

How to inform urban greening plans

Grazia Zulian, Federica Marando
DG-JRC D3 Land Resources Unit

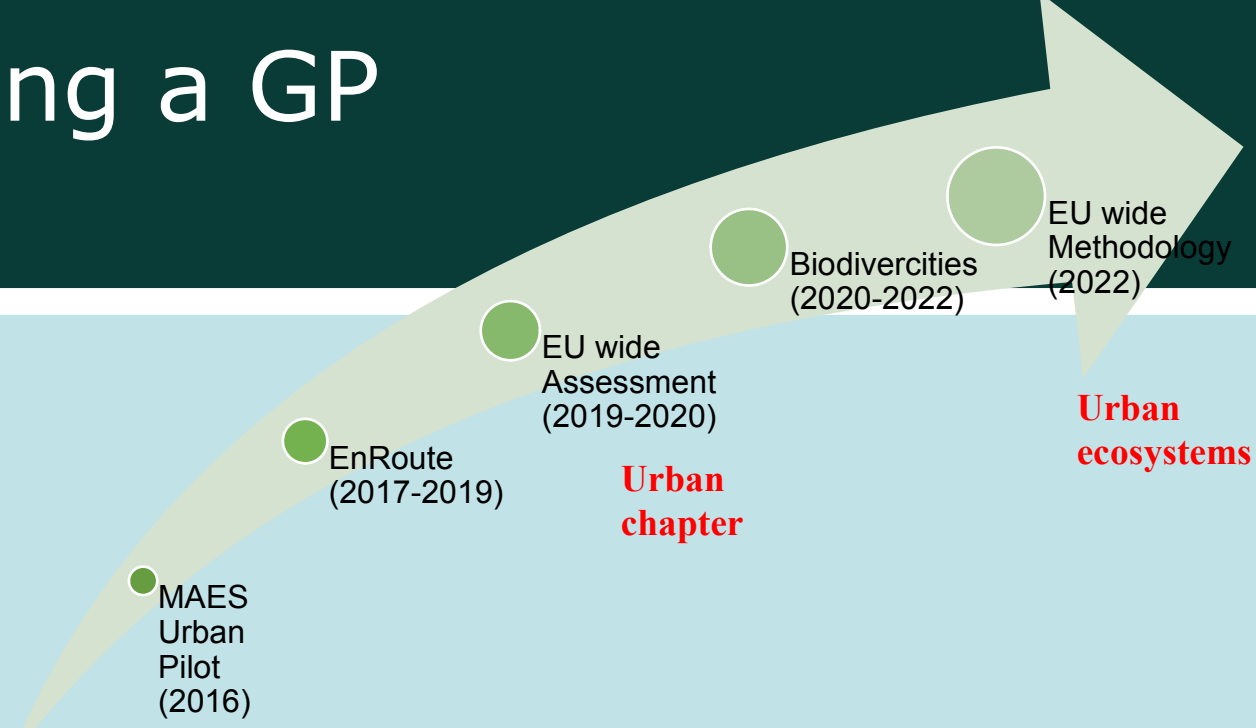
“Gearing up towards Urban Greening Plans” workshop

20/09/2022

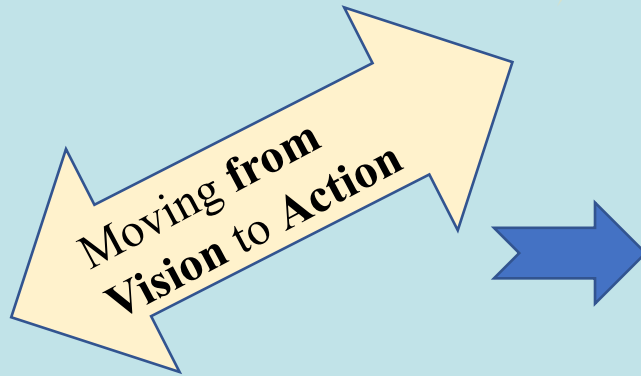
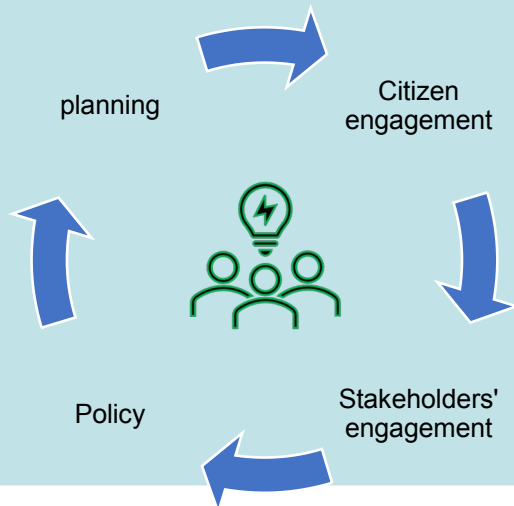
Informing and monitoring a GP



Provide an overall picture



Set Targets (minimum = Urban Targets in the Proposal for a NRL)



Tailored analysis



Monitor the achievement of targets

Urban green

Urban trees

...

A Proposal for the Nature Restoration Law: The urban targets : 22-06-2022



- No net loss by **2030** of:
 - Urban green
 - Urban trees

- Increase in the national area of urban green
 - 3 % by 2040
 - + 2 % by 2050 (to reach 5%)

- Increase in all cities-towns and suburbs
 - 10% Tree canopy cover By 2050

- Net gain in urban green spaces
 - Integrated in new and existing buildings and infrastructures

Examples of context analysis (1) => EnROUTE City Labs

11 city labs in 2017-2019
Selected 6 challenges

EnRoute

View Members

EnRoute stands for Enhancing Resilient infrastructure. EnRoute is a project of the EU Biodiversity Strategy and the G provides scientific knowledge of how to at different stages of policy and for making for sustainable cities. It aims to infrastructure at local level and deliver: governance of urban green infrastruc collaboration between and across diffe infrastructure policy setting.

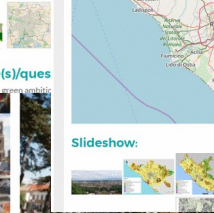
Case studies



Leipzig



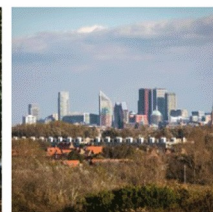
City of Utrecht: growing with green ambitions



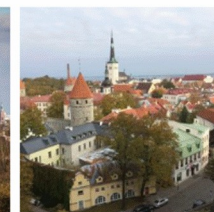
Growing cities with sufficient green space for everyone - Karlovo City-Lab



An assessment of green infrastructure and ecosystem services in the Valletta urban area: a case-study for sustainable urban



The Hague: peacefully green



Climate-proof cities: City of Tallinn, Estonia

Case studies - Case study finder

Leipzig

Keywords:
 Double inner development
 Green and blue infrastructure
 Green Master Plan
 Mapping

Enroute themes:
 Growing with green ambitions

Case studies - Case study finder

Greening Rome for human and ecosystem health

Keywords:
 Air quality and local (noise) regulation
 Between Biodiversity and ES (ecosystem)
 Citizens' involvement about the importance of ES
 Human health and well-being
 Multiscale and sustainable G planning
 Natural and Cultural Capital
 Synergies between Natural and Cultural Capitals
 Urban biodiversity

Enroute themes:
 BiodiverCities

Organisations:
 Fausto Mares, Carlo Biasi, Paolo Audino, Guido Casaroli, Federica Marandisi, Alessandro Sebastiani, Elisabetta Salvatori, Luca Fiaschi, Laura Zavertero, Riccardo Cozzi, Eva Del Vico

Publications and reports:
 Anzalone B, Iberini M, Lattanzi E. 2010. La Flora vascolare del Lazio. Informazione Botanica Italiana 42:387-317
 Biasi, C., Zavertero, L., Marignani, M., Serraglia, D., Cozzi, R., Rosati, L., Del Vico, E., 2008. The concept of land-ecological network and its design using a land unit approach. Plant Biosystems 142: 540-549
 Casaroli G, Del Vico E, Anzellotti L, Celesti-Grospou L, 2017. Combining the conservation of biodiversity with the provision of

Case studies - Case study finder

Climate-proof cities: City of Tallinn, Estonia

Keywords:
 Climate-proof cities
 BiodiverCities
 Sustainable strategic urban planning

Enroute themes:
 Climate-proof cities

Organisations:
 The activities listed were implemented in the cooperation between the City of Tallinn, the Environmental Department of Tallinn City and the Ministry for the Environment of the Republic of Estonia. The City of Tallinn provided the city spatial information, whereas the Department of the City Planning, the Ministry of the Environment and the Department of the Environment and Urban Planning of the Ministry of the Environment provided the methodology and conducted the work. Dr. Kaja Piironen compiled the report.

