Ecosystem accounting for urban areas

- challenges and opportunities for municipal land use planning and policy

David N. Barton

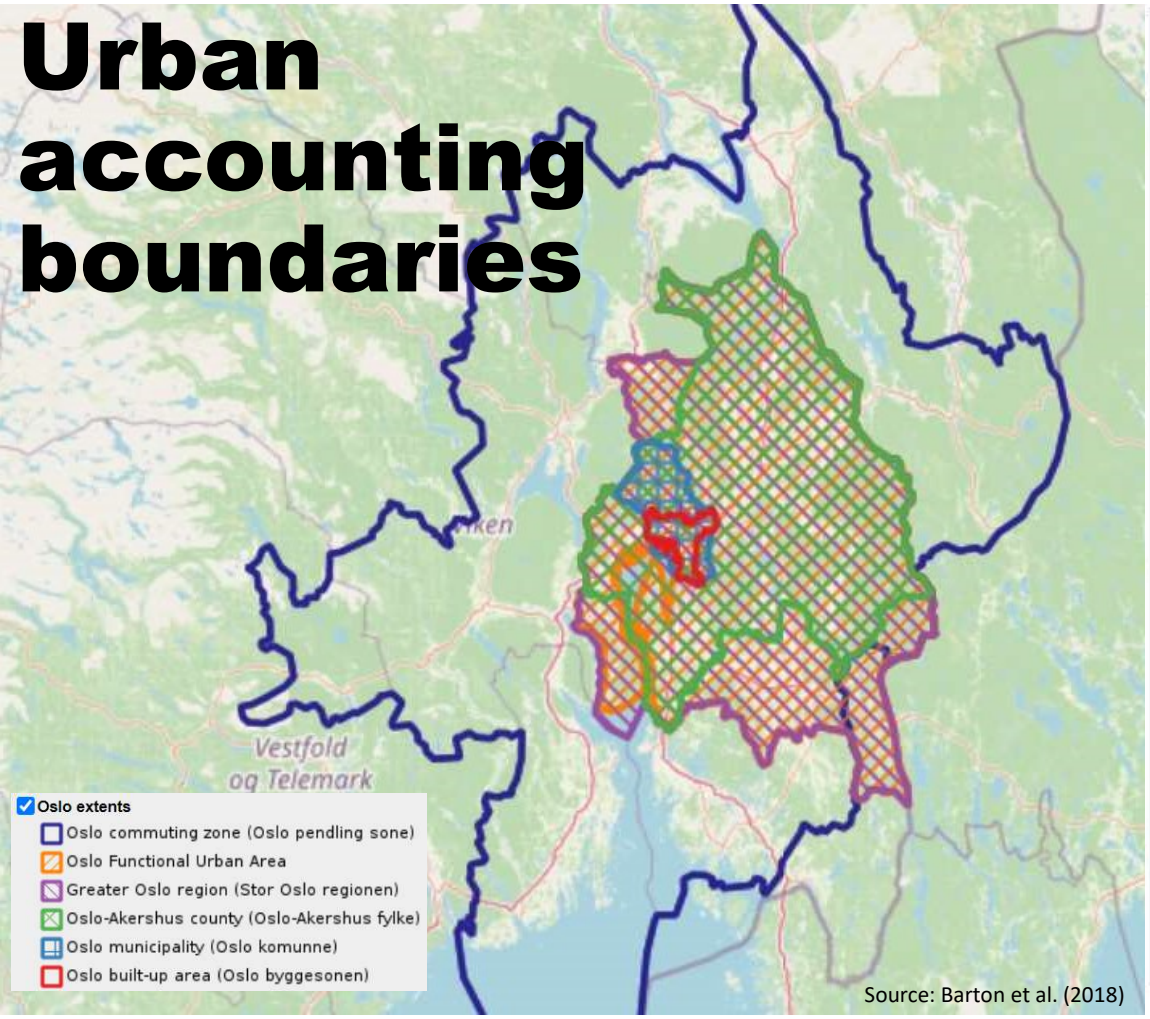
Virtual Expert Forum on SEEA Experimental Ecosystem Accounting, 9th Nov. 2020

