

StatEO

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Assimila 



UNIVERSITY OF COPENHAGEN



Accounting for Nature: EO-Derived Biodiversity Metric for Green National Income



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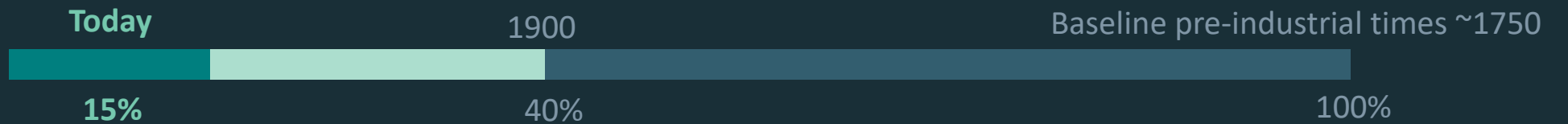
15%

What's left of the Netherlands' natural biodiversity.

The other 85% is gone.



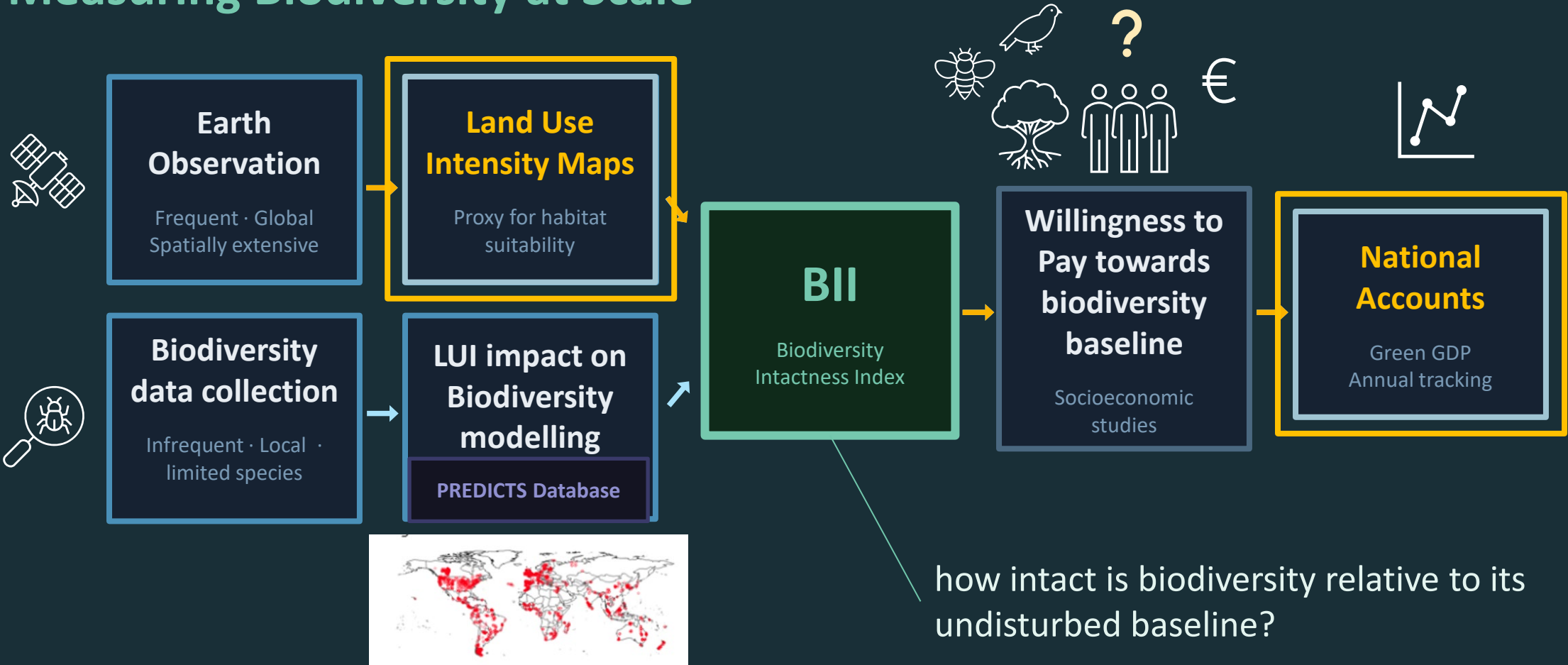
Credit: Mathieu Deslauriers



Source: PBL Netherlands Environmental Assessment Agency & CBS Statistics Netherlands — Mean Species Abundance (MSA), 1900–2000