Publications and reports:
 Anzellotti L, Cozzi R, Casaroli G, Celesti-Grospou L 2014. Relations between citizens' willingness and the availability of green spaces in the city of Tallinn. Urban Ecosystems and Urban Forestry and Urban Greening 13: 534-542
 Brown, G.B. 2002. Ecological Challenges: Greening Metropolitan Centers.
 Carrington, C., Goodwin, D. 2016. Sustainable development indicators (SDG) trends and what is still needed for better urban land use.
 Cullen, S. 2005. Trees and Land: A Practical Assessment of the Role of Trees in the Urban Environment.
 Dierkes, D.D., Dierkes, A. 2017. The role of trees in the urban environment as an urban infrastructure: a case study of the urban environment in the city of Tallinn.
 Quality of Life Survey (QoL) 2012-2015. Urban Forestry and Urban Greening 23: 54-60

Growing with green ambitions

Growing cities with sufficient green space for everyone

Leipzig, Utrecht, Karlovo

BiodiverCities

A focus on maintaining urban trees and biodiversity; embedding the city in a regional ecological network, and urban bee keeping

Lisbon, Limassol, Oslo, Helsinki-Espoo-Vantaa, Padova, Rome

Improving the quality of life

Community based approaches for investing in natural capital and urban green space for recreation

Manchester, Poznan, Trento

Green cities, healthy cities

Different examples of proper planning of how urban green space delivers benefits for physical and mental health.

The Hague, Rome

Sustainable strategic urban planning

Development of multi-functional urban green and blue infrastructure and integration in regional planning.

Antwerp, Valletta, Dublin, Trento

Climate-proof cities

Urban nature to support climate transition

Glasgow, Tallinn, Utrecht

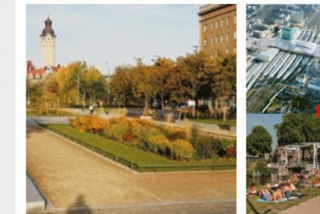
https://oppla.eu/enroute

EnRoute

View Members

EnRoute stands for Enhancing Resilient Infrastructure. EnRoute is a project of the EU Biodiversity Strategy and the G provides scientific knowledge of how u at different stages of policy and for var making for sustainable cities. It aims to infrastructure at local level and deliver governance of urban green infrastru collaboration between and across diffe infrastructure policy setting.

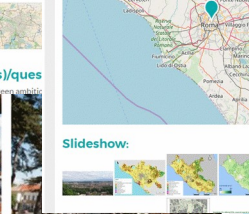
Case studies



Leipzig



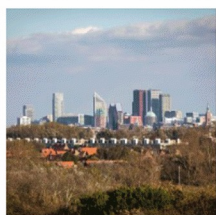
City of Utrecht: growing with green ambitions



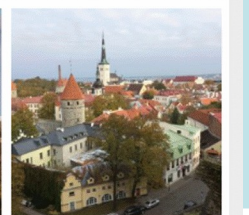
Growing cities with sufficient green space for everyone - Karlovo City-Lab



An assessment of green infrastructure and ecosystem services in the Valletta urban area: a case-study for sustainable urban planning



The Hague: peacefully green



Climate-proof cities: City of Tallinn, Estonia

Case studies - Case study finder

Leipzig

Keywords: Urban green development, Green and blue infrastructure, Green Master Plan, Planning

Enroute themes: Growing with green ambitions

Case studies - Case study finder

Greening Rome for human and ecosystem health

Keywords: Active involvement of citizens, Air quality and local climate regulation, Urban biodiversity and ES capacity, Citizens' awareness about the

Enroute themes: Improving the quality of life

Case studies - Case study finder

Poznan: Mapping and assessing ecosystem services to support decision making towards enhancing green infrastructure and recreation facilities that contribute to the quality of life in the city

Enroute themes: Improving the quality of life

Case studies - Case study finder

Climate-proof cities: City of Tallinn, Estonia

Keywords: Access to public green areas, Land-use cover, Climate change, Surface permeability

Enroute themes: Climate proof cities

Organisations: The current study was implemented in the cooperation with the Tallinn City and Dr Maria Väin from the Institute of Ecology at Tallinn University. Mr Laasi provided the city spatial information, whereas Dr Väin implemented the GIS mapping. Mr Meelis Uusital and Dr Kaja Peterson provided the methodology and conclusions of the work. Dr Kaja Peterson compiled the report.

Publications and reports: Bowen, G.B. 2002. Ecological Climatology: Concepts and applications. Cambridge University Press, Cambridge UK. Cortinovis, C., Geneletti, D. 2018. Ecosystem services in urban plans: What is there, and what is still needed for better decisions. Land Use Policy, 70, 298-312. Collin, S. 2005. Trees and wind: A practical consideration of the drag coefficient velocity exponent for urban tree risk management. Journal of Arboriculture, 33(2), 101-113. Dnestrova, D.D., Dzhambova, A. 2017. Perceived access to recreational green areas as an effect modifier of the relationship between health and neighbourhood residential quality: Results from the 3rd European Quality of Life Survey (EQLS, 2011-2012). Urban Forestry and Urban Greening, 23, 54-60.

Land 2018, 7(4), 112; doi:10.3390/land7040112

Article

Assessing Nature-Based Recreation to Support Urban Green Infrastructure Planning in Trento (Italy)

Chiara Cortinovis¹, Grazia Zulian² and Davide Geneletti¹

1 Department of Civil, Environmental and Mechanical Engineering, University of Trento, 38123 Trento, Italy

2 European Commission—Joint Research Centre, 21027 Ispra, Italy

* Author to whom correspondence should be addressed.

Received: 31 July 2018 / Accepted: 21 September 2018 / Published: 27 September 2018

Abstract: Nature-based recreation is among the most relevant ecosystem services supplied by urban green infrastructure, affecting citizens' physical and mental wellbeing. Providing adequate green spaces for nature-based recreation is among the main goals of urban planning, but commonly-used indicators offer a partial view on the issue. Innovative methods and approaches, such as the ESTIMAP-recreation model, appear as promising ways to increase the quality of information available for decision-makers by considering both the range of green spaces that provide the service and the locally-specific demand. The article presents an application of the ESTIMAP-recreation model to the city of Trento (Italy), aimed at testing its adaptation to the local context and the potential improvements brought to urban planning. The comparison of the results with traditional indicators based on the availability and accessibility to urban parks shows significant differences in terms of priority of intervention across the city, with implications on planning decisions. The application demonstrates that

Remote Sensing 2017, 9(8), 791; doi:10.3390/rs9080791

Article

Mapping and Assessment of PM₁₀ and O₃ Removal by Woody Vegetation at Urban and Regional Level

Lina Fusaro¹, Federica Marando¹, Alessandro Sebastiani¹, Giulia Capotorti¹, Carlo Blasi¹, Riccardo Copiz¹, Luca Congedo², Michele Munari², Luiseila Ciancarella³ and Fausto Manes¹

1 Department of Environmental Biology, Sapienza University of Rome, 00185 Rome, Italy

2 ISPRA Italian National Institute for Environmental Protection and Research, 00144 Rome, Italy

3 ENEA—Italian National Agency for New Technologies, Energy and Sustainable Economic Development—Atmospheric Pollution Laboratory, 40129 Bologna, Italy

* Author to whom correspondence should be addressed.