NINA
Norwegian Institute for Nature Research

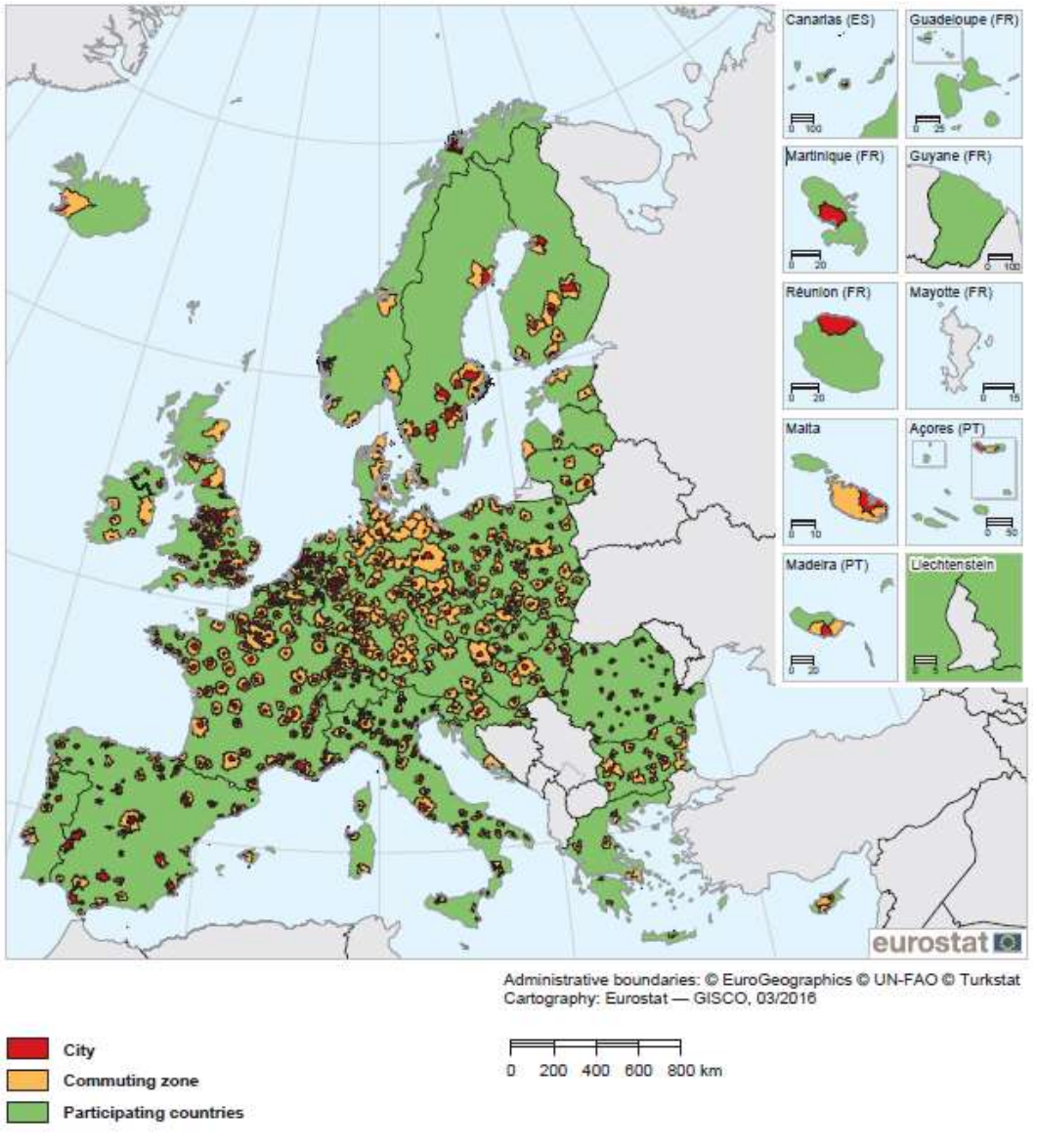
Challenges and opportunities

- accounting and asset boundaries
- aligning NSO and municipal govt. accounting purposes –trade-offs
- high spatial and temporal resolution
- hybrid extent-condition accounts
- highly modified ecosystems – restoration & nature-based solutions
- valuation - zero rent municipal services, open access amenities.

Urban accounting boundaries



Source: Barton et al. (2018)



Accounts can be compiled for cities based on administrative boundaries (i.e., local government boundary), functional boundaries (e.g., based on commuting flows as defined by census data), or morphological criteria, such as the extent of the built-up area plus a buffer zone. Chapter 13.2 SEEA EA

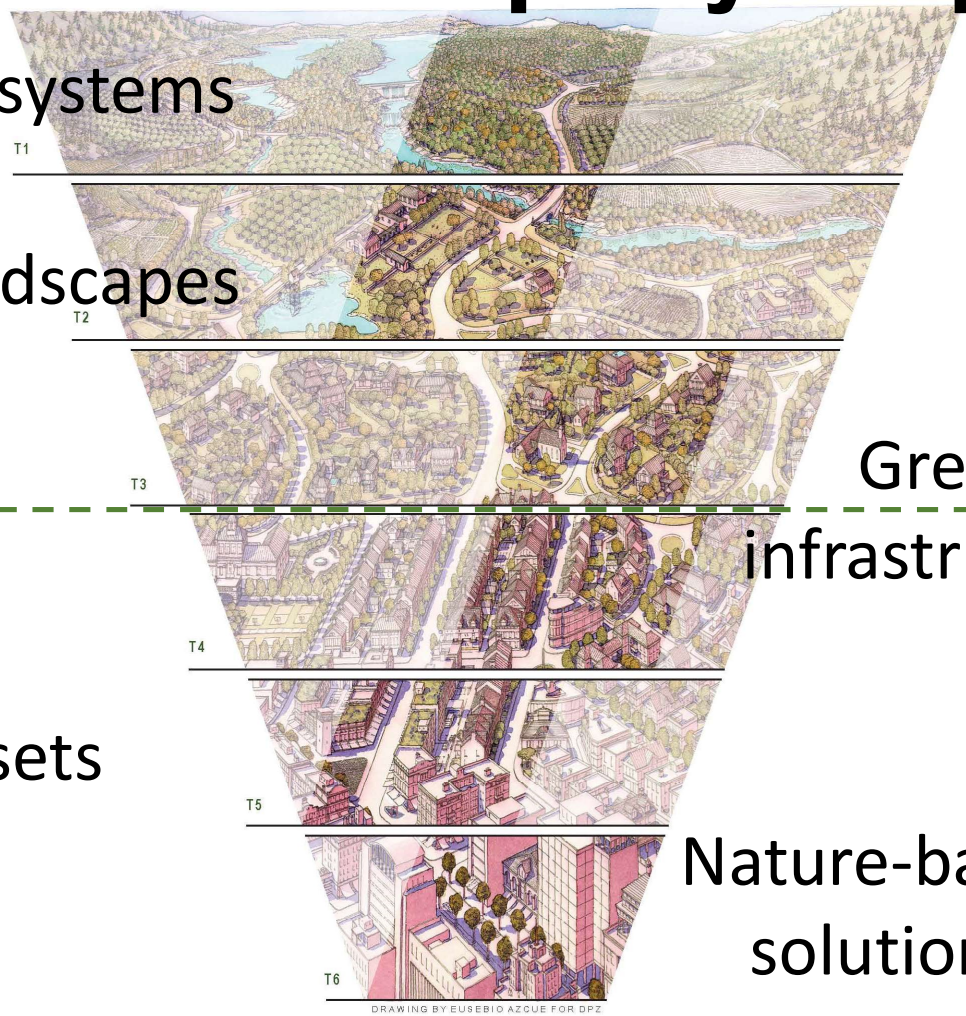
Source: Eurostat 2016. https://ec.europa.eu/eurostat/documents/3217494/7596823/KS-01-16-691-EN-N.pdf

