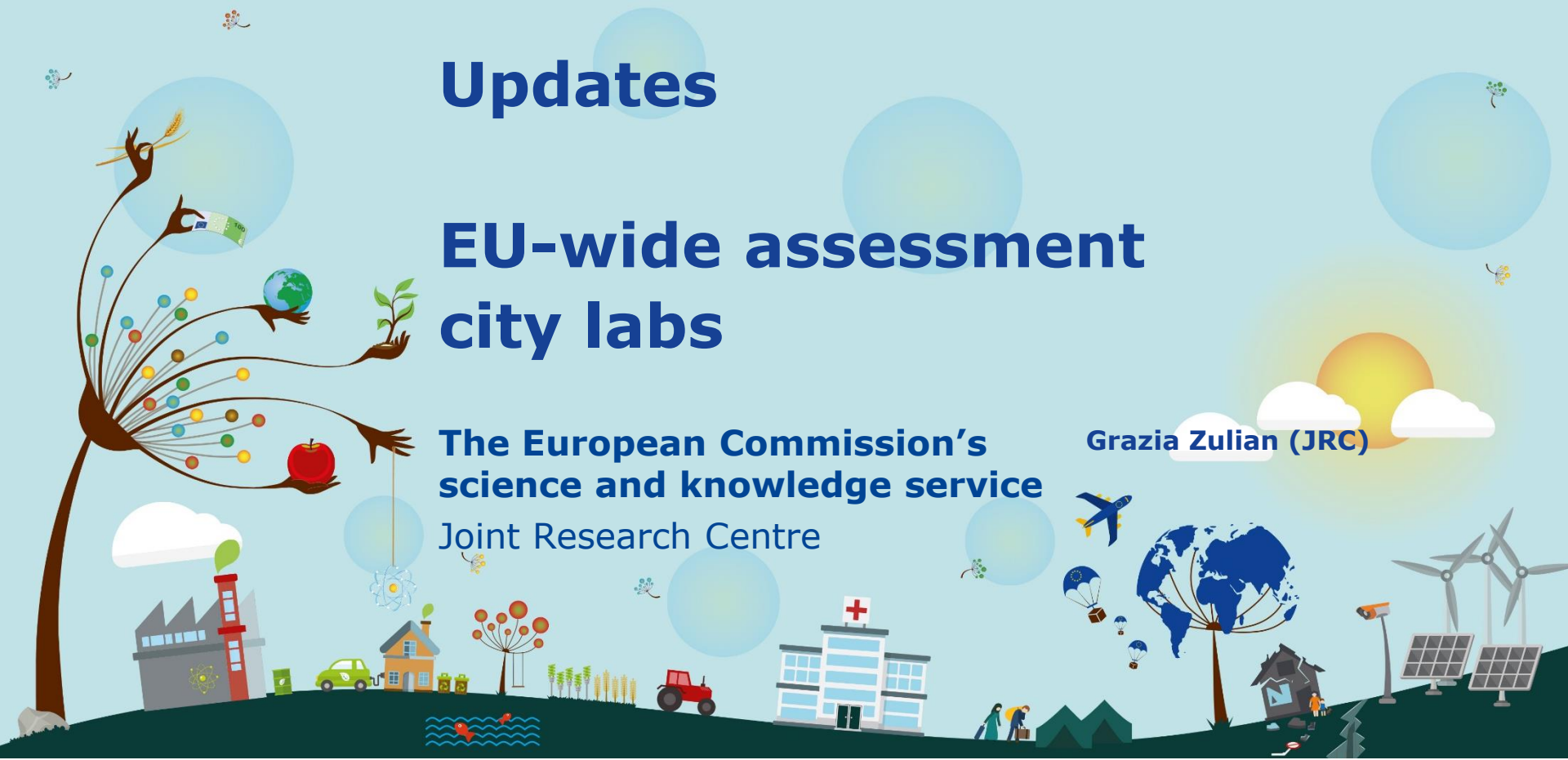
Updates

EU-wide assessment city labs



The European Commission's science and knowledge service

Joint Research Centre

Grazia Zulian (JRC)

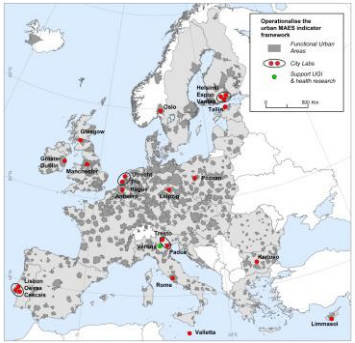
European Commission

Outline

1. Short update on the spatial assessment:
    1. **EU-wide assessment**
    2. **The city labs**
2. Key concepts for the project
    1. **"*Scale*"**
    2. **The tiered approach for ecosystem services mapping**
3. Key issues for the project:
    1. **Comparison**
    2. **Cross-scale assessment**
4. Examples