Received: 4 July 2017 / Accepted: 28 July 2017 / Published: 1 August 2017

Abstract: This study is the follow up of the URBAN-MAES pilot implemented in the framework of the EnRoute project. The study aims at mapping and assessing the process of particulate matter (PM₁₀) and tropospheric ozone (O₃) removal by various forest and shrub ecosystems. Different policy levels and environmental contexts were considered, namely the Metropolitan city of Rome and, at a wider level, the Latium region. The approach involves characterization of the main land cover and ecosystems using Sentinel-2 images, enabling a detailed assessment of Ecosystem Service (ES), and monetary valuation based on externality values. The results showed spatial variations in the pattern of PM₁₀ and O₃ removal inside the Municipality and in the more rural Latium hinterland, reflecting the

Papers

Workshops

City Labs reports

oppla

Home - Oppla group - EnRoute

EnRoute conference Evidence-based planning for greener cities: summary report

Minutes of the Biodiver-City conference in Sofia, 24 April 2018

Group membership

LEAVE ENROUTE

Group pages

Partners

Publications and deliverables

Joachim Maas

Grazia Zulian

Davide Geneletti

Julie Raynel

Travis O'Doherty

Iwona Zwierczowska

an Commission

Options for upscaling based on an EU wide assessment of urban green infrastructure



917
Core cities



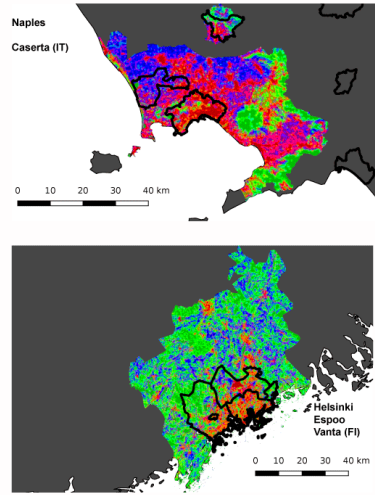
690
Functional Urban
Areas

- **25 indicators**

- Green Infrastructure
- Air quality
- Population
- Soil sealing
- Natura 2000
- Ecosystem services

European maps from spatially explicit results

Land Mosaic

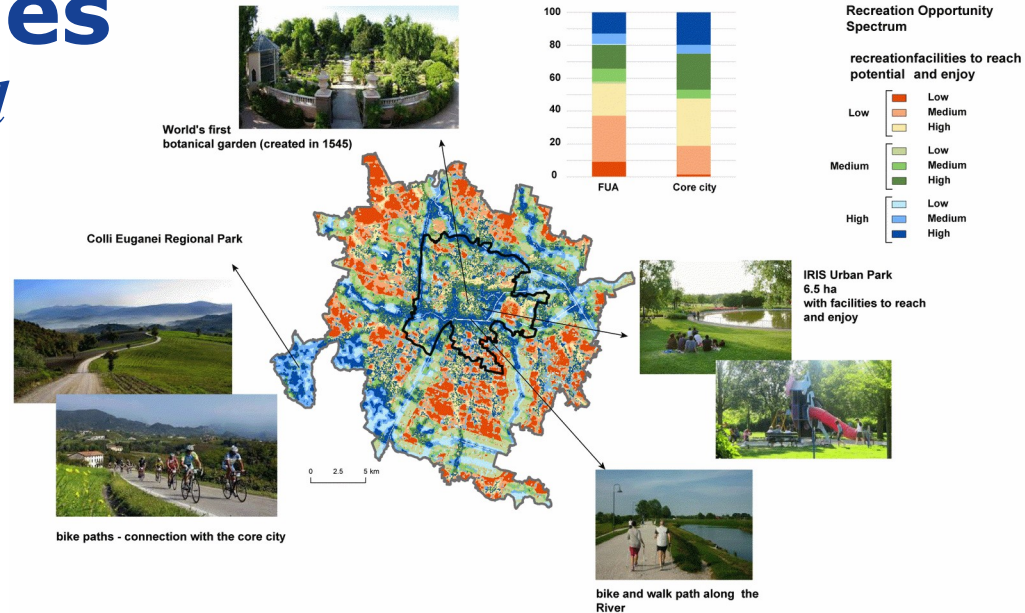
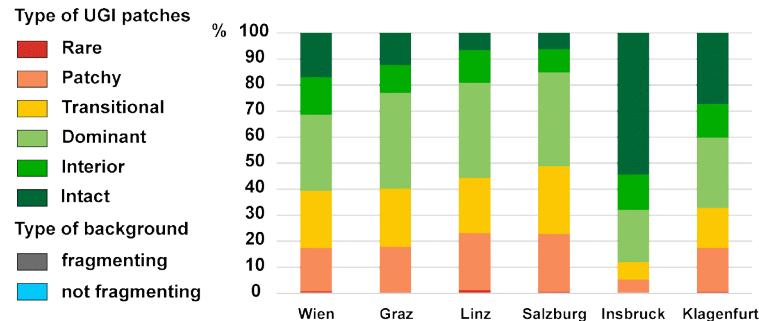
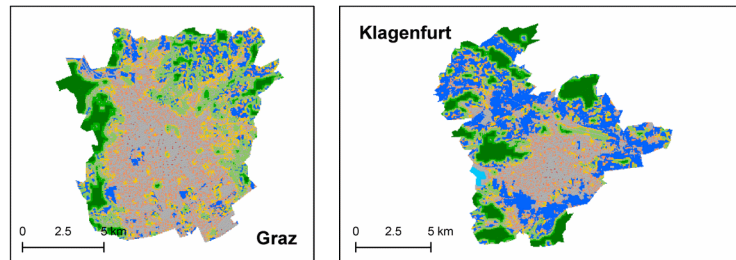


for 690 EU cities

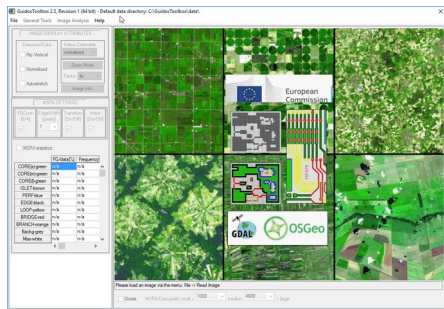
The nature based Recreation map

ESTIMAP modules

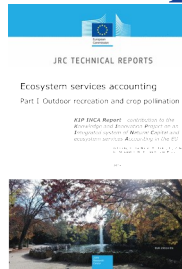
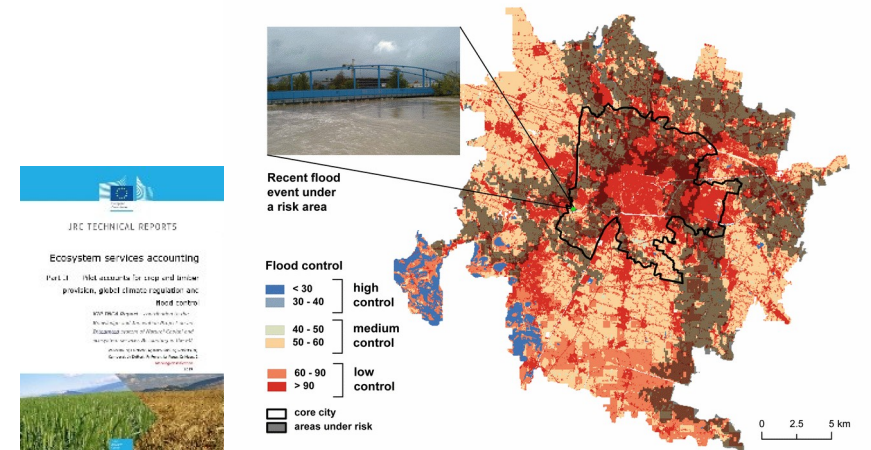
FOS (Fragmentation analysis at a fixed observation scale)