Urban accounting for restored ecosystems and nature-based solution

Urban ecosystem accounting - indicator dashboard for municipal SDG reporting

on access to municipal (ecosystem) services

Flexible extent-condition accounting approach for different policy and planning purposes



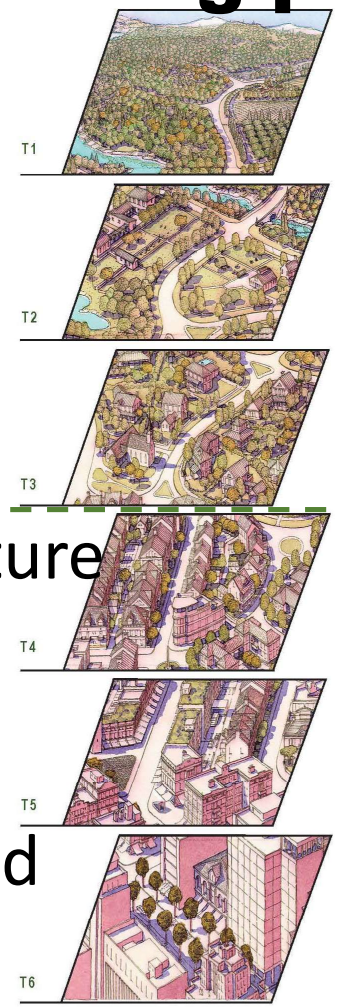
Ecosystems

Landscapes

Assets

Green infrastructure

Nature-based solutions



Planning

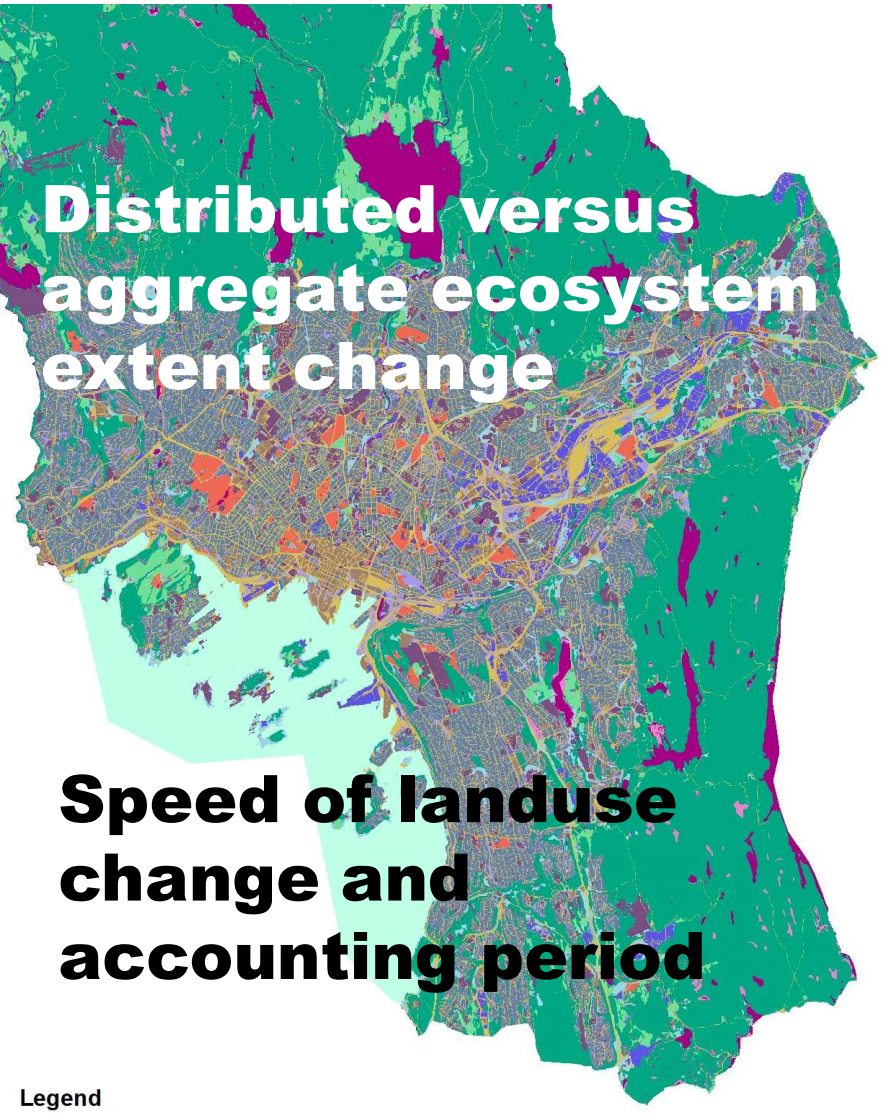
Zoning