Short update on the Spatial assessment

Functional urban areas and local municipalities



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European FUAs

UES –UEC and urban form

Biodiversity and Urban Protected areas

municipalities

City-labs

Cross-scale assessment

Local assessment

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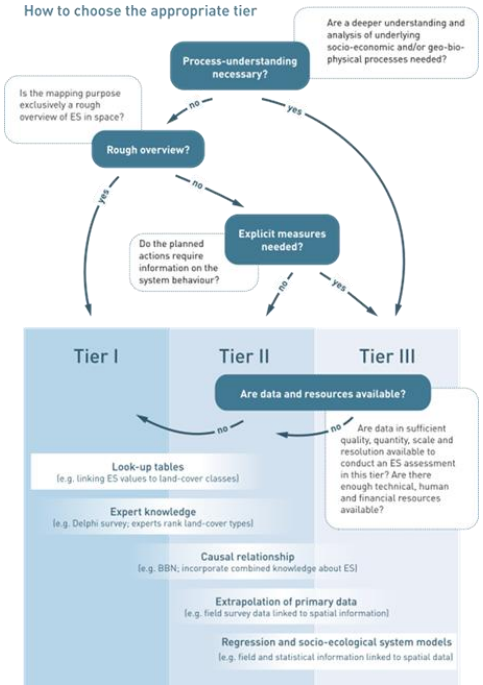
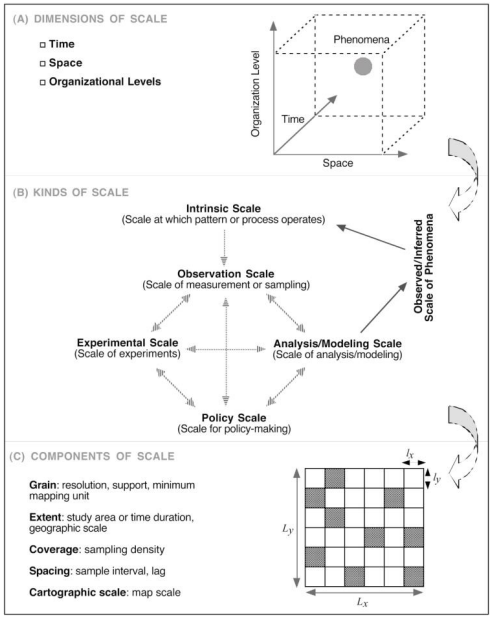
'*Scale*' and Tiered approach for Ecosystem Services and ecosystem condition mapping

To proceed we need to agree over two concepts:

1) '*Scale*'

2) Tiered approach



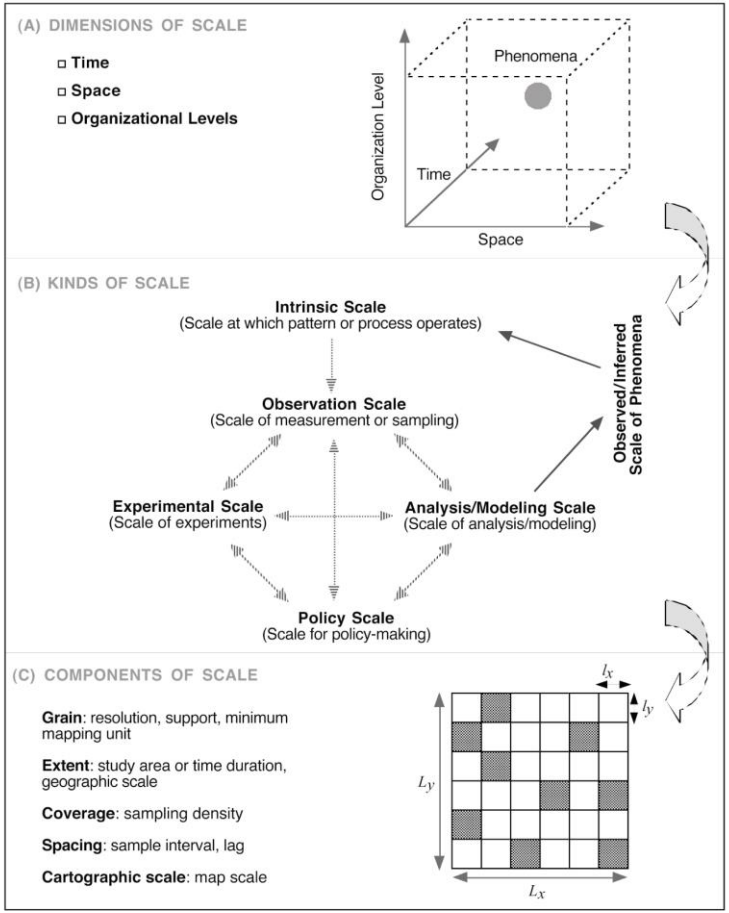


Burkhard, B., Maes, J., 2017. Mapping Ecosystem Services, Advanced Books. Pensoft Publishers. doi:10.3897/ab.e12837

Chapter 5.6.1: 'A tiered approach for ecosystem services mapping'

Wu, J., Li, H., 2006. Concepts of scale and scaling, in: WU, J., JONES, K.B., LI, H., LOUCKS, O.L. (Eds.), Scaling and Uncertainity Analysis in Ecology. Springer Netherlands, Dordrecht, pp. 3–15. doi:10.1007/1-4020-4663-4_1

Scale



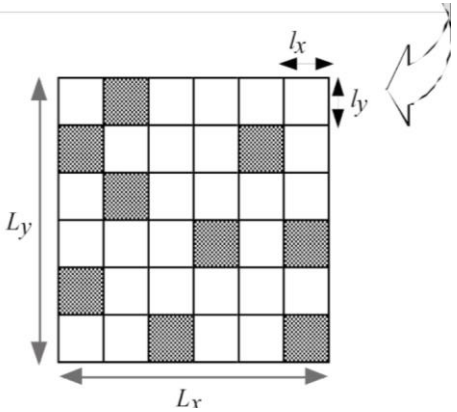
Conceptual hierarchy:

- DIMENSION (space – time)
- KIND OF SCALE (from the intrinsic scale to the policy scale)

- **COMPONENTS OF SCALE => "*measurable definitions are required in order to quantify scale and develop scaling relations*."**

(C) COMPONENTS OF SCALE

- **Spatial extent**
- **Spatial precision**
- **Attribute accuracy**
- **Completeness**