Guido's Tool box



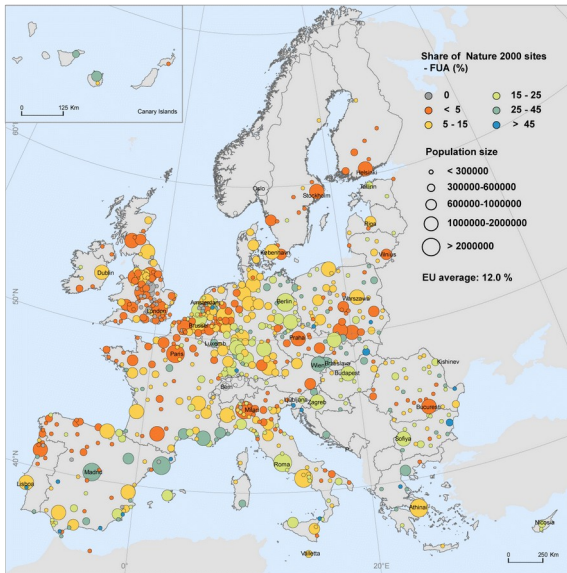
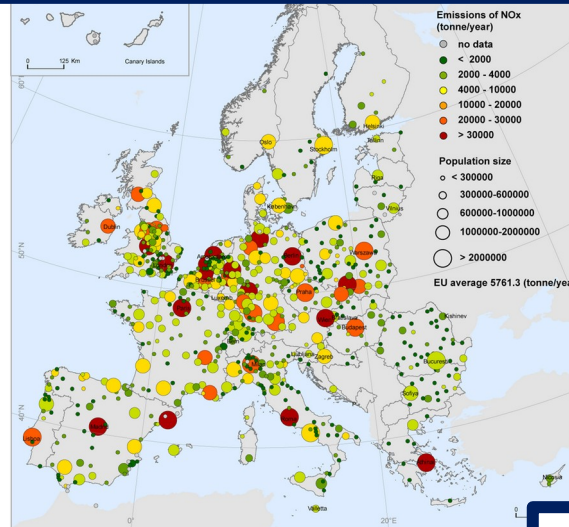
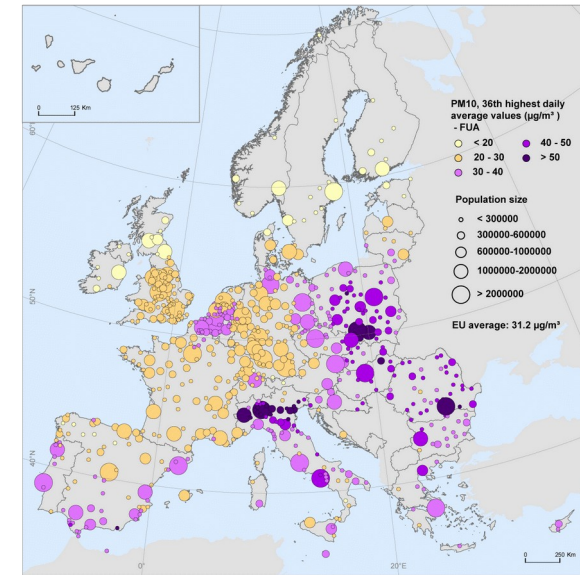
Flood control map



FUA reporting unit: EU average values

Pressures

- **NOx emissions: 5761.3 (tonne/year)**



Examples of outputs

Environmental quality

- **Population density: 549.4 (inhab./km²)**
- **Air Quality:**
 - PM10 concentration Yearly average: **18.06** (µg/m³)
 - PM10 36th highest daily mean PM10 concentration **31.27** (µg/m³)
 - O₃ 26th highest daily maximum 8-hour value in: **111.87** (µg/m³)
 - NO₂ Yearly average: **17.39** (µg/m³)

Structural ecosystem attributes

Natura 2000 in cities:

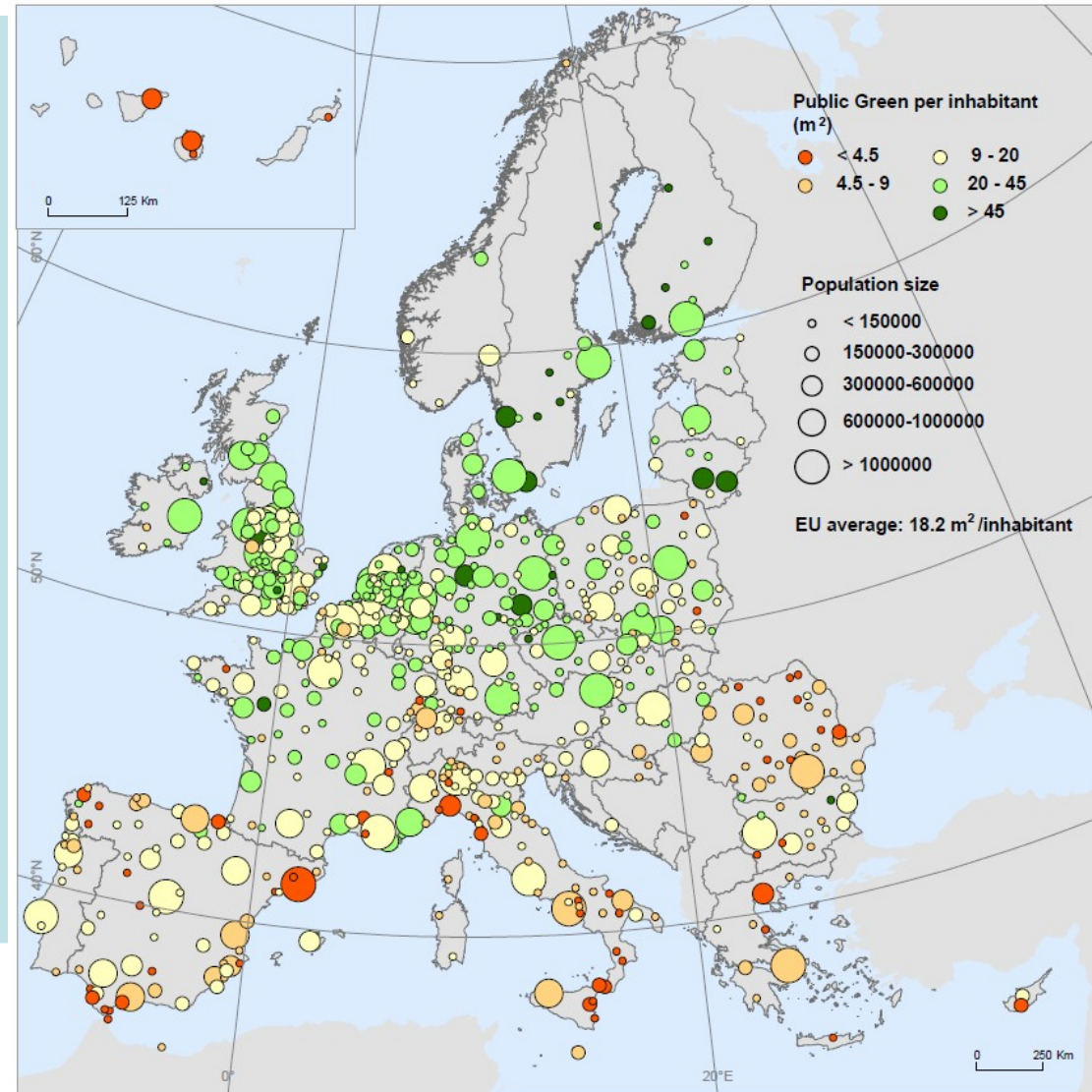
- Share of FUA covered by Natura 2000 sites : **12 %**
- **15.2 % of Natura 2000 sites in Europe is within FUAs**

Cities are probably greener than we think but most urban green space is not publicly accessible.

Average coverage (%) of the surface area of core cities in Europe:

Ⓢ 39.7% urban green and blue space

➔ 2.5% publicly accessible (urban parks): 18 m²/inhabitant



The potential of urban green infrastructure is not fully tapped

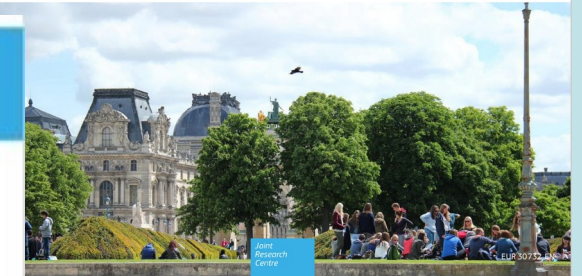
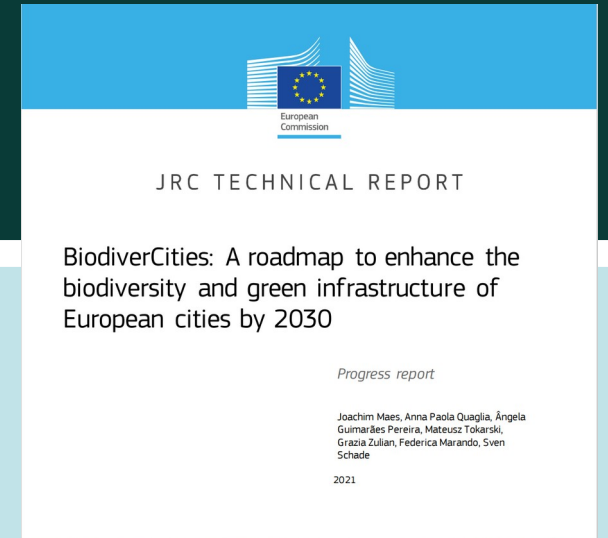
- Measuring is knowing: Urban GI map is a key product for urban planning
- A network of urban GI can help achieve local and regional **biodiversity** goals
- Urban GI: a bridge between scientists, policymakers and **citizens** to make cities sustainable and resilient