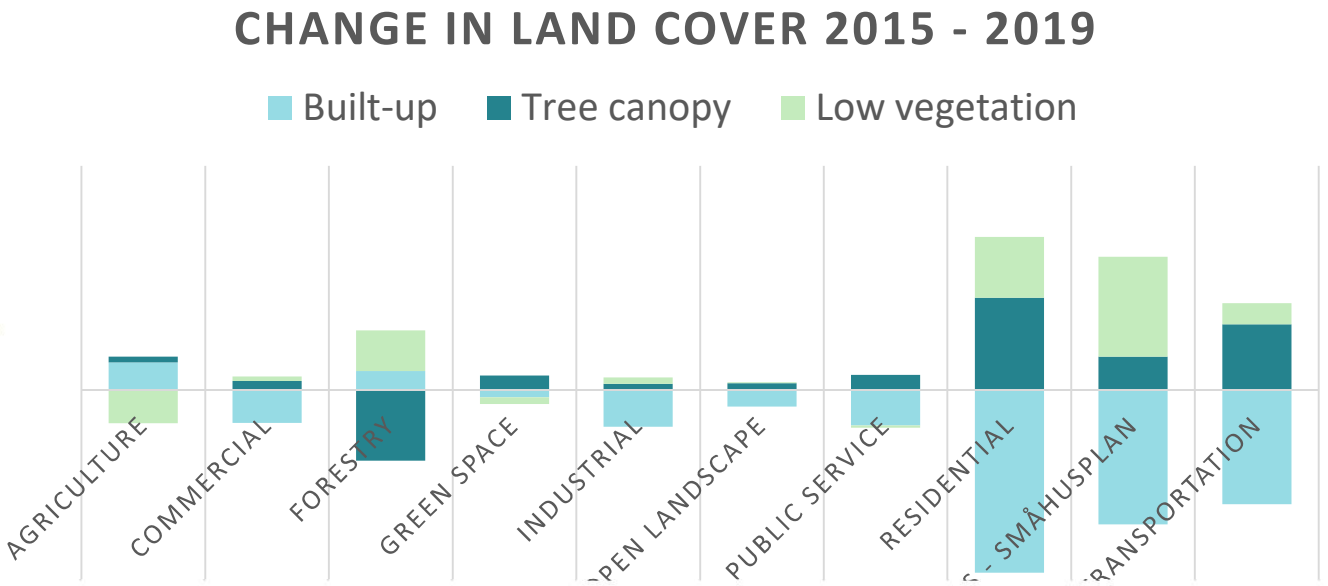
Regulating

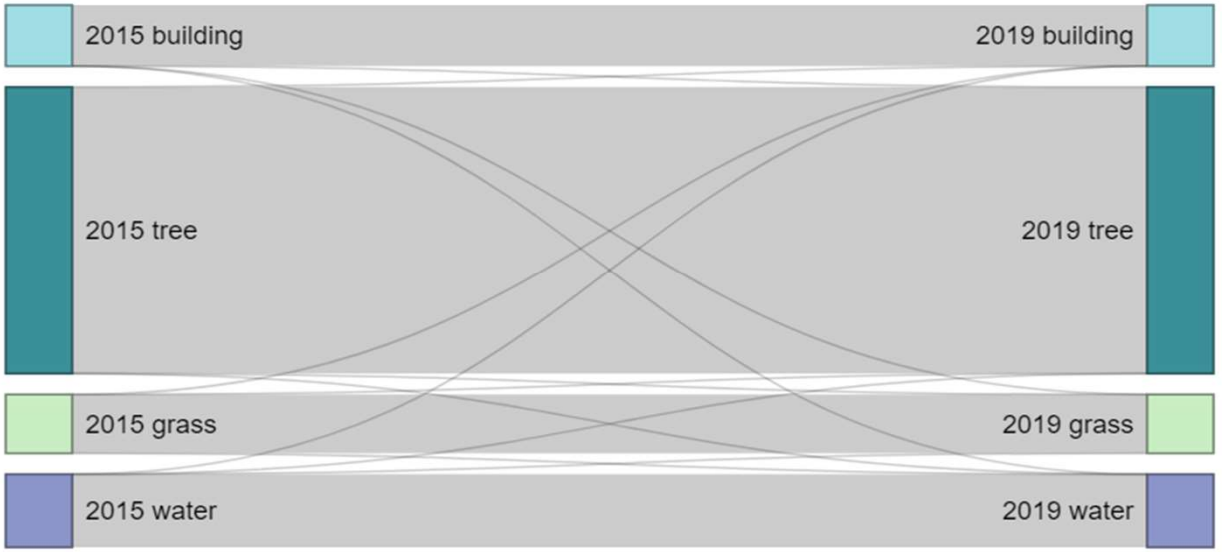
Permitting

Utilities pricing

Illustration source: Duany Plater-Zyberk & Company. https://transect.org/


Distributed versus aggregate ecosystem extent change
Speed of landuse change and accounting period
Legend
LULC
Level 1
Agriculture
Commercial
Forestry
Freshwater
GreenSpace
Industrial
Mire
Open landscape
Public
Residential
Sea
Transportation
Unclassified
Unknown