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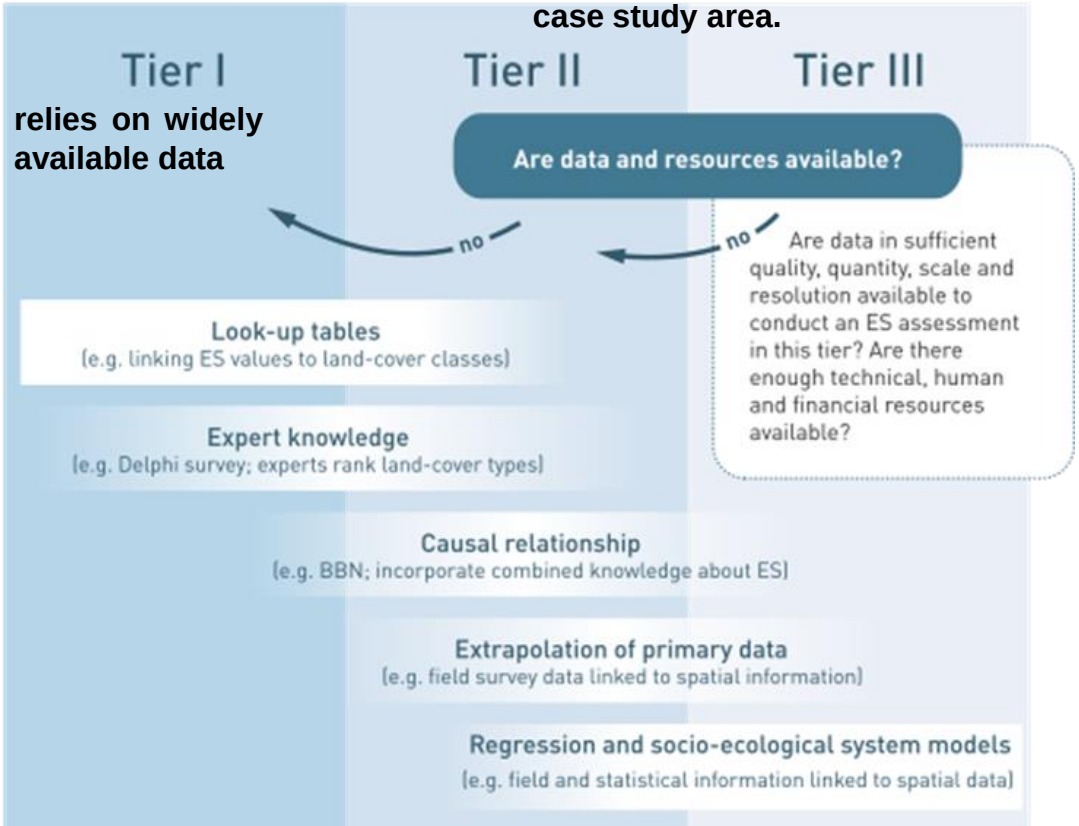
A Tiered approach for Ecosystem Services and ecosystem condition mapping

include more specific information for the case study area.



The methods can be categorized into tiers with increasing **complexity** between the different levels

Added value
Stakeholders engagement

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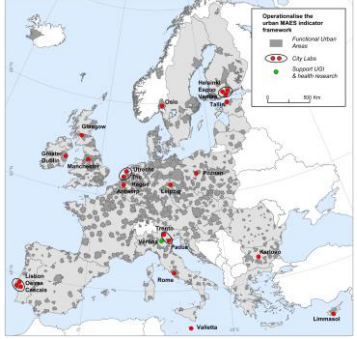
Short update on the Spatial assessment



Functional urban areas and local municipalities

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Cross-scale assessment

Local assessment

T 1 comparison

T 1-2-3

- how observation, management, and analysis shift with scale
- Can UEC and UES mapping inform consistent cross scale policies?

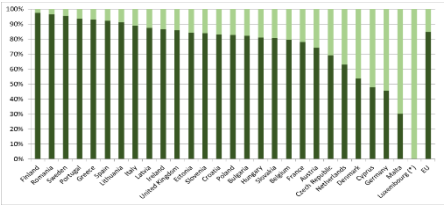
T 3 Focus on specific urban challenges

Tiers

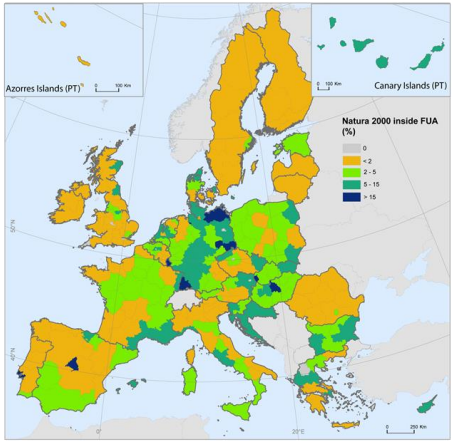
EU wide assessment focus:

- **Analysis of** - **Urban ecosystems Condition (UEC)** (updated MAES framework) and of **- relevant Urban Ecosystem Services (UES) in Europe**
  - **Specific interest :**
  - **1) is there a relationship between the landscape metric and UES provision and UEC?**
  - **2) how EU cities can support biodiversity (focus on urban N2000 sites)**

15 % N2000 network
Falls inside the FUA (L)



- **Scale**:
  - **Spatial extent** 700 European Functional Urban Areas
  - **Spatial resolution**: from 25 ~m up to 10km
  - **Attribute accuracy**: general
  - **Completeness**: general
- **Type of indicators**: TIER 1 and TIER 2



- **Aim and Map users** : Eu-policies support – public awareness
- **Stakeholder engagement** : informed

City –labs assessment, focus:

- Analysis of local **Urban ecosystems Condition** of **- relevant UES -> FUCUS on a relevant challenge**
    - **Specific interest: depend on the city lab.**

- **Scale**:
    - **Spatial extent:** urban or metropolitan
    - **Spatial resolution**: from 2.5 ~m up to 100 m
    - **Attribute accuracy**: high
    - **Completeness**: high