City-lab: Rome

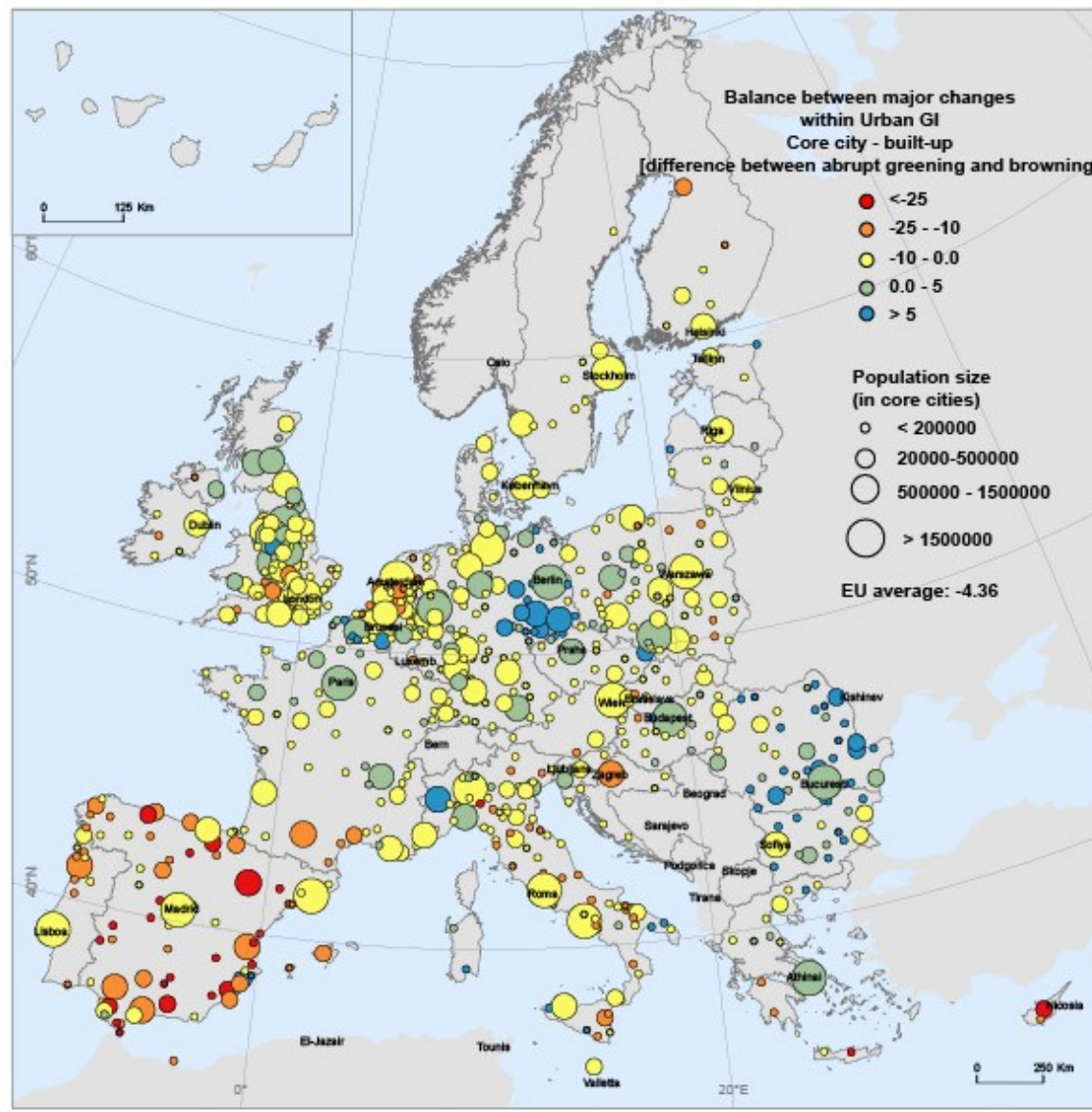
Biodivercities

- Citizen engagement
- What territorial unit to measure and monitor urban ecosystems
- **Monitoring:**
 - **urban green**
 - **ecosystem services**
 - **urban biodiversity**



The “greening-browning balance” indicator

- difference between share of UGI (%) where major upward and downward trends in vegetation cover take place.
 - A negative balance means browning;
 - a positive balance means greening.
- This approach complements traditional metrics, such as the extent of UGI or tree canopy cover, in measuring condition of urban ecosystems and to monitor land take



One Ecosystem 7: e72685
doi: 10.3897/oneco.7.e72685

OPEN ACCESS

Research Article

Green balance in urban areas as an indicator for policy support: a multi-level application

Grazia Zulian[†], Federica Marando[‡], Lorenzo Mentaschi[§], Claudia Alzetta[|], Bettina Wilk[¶], Joachim Maes[#]



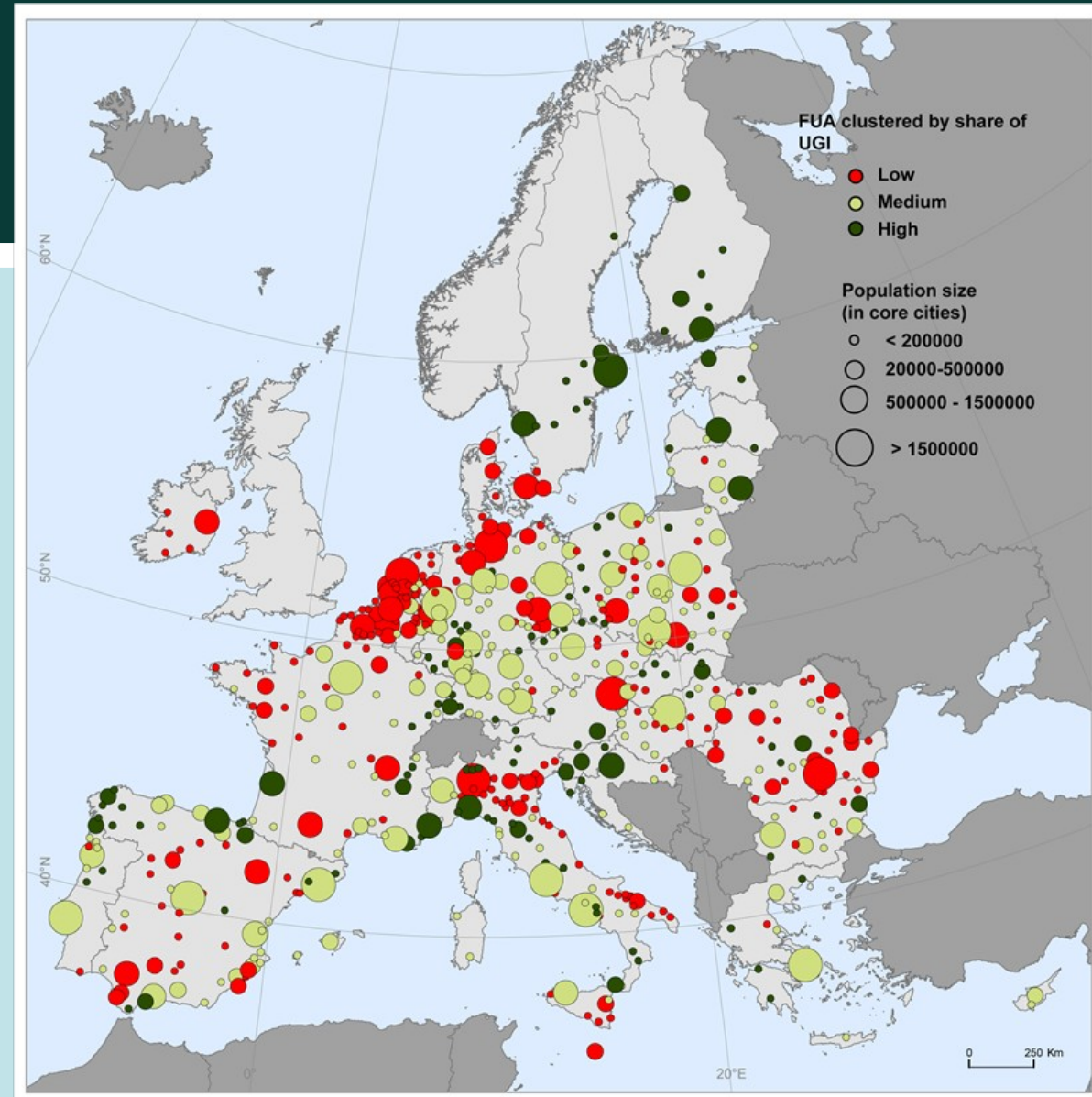
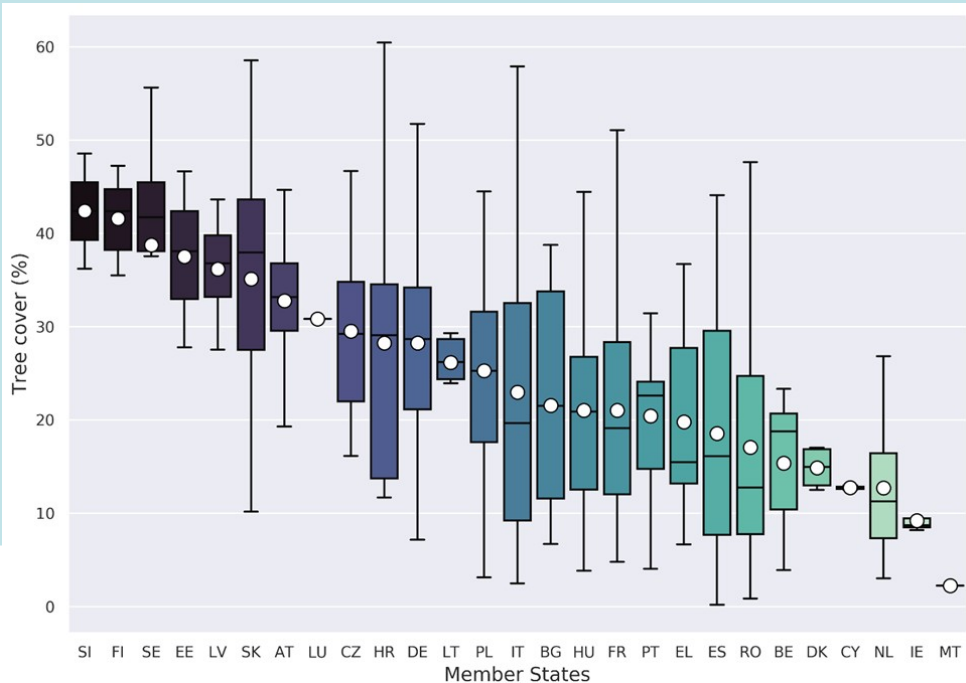
How green are European cities?