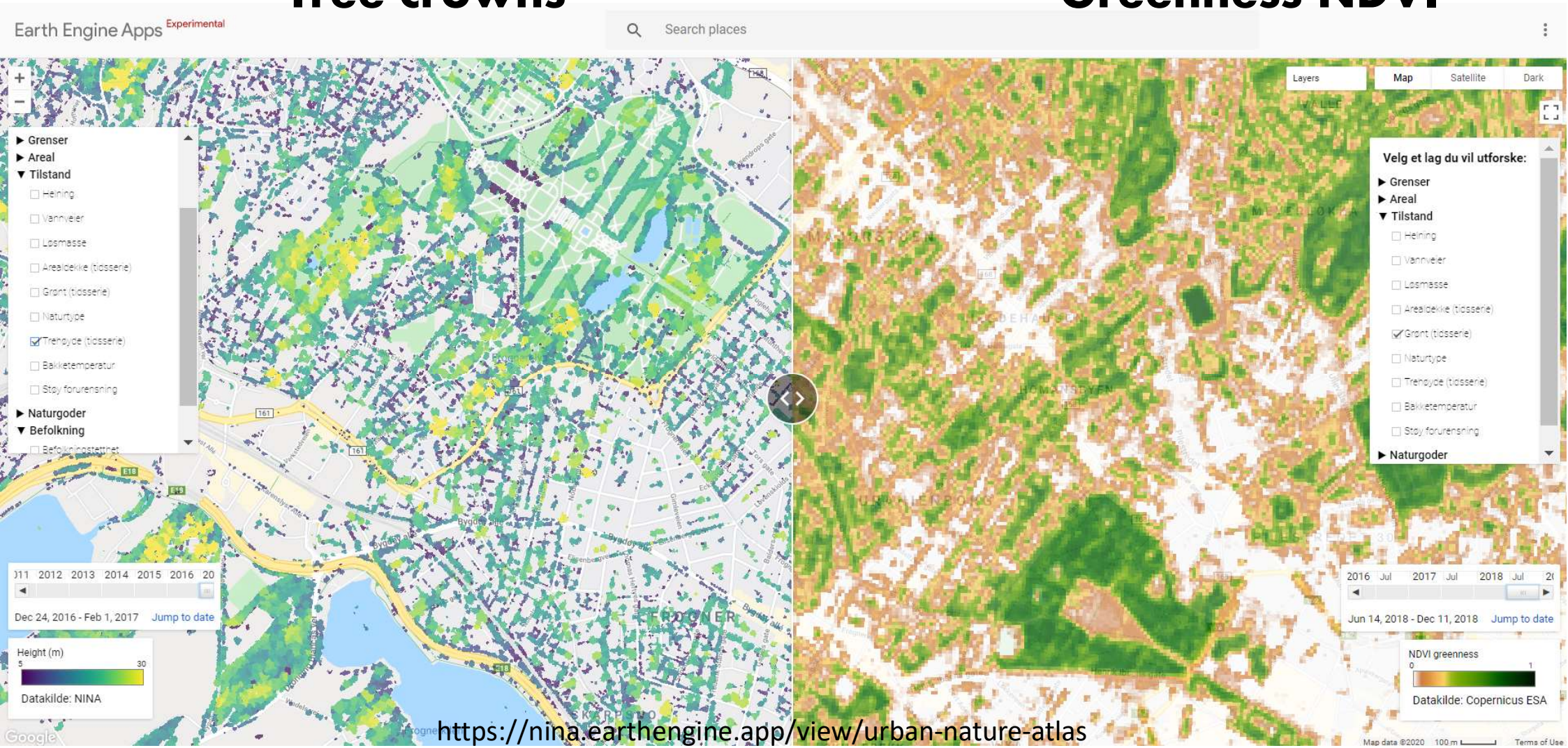

CHANGE IN LAND COVER 2015 - 2019
Built-up
Tree canopy
Low vegetation
AGRICULTURE
COMMERCIAL
FORESTRY
GREEN SPACE
INDUSTRIAL
PUBLIC SERVICE
RESIDENTIAL
SMÅHUSPLAN


2015 building
2019 building
2015 tree
2019 tree
2015 grass
2019 grass
2015 water
2019 water