- **Type of indicators**: TIER 2+ and TIER 3

- **Aim and Map users** : local policy support - impact analysis – project evaluation

- **Stakeholder engagement** : consultation – knowledge co-production

The TIER approach and the comparison

TIER	Type of input data	Stakeholders engagement	Cost of the indicator	Type of support	Type of comparison
TIER 3	Local data • High spatial resolution • High attribute accuracy	high	high	Local targeting Local management	**Relative comparison** of a solution (increase or decrease of a performance)
TIER 2	Public available data • High spatial resolution • Medium /Low attribute accuracy	Medium	Medium /high	Regional – National supranational policy support	**Absolute comparison** (Regional – National)
TIER 1	Public available data • Medium /Low spatial resolution • Low attribute accuracy	Low	Medium/low	National supranational policy support	**Absolute comparison** (Continental)

Within The city

Between cities

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EU- wide Ecosystem services

Ecosystem Services	Indicator	Completed by
Flood protection	Under development	2018
Run-off	Under development	
Noise reduction	Under development	
Microclimate regulation	Cooling capacity of urban ecosystems (by land cover)	2017
Pollination	ESTIMAP-pollination Share of areas with high suitability for insect pollinators	
Air Quality regulation	NO2 removed by vegetation in kg/ ha * year	
Coastal protection	ESTIMAP – coastal protection (derived from Liquete et al 2016)	
Recreation	ESTIMAP-recreation Share of areas with high suitability for nature-based recreation activities	

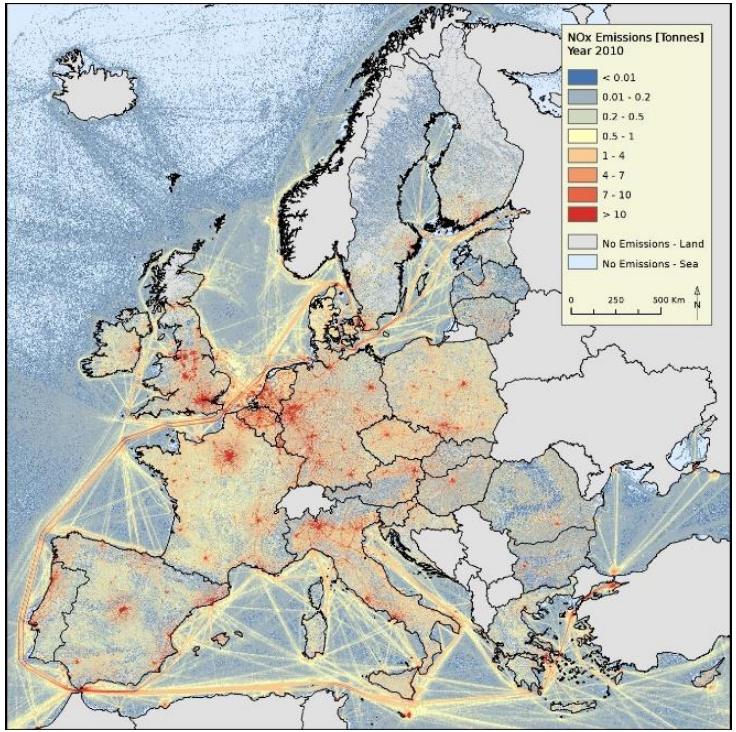
Condition

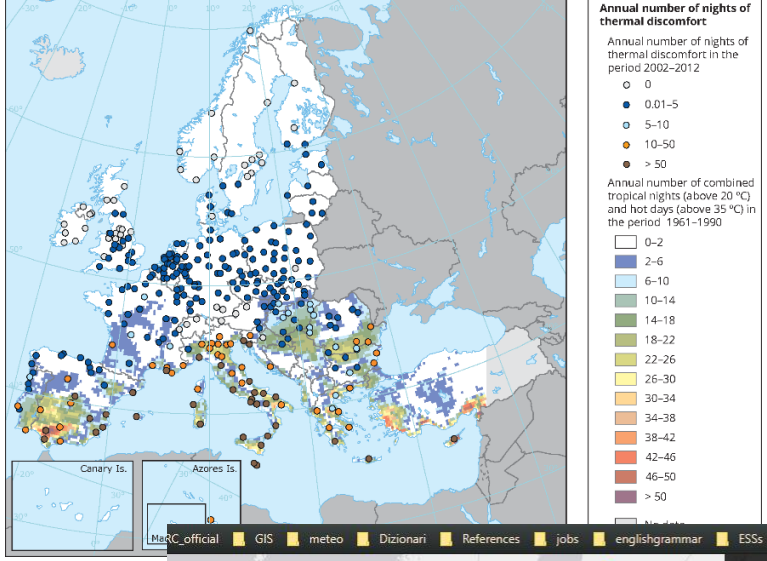
Class	Indicator	Data source
Land conversion	Land annually taken for built-up areas per person (m2 person-1)	Copernicus Land Monitoring Service - Population estimates by Urban Atlas polygon http://land.copernicus.eu/local/urban-atlas/ancillary-data-on-population-estimates-by-urban-atlas-polygons/view
Climate change	Thermal discomfort: Annual number of combined tropical nights (above 20 °C) and hot days (above 35 °C)	https://www.eea.europa.eu/data-and-maps/figures/annual-number-of-nights-of
Pollution and nutrient enrichment	Emissions (kg year-1) or concentration of NO2, PM10, PM2.5, O3 (µg m-3)	JRC07 (Air and Climate Unit, JRC) NOx, SO2, VOC, PM10, PM2.5 and NH3
	Number of annual occurrences of traffic noise at levels exceeding 55 db(A) during the day and 50 db(A) during the nights (possibly broken down over the source of noise)	http://noise.eea.europa.eu/ https://www.eea.europa.eu/data-and-maps/data/data-on-noise-exposure-2
Introductions of invasive alien species		JRC EASIN https://easin.jrc.ec.europa.eu/
Environmental quality	Urban temperature (°C)	
	Noise levels (dB(A))	
	Percentage of population exposed to road noise within urban areas above 55 dB during the day	
	Percentage of population exposed to road noise	