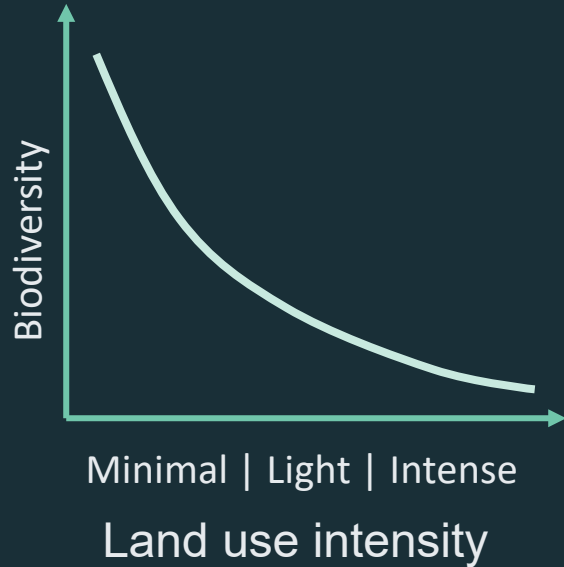
Measuring Biodiversity at Scale

Denmark / Netherlands



Global biodiversity samples linked to LUI

Land Use Intensity — Input Datasets



Secondary Vegetation
Natural Forest / Shrub / Grassland

CLCplus Backbone (CLMS)
Land cover / SV intensity

Natural Forest 2020
Natural forest / plantation classification

Grassland Mowing Events (CLMS)
Natural Grassland / Pasture separation

Tree Cover Density (CLMS)
SV / plantation intensity

Fragmentation
SV intensity

Pasture

CLCplus Backbone (CLMS)
Land cover / SV fragmentation intensity

Grasslands (CLMS)
Pasture classification

Grassland Mowing Events (CLMS)
Natural Grassland / Pasture separation

Net Primary Productivity (MODIS)
Pasture intensity

Global Pasture Watch
Pasture intensity / gridded Lifestock

WorldClim 2.1
Pasture intensity (climate)

Cropland

CLCplus Backbone (CLMS)
Land cover / SV fragmentation intensity

Small Woody Features (CLMS)
Cropland intensity

Bare Soil (CLMS)
Cropland intensity

Plantation

CLCplus Backbone (CLMS)
Land cover / SV fragmentation intensity

Natural Forest 2020
Plantation / Natural forest separation

Global Canopy Height Maps 2018-20
Plantation intensity

Urban

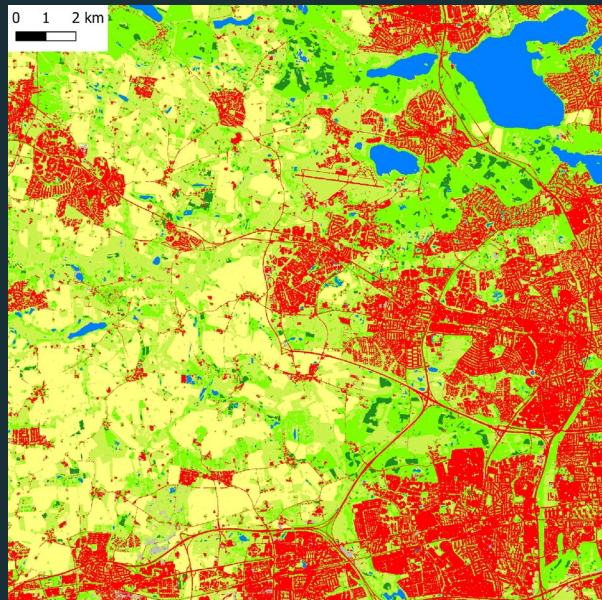
CLCplus Backbone (CLMS)
Land cover / SV fragmentation intensity