Hybrid ecosystem extent-condition mapping

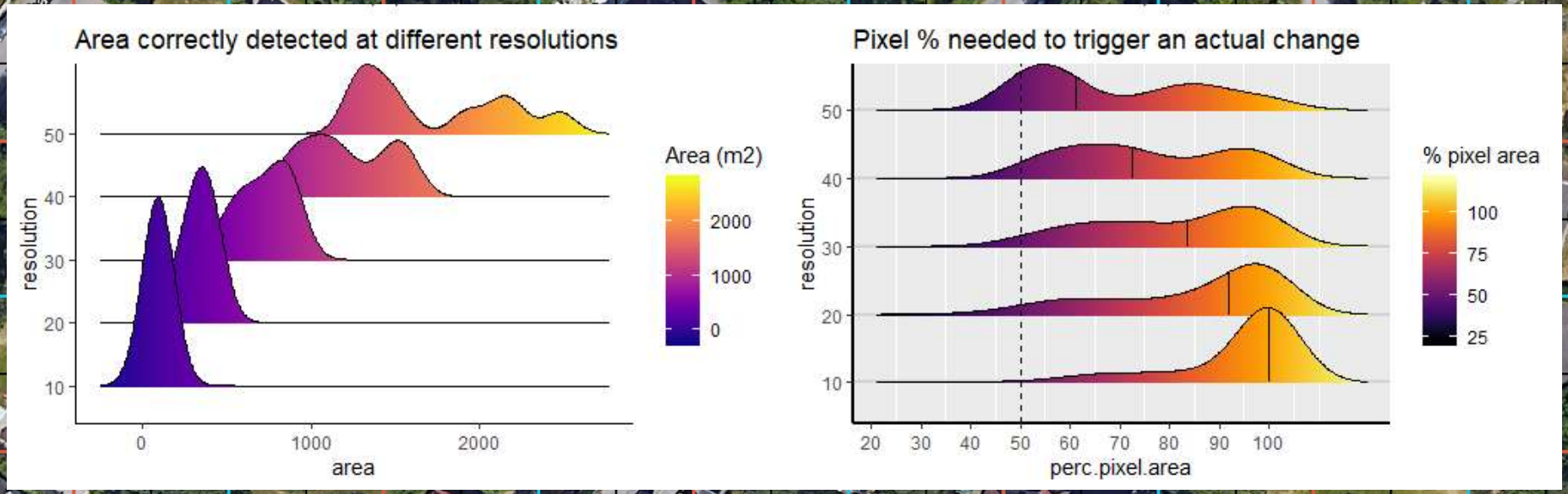
Tree crowns

Greenness NDVI



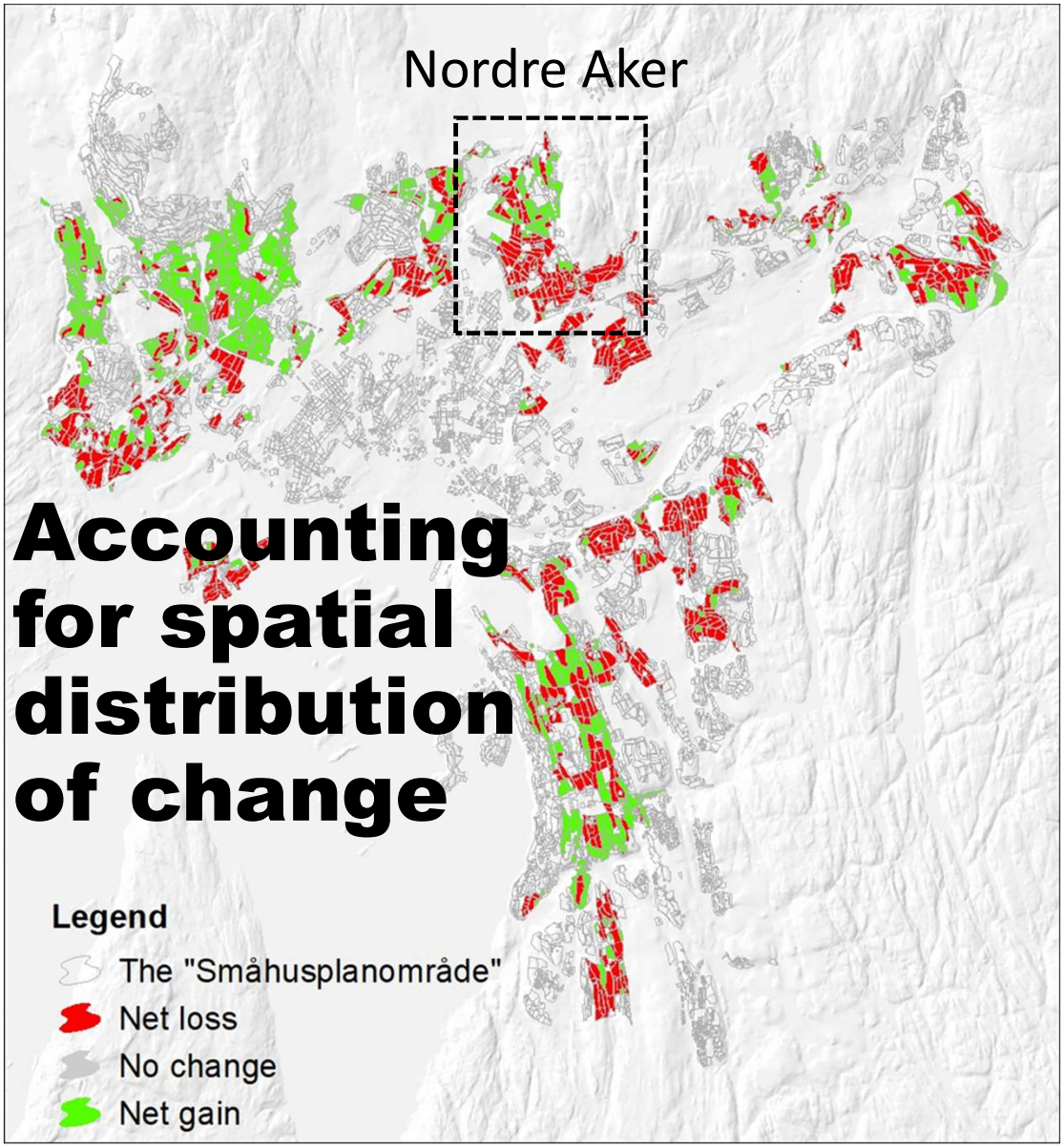