Condition

Class	Indicator	Data source
Environmental quality	Bathing water quality	EEA
	Number of inhabitants per area (number ha-1)	http://land.copernicus.eu/local JRC European Settlements Map (http://publications.jrc.ec.europa.eu/repository/handle/JRC105679) Population estimates by Urban Atlas polygon https://publications.europa.eu/en/publication-detail/-/publication/8568b1b3-b864-11e6-9e3c-01aa75ed71a1/language-en/format-PDF/source-45255517
	Artificial area per inhabitant (m2 person-1)	
	Percent of built-up area (%)	
	Imperviousness (%)	
	Soil sealing (% area)	
Structural ecosystem attributes	Proportion of urban green space (%)	JRC European Settlements Map EEA – Urban Atlas Methods from **Guido's Tool box** **JRC** http://forest.jrc.ec.europa.eu/download/software/guidos/
	Proportion of natural area (%)	
	Proportion of agricultural area (%)	
	Fragmentation of GI (Mesh density per pixel)	
	Fragmentation by artificial areas (Mesh density per pixel)	

Example of data



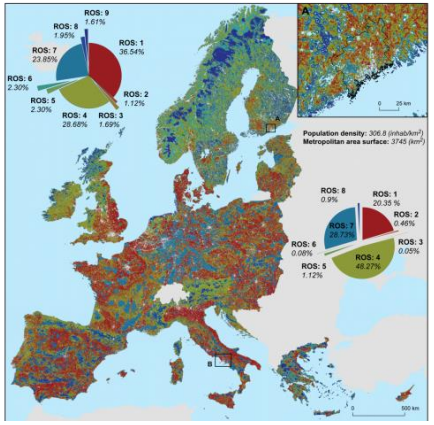


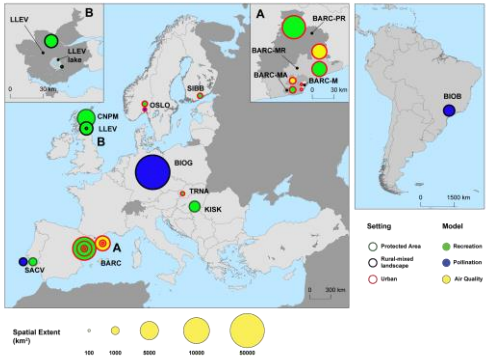
TIER2 Ecosystem service mapping : Urban version of ESTIMAP-recreation

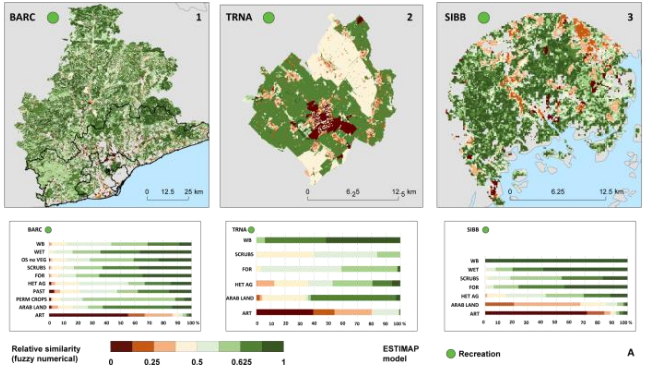
Cultural ES -> cover ~5 Over 10 urban challenges

ESTIMAP recreation model: maps the capacity of **ecosystems** to provide nature-based outdoor recreational opportunities

The EU model doesn't fit the Urban dimension.







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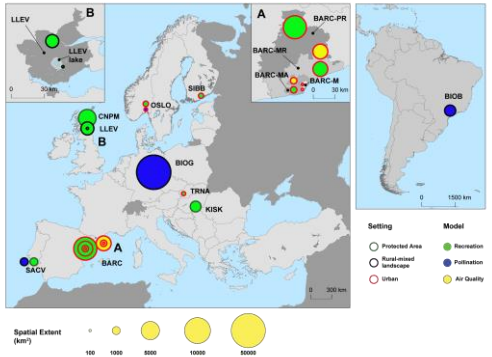
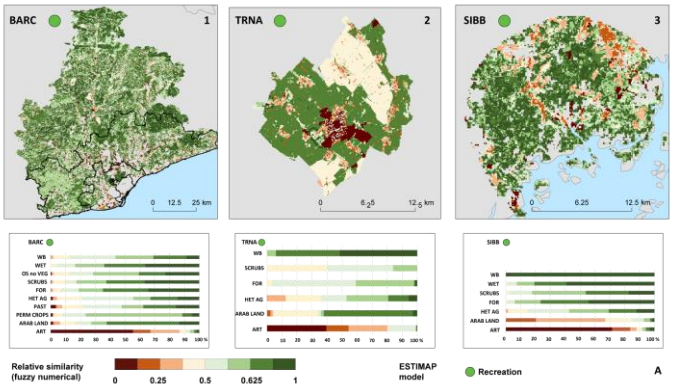
TIER2 Ecosystem service mapping : Urban version of ESTIMAP-recreation

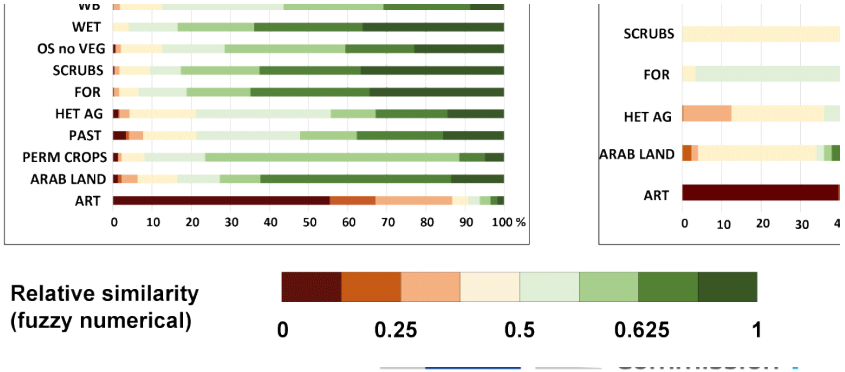


ESTIMAP r tested in 8 case studies in OPENNES + 2 cities in EnRoute + 2 cities in a paralel project

Comparison between the local adaptation of ESTIMAP r and the EU model

The EU model doen't fit the Urban dimension.