Nighttime Lights (NPP-VIIRS)
Urban intensity

Global Human Settlement Layer (GHSL)
Urban intensity / population grid

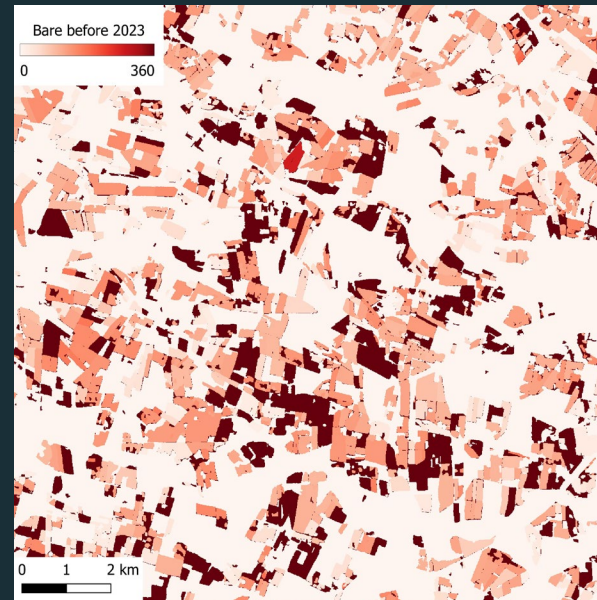
Land cover

CLCplus Backbone (CLMS)