Current status:

Green areas: 31 million ha (30% of FUA)

Tree cover: 23 million ha (25% of FUA)

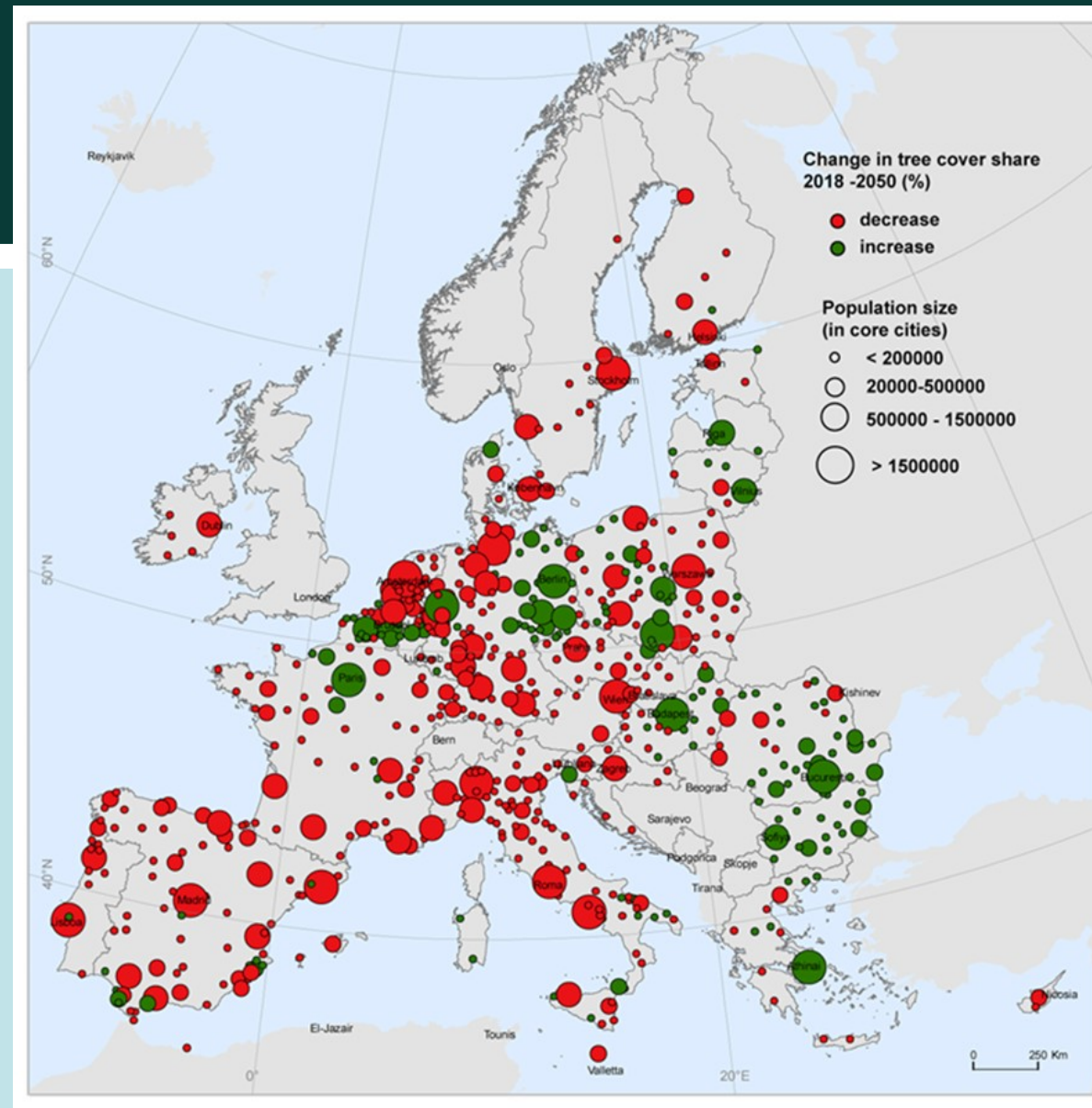
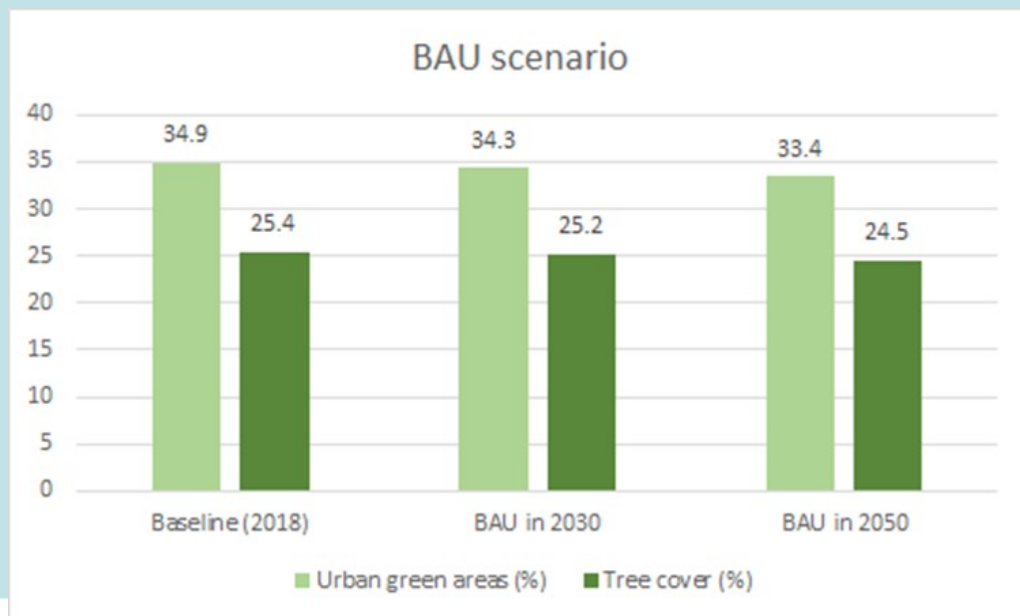
Urban green and trees are not equally distributed among Member States



How green are European cities?