TIER2 Ecosystem service mapping : Urban version of ESTIMAP-recreation

Recreation potential

component	inputs
Land	Urban Atlas
	European Settlement Map (code 40 - 45)
Water	Urban Atlas ('code_2012 50000)
	Stream riparian areas temporal reference 2010 -2014 (http://land.copernicus.eu/local/riparian-zones/riparian-zones-delineation/view)
	Bathing water quality temporal reference 2014
	OpenStreetMap-tags: natural –water related
Urban Green Infrastructure	Natura 2000 sites (2016) integrated with WDPA for regional protected areas
	OpenStreetMap-tags: natural –inland related tags: point of interest (viewpoint)
	Urban Atlas ('code_2012 14100)

Recreation opportunity spectrum

component	inputs
Features to reach	Teleatlas (local roads)
	OpenStreetMap-tags: roads Paths – bridleways –cycle ways
	Blue flags
Features to enjoy	OpenStreetMap-tags: leisure, tourism, amenity (e.g. playground, dog park, picnic site…)

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TRENTO

- How do **urban parks and natural areas surrounding the city** contribute to recreation potential?
- Are urban and extra-urban recreational opportunities **equally distributed** among the population?

Recreation Potential (RP)

- Inputs:
  - Land use;
  - Natural features: monumental trees, sites of geological and geomorphological interest, mountain peaks and passes, viewpoints, cascades, springs, river areas with high landscape value, …;
  - Urban green areas.

TRENTO

The exploitation of recreation potential depends on facilities:

Recreation Opportunities spectrum (ROS)

- Inputs:
  - RP;
  - "***facilities to reach***": road network, local cycle paths, bus stops, parking areas;
  - "***facilities to enjoy***": alpine huts, mountain tracks, MTB trails, climbing routes, long-distance cycle paths, picnic areas, facilities inside urban green areas.

- **Facilities to reach opportunities**




- **Facilities to enjoy**




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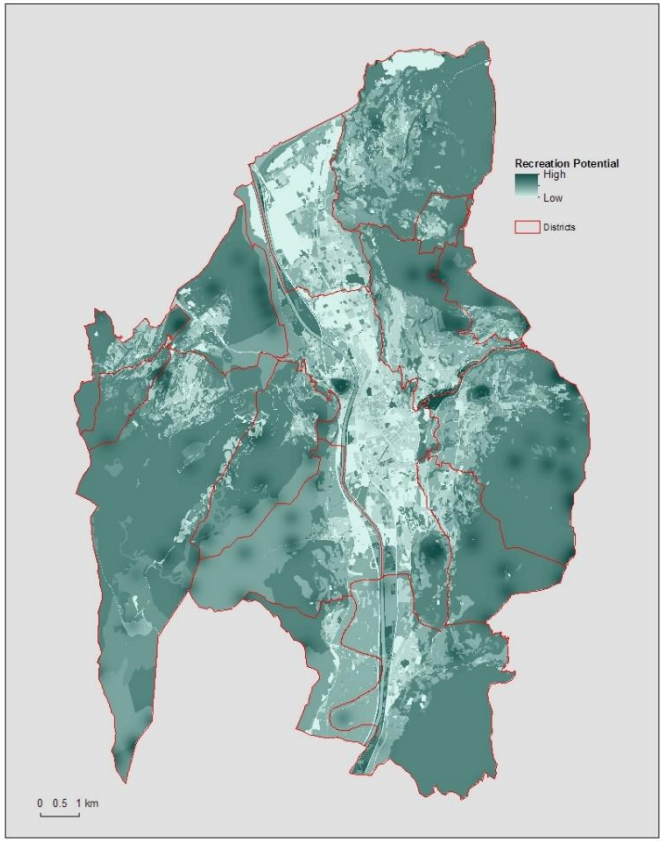
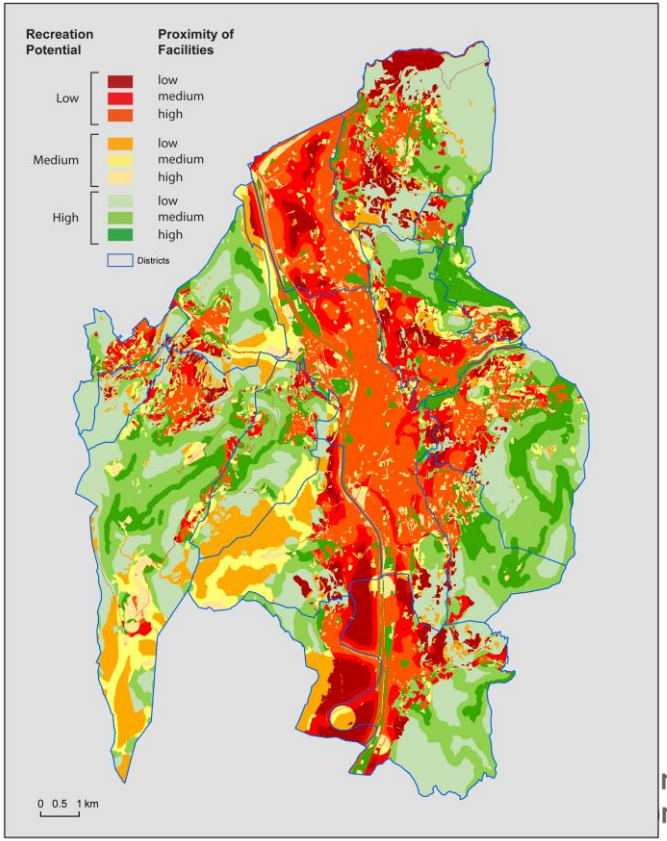
Recreation Maps