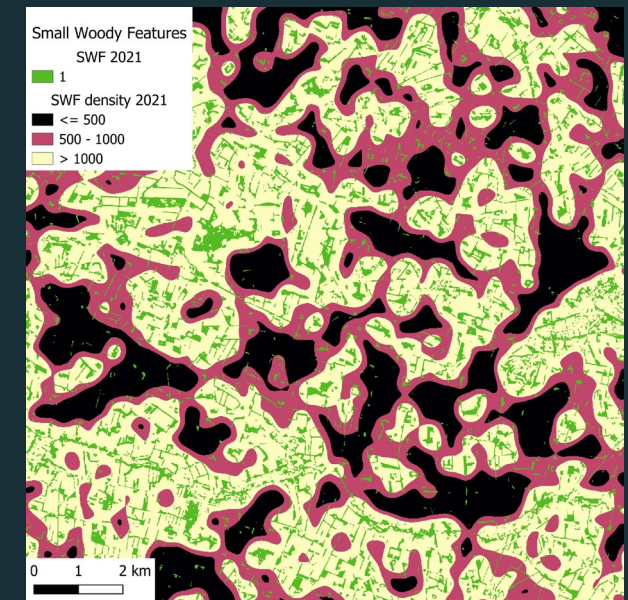


Cropland

Bare soil (CLMS)
Per year in days



Small Woody Features (CLMS)
SWF cover --> density



Urban

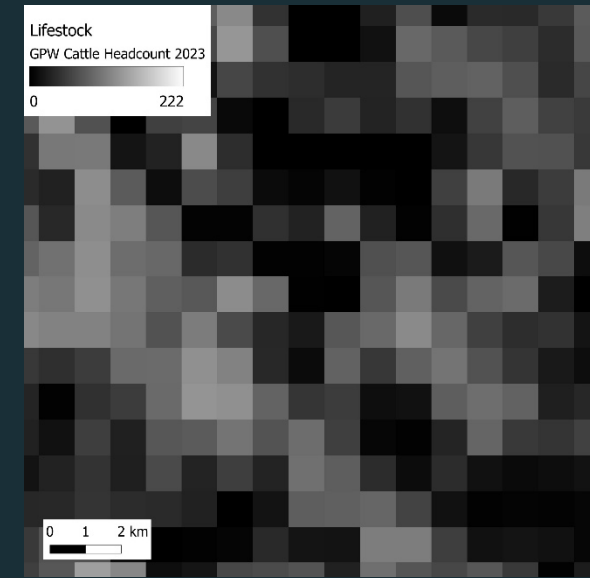
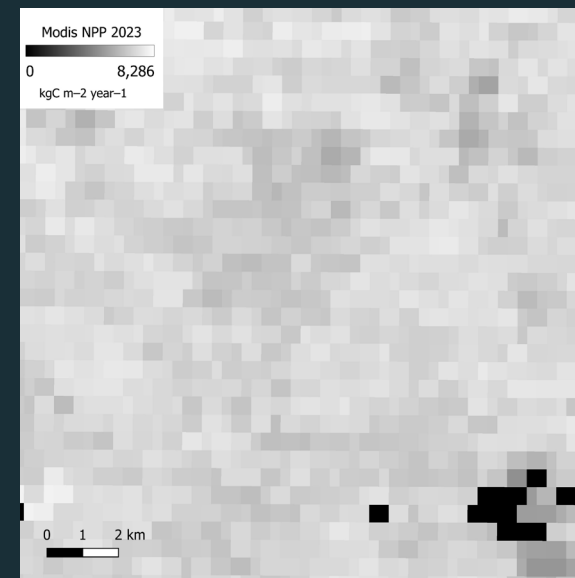
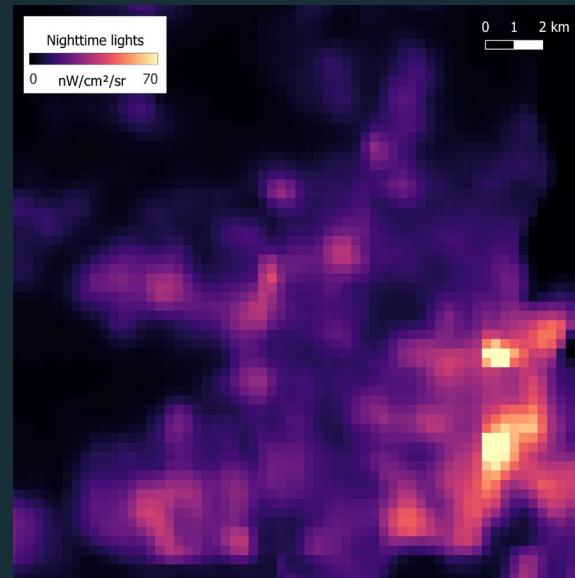
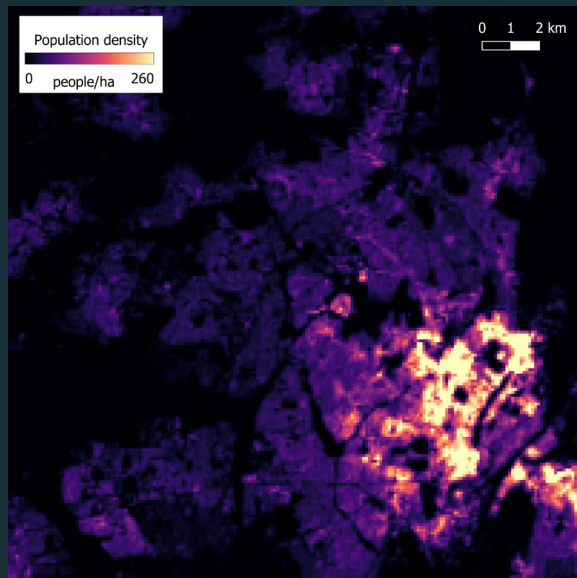
Pasture

Population density
(GHSL)

Nighttime lights
(VIIRS)