https://nina.earthengine.app/view/urban-nature-atlas

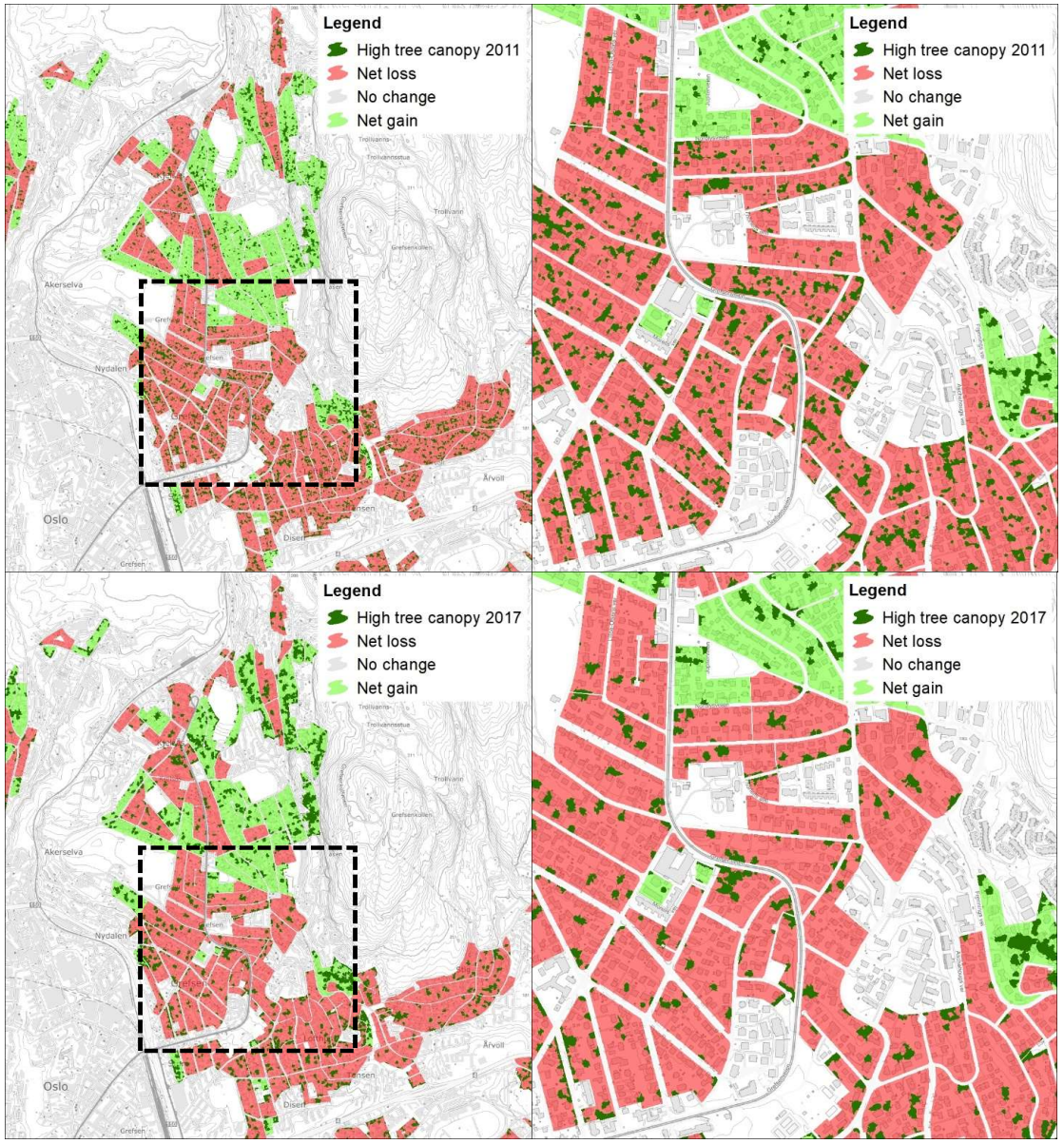
Basic spatial unit resolution and change detection – flexibility needed