Future scenario based on vegetation cover trends within UGI:

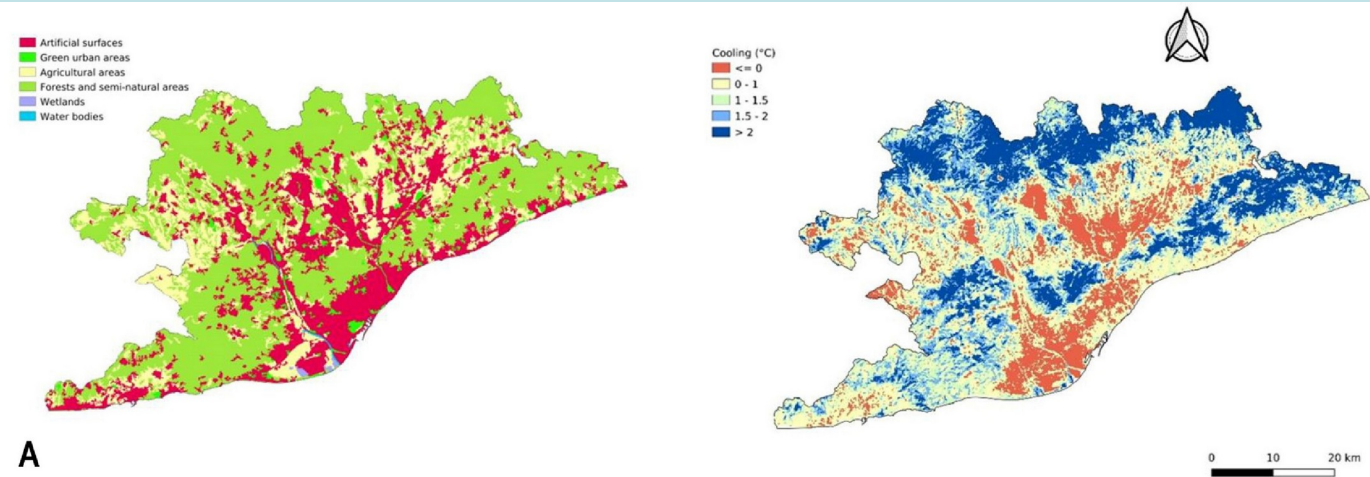
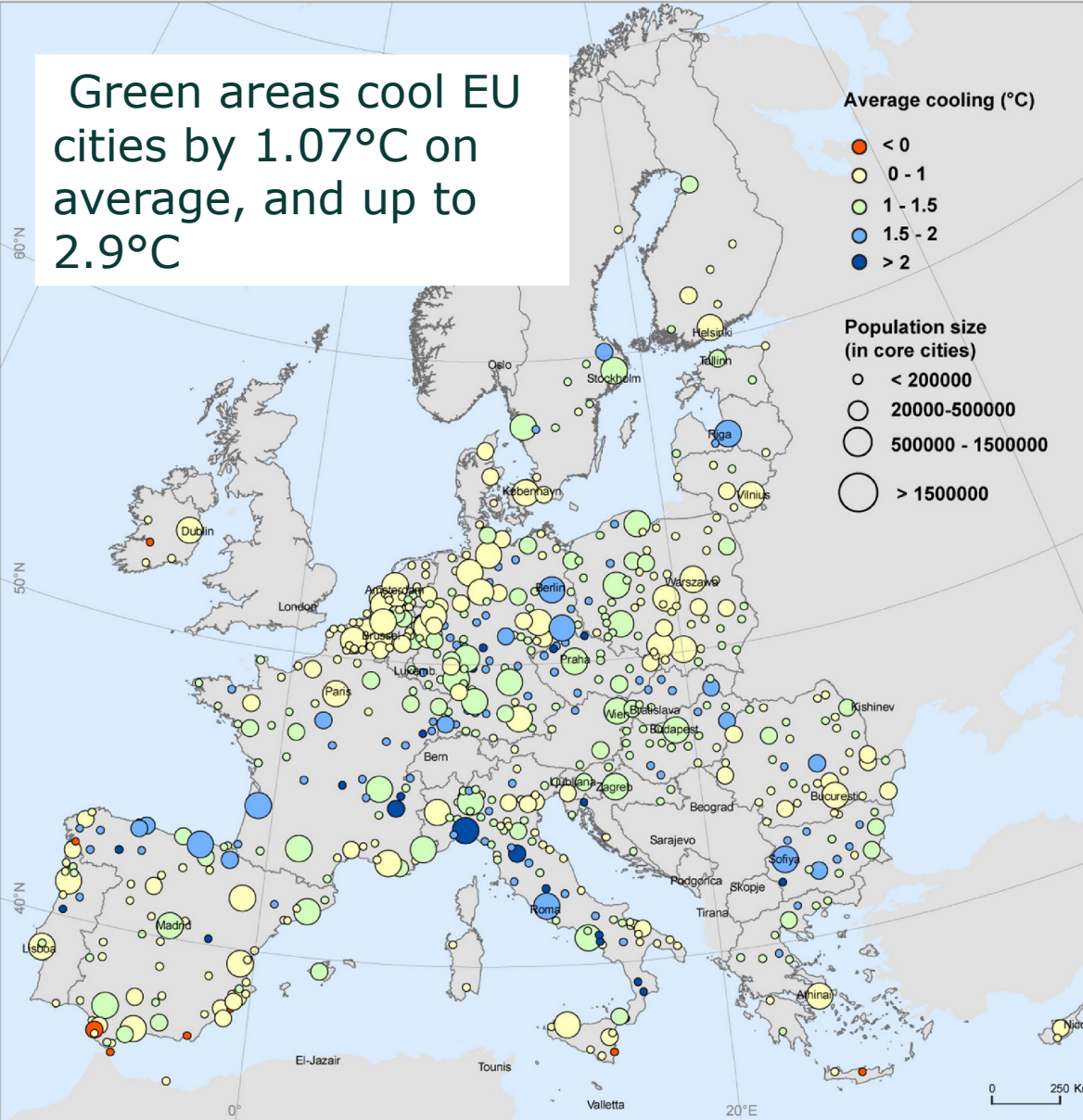
Business As Usual (BAU) scenario (2050): decrease of urban green areas in most Member States



Most FUA present a major downward trend of UGI in time. The loss of green is expected to continue unless specific policy measures are adopted.

Ecosystem services indicators: microclimate regulation

The ecosystem service of microclimate regulation has been assessed in 601 FUA, through a model that simulates the temperature difference between a real-case and a no-vegetation scenario



Benefits: microclimate regulation

Urban heat island mitigation by green infrastructure in European Functional Urban Areas