NPP (MODIS)
Carrying Capacity

Cattle Count (GPW)
Animal units

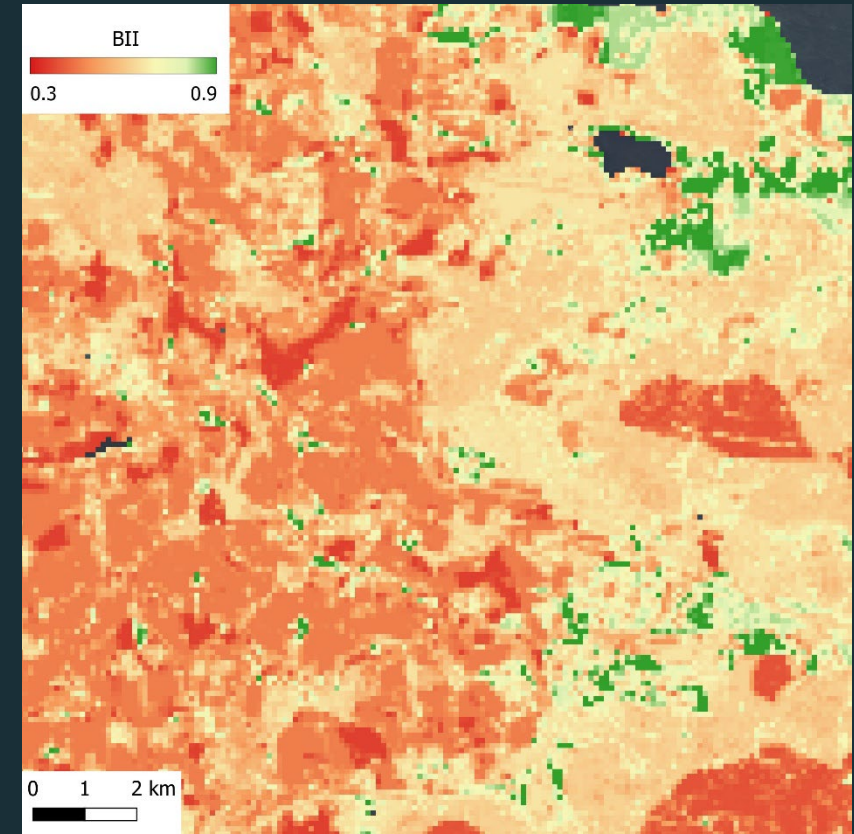
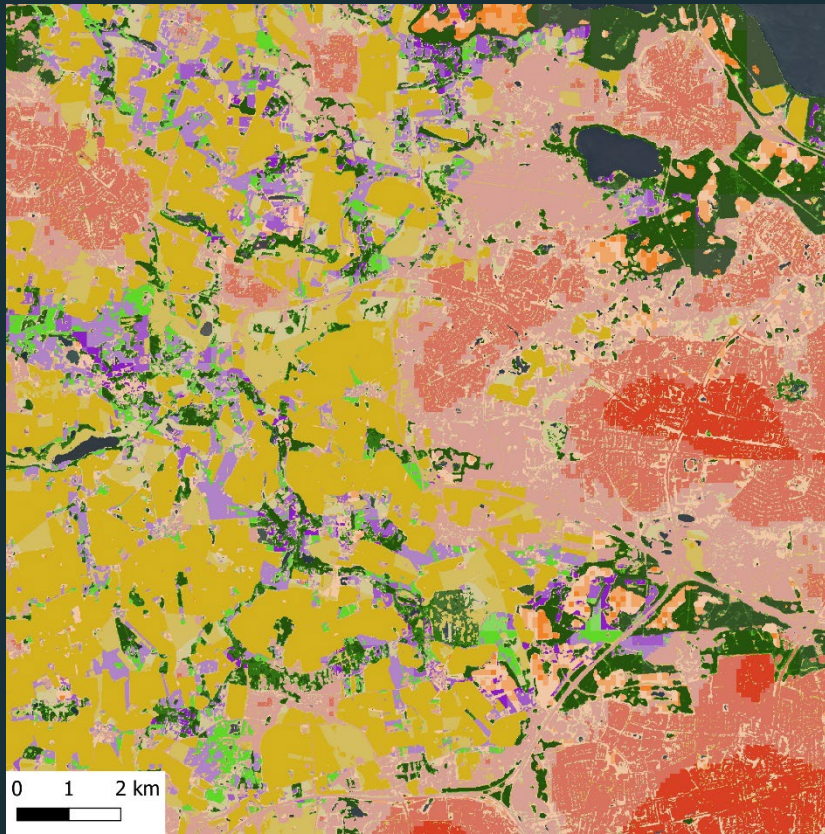


Land use intensity