40m spatial resolution
20m spatial resolution
10m spatial resolution

Source: Nowell et al.(2020)





Source: Hanssen et al. 2020

DB1

High resolution ecosystem asset approach for permitting & utility pricing

Challenges for exchange value accounting:

- Open access, zero expense recreation

- At cost pricing of municipal utilities

1706 NINA Rapport

Kartlegging av grønnstrukturer for Nye Stavanger Kommune

Erik E. Stange, Zander Samuel Venter, Benno Dillinger, Markus A.K. Sydenham

Map: Zander Venter https://www.nina.no/Publikasjoner/Publikasjonslister/NINA-Rapport

Slide 11

DB1 David Barton; 09.11.2020

Aligning national and urban ecosystem accounting purposes and requirements

USERS:

International agencies

National governments

Finance sector

Inudstrial sectors

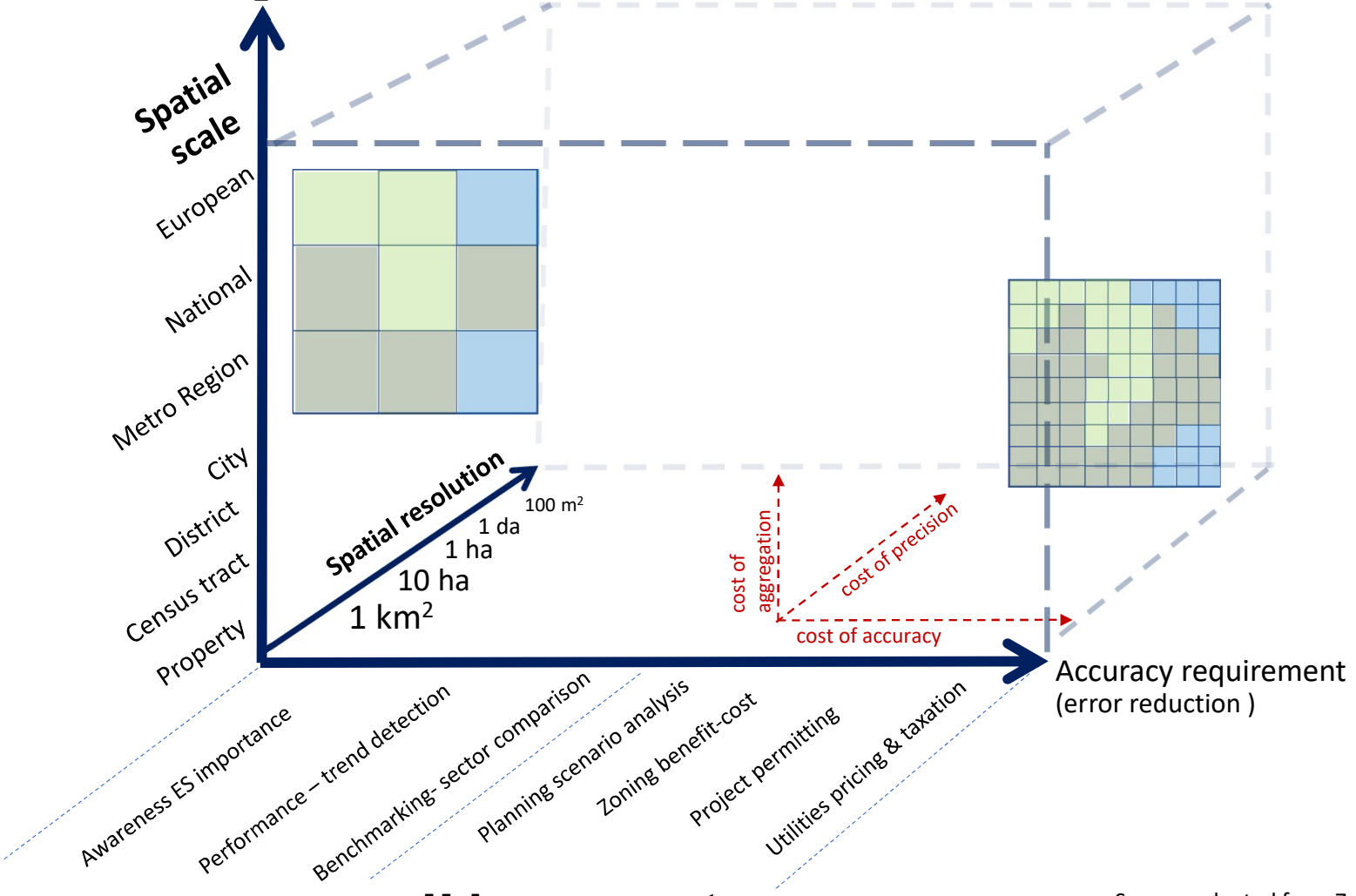
Land & water authorities

Local governments

Producers & utilities

Civil society -managers

Landowners - residential



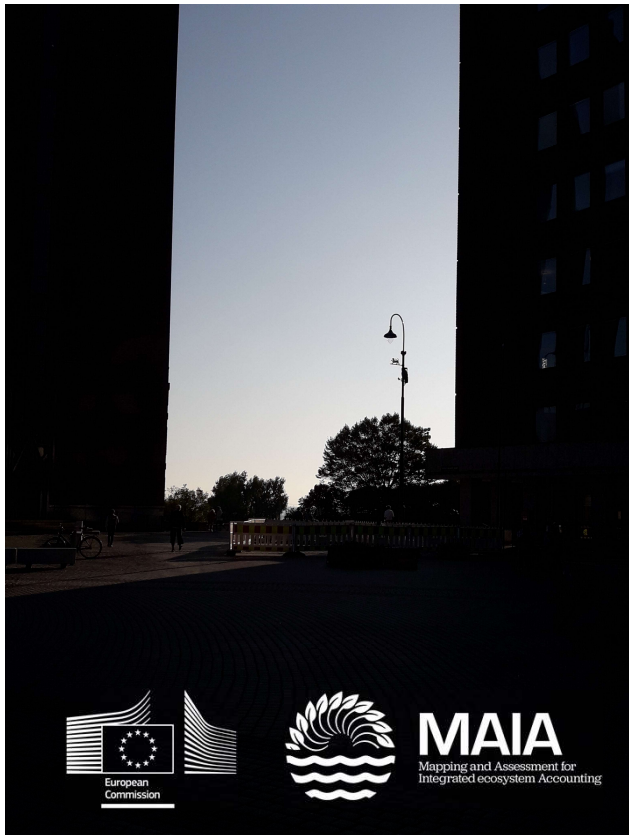
PURPOSES:

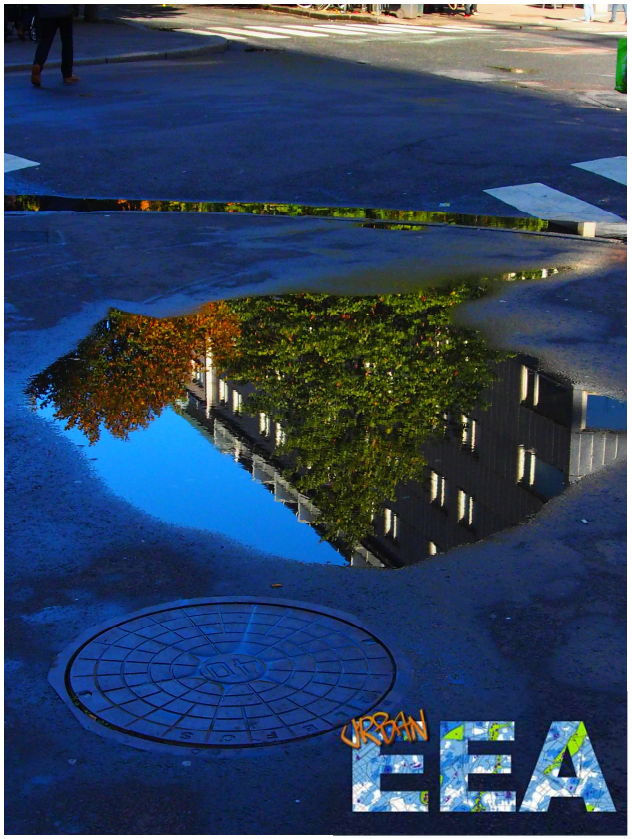
National accounts

Urban accounts

Source: adapted from Zulian, G. et al. (2017)

Thank you





david.barton@nina.no

References

Barton et al. (2018) Introduction to URBAN EEA 2017-2018. Experimental Ecosystem Accounting in Greater Oslo - Annual symposium. 17 September 2018, Statistics Norway (SSB)

Eurostat (2016) Urban Europe. Statistics on cities, towns and suburbs https://ec.europa.eu/eurostat/documents/3217494/7596823/KS-01-16-691-EN-N.pdf

Hanssen et al. (2020) Tree spotting - mapping the urban tree canopy Fremtidens Areal- og Naturregnskap for Byer . The future of land use and natural capital accounting for cities. URBAN EEA Virtuell konferanse 18 mars 2020

NINA. Urban Nature Atlas for Oslo. https://nina.earthengine.app/view/urban-nature-atlas

Nowell et al. (2020) Can actual land cover changes be detected from space? Fremtidens Areal- og Naturregnskap for Byer . The future of land use and natural capital accounting for cities. URBAN EEA Virtuell konferanse 18 mars 2020

Stange et al. (2019) Kartlegging av grønnstruktur for Nye Stavanger Kommune. NINA Rapport 1706

Zulian et al. (2017) Practical application of spatial ecosystem service models to aid decision support https://www.sciencedirect.com/science/article/pii/S2212041617302358