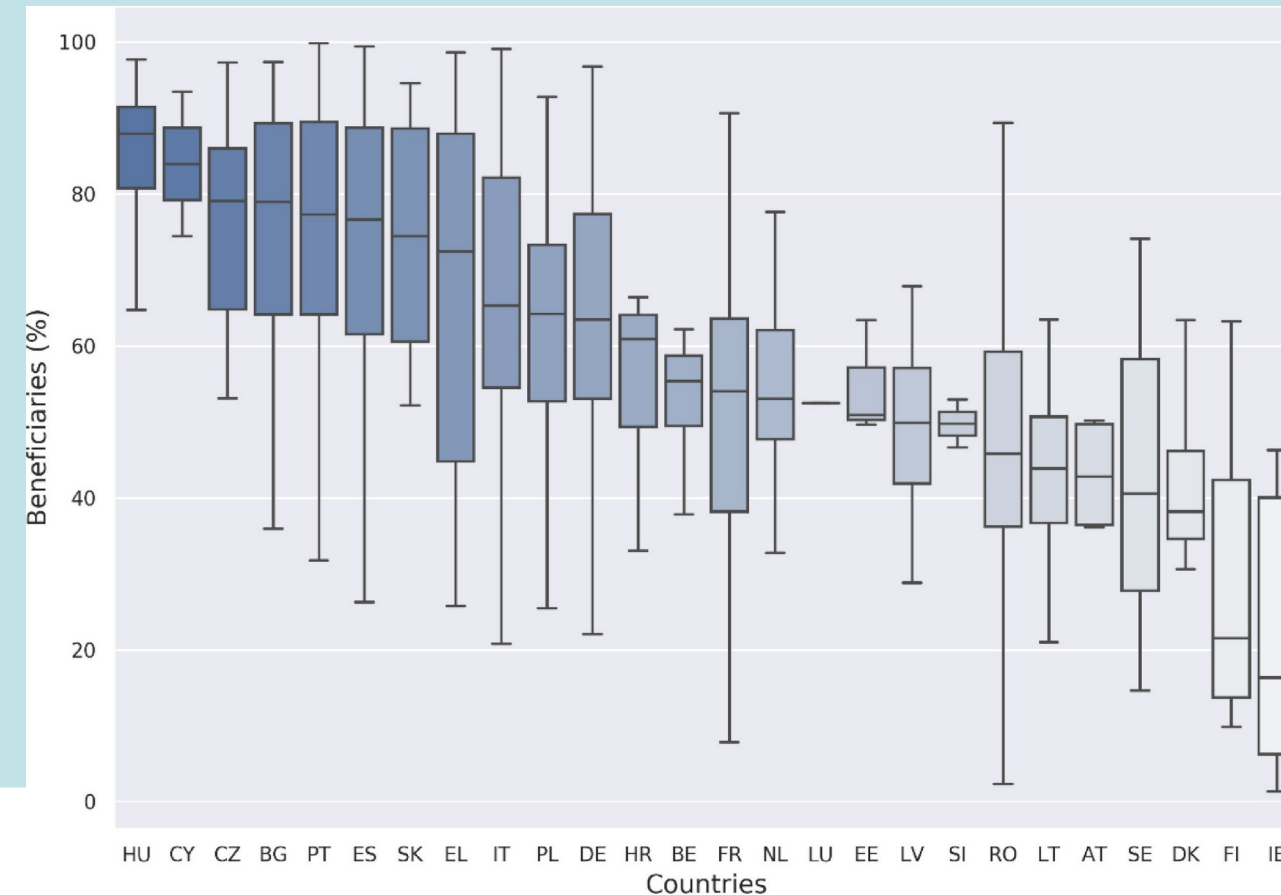
Federica Marando ^{a, *}, Mehdi P. Heris ^b, Grazia Zulian ^{a, *}, Angel Udfas ^{a, *}, Lorenzo Mentaschi ^{c, *}, Nektarios Chrysoulakis ^{d, *}, David Parastatidis ^{d, *}, Joachim Maes ^{a, *}

Around half of EU population in FUA does not benefit from this ecosystem service

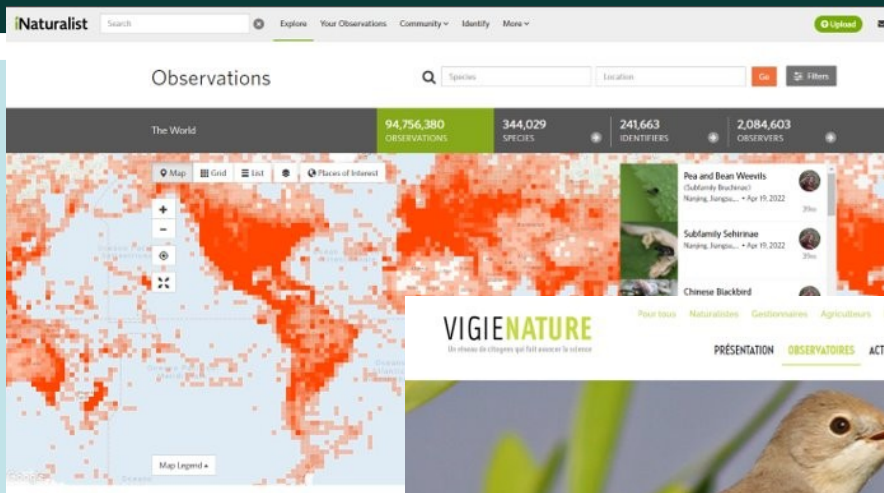
Cooling Index

Degree of cooling (°C)	Tree cover (%)
1	16
2	32
3	48

In order to achieve a 1°C drop in city-wide temperature, a tree cover of at least 16% is required



Benefits: biodiversity support



Sulle ali dei rondoni è un'attività di citizen science per coinvolgere tutti nel censimento delle colonie di rondoni in provincia di Varese.

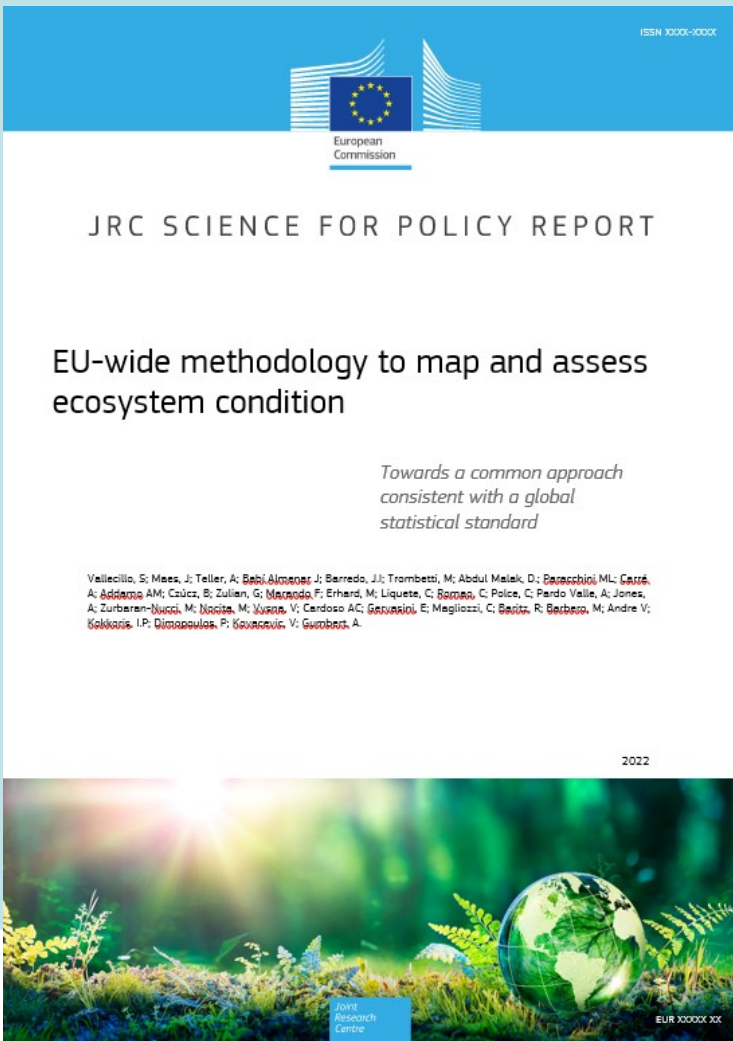


Does urbaneness affect avian populations and communities?

- Out of the 170 species found within FUA, 51 (30%) are classified as **under threat** in the IUCN Red list for France.
- Urban **dense settlements** face biotic homogenization in bird communities
- Urban **green/blue infrastructures** have the potential to reduce biotic homogenization, by supporting richer and more diverse communities, as well as greater abundance of a majority of common bird species
- **Sustainable land use practices** (agriculture and forestry) can help support richer and more diverse bird communities



EU-wide methodology to map and assess ecosystem condition



- The EU Biodiversity Strategy for 2030 calls for a methodology to map, assess and achieve good condition of EU ecosystems.
- The EU-wide methodology uses the System of Environmental Economic Accounting - Ecosystem Accounting (SEEA EA) as the reference framework
- This approach allows leveraging the use of data and indicators available at the EU level. The indicators are fully aligned with the ones proposed under the NRL.
- The case for urban ecosystems is challenging as ecosystem condition rooting concepts do not fully work for anthropogenic ecosystem

EU-funded initiatives

EU Mission: Climate-Neutral and Smart Cities

Objectives:

- Deliver 100 climate-neutral and smart cities by 2030 (FINLAND: Espoo, Helsinki, Lahti, Lappeenranta, Tampere, Turku)
- Ensure that these cities act as experimentation and innovation hubs to enable all European cities to follow suit by 2050

Green City Accord

Cities commit to taking further actions in **5 environmental management areas** to achieve ambitious goals by 2030. The areas are: Air quality, Water, **Nature and Biodiversity**, Waste/Circular Economy, Noise



Conserving and enhancing urban biodiversity, including increasing the extent and quality of green areas in cities and halting the loss of and restoring urban ecosystem