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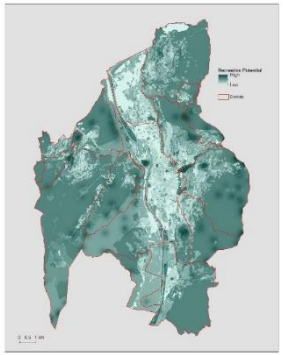
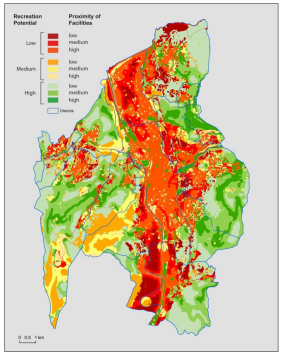
Local version

EU urban version





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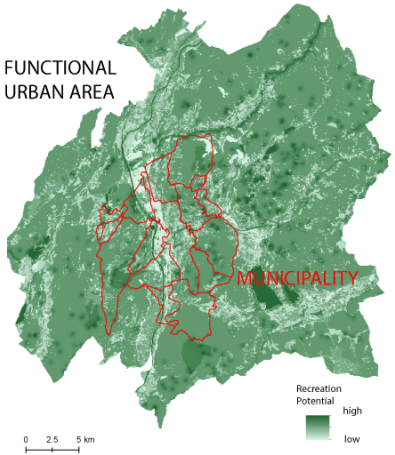
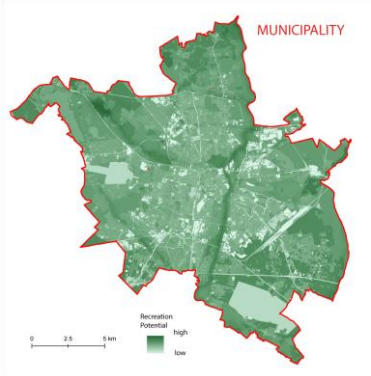
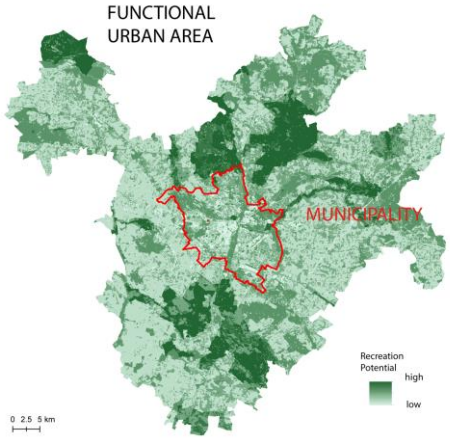




Poznan



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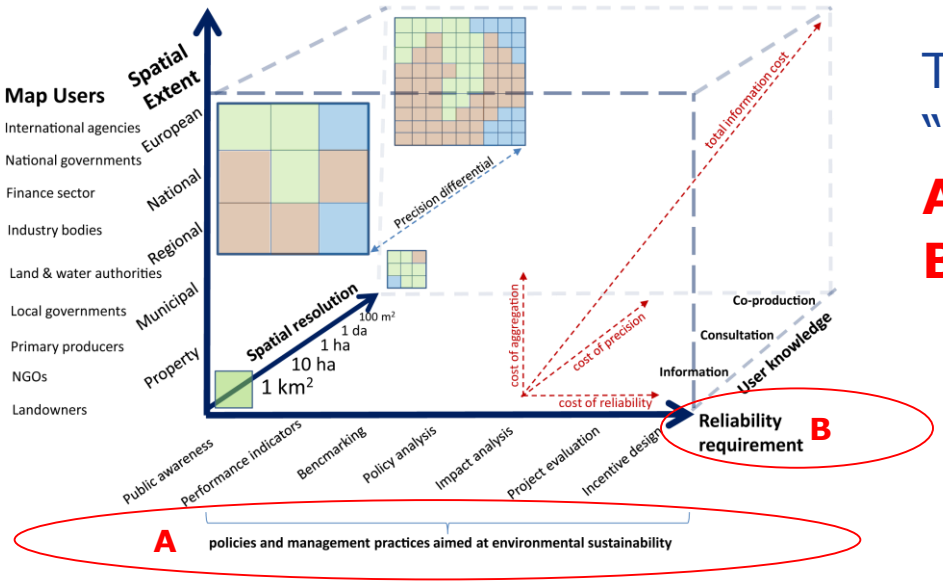
The cross-scale assessment



Type of indicator and "scale" depends on:

A Final use/users

B Reliability requirements

The "*scale*"

- **Spatial extent**
- **Spatial precision**
- **Attribute accuracy**
- **Completeness**

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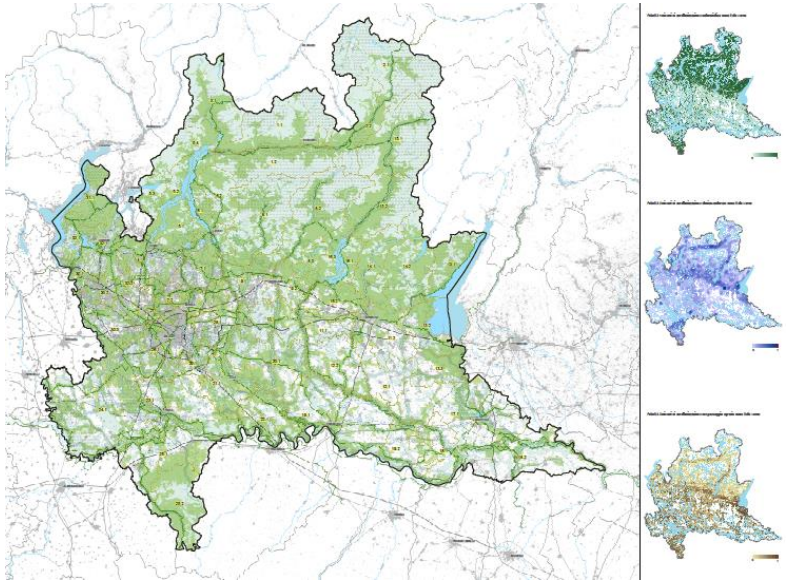
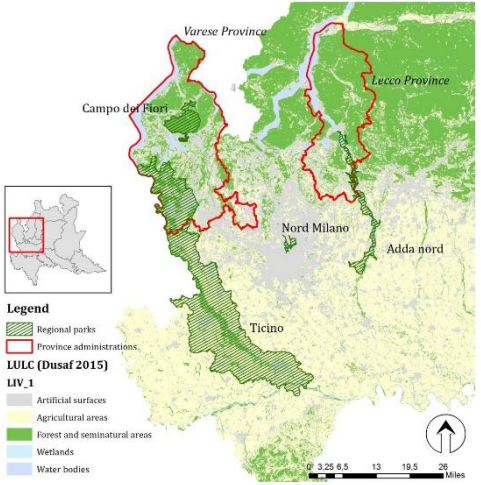
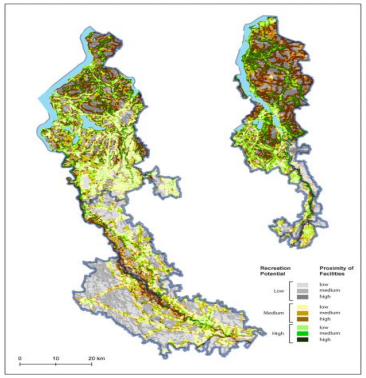
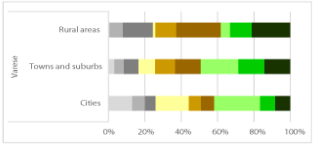
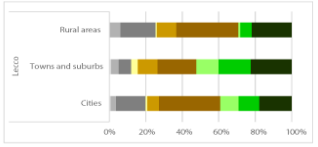
Example of cross –scale assessment











Regional Green Infrastructure plan (Region Lombardia, Italy)

POLITECNICO MILANO 1863

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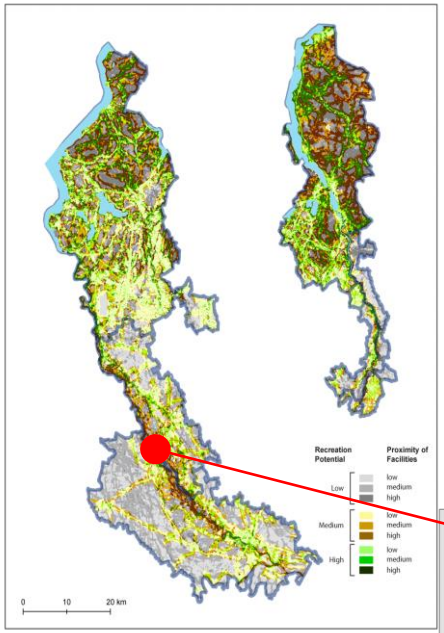
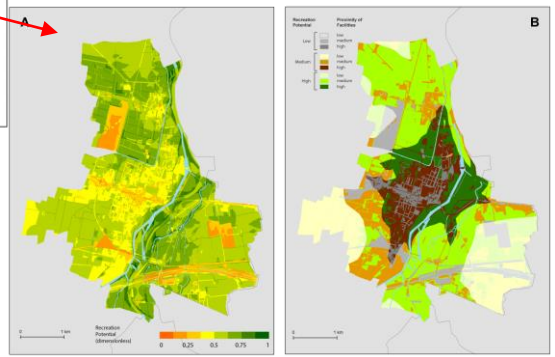
Example of cross scale assessment



Indicator: Recreation opportunity Spectrum
Spatial Extent: Regional
Type of policy support: Regional Policy on Green infrastructure

Indicator: Recreation opportunity Spectrum
Spatial Extent: Municipal
Type of policy support: Local planning for the renewal of 20 Transformation areas



Transformation area	Recreation potential (average)		direction of change
	actual	scenario	
PdR_1	0.50	0.49	-
PdR_7	0.55	0.48	-
TS3	0.35	0.47	+

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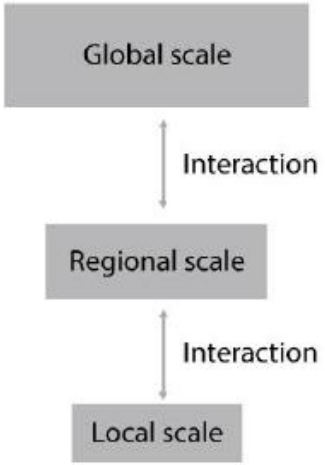
Example of cross scale assessment

Methodological framework

Cross Scale Assessment



Regional Landscape Plan

1

Provincial territorial plan

Protected areas management planning

2

For the implementation of the Regional Green Infrastructure

the proposal needs the confirmation from different actors

Local urban Plan

3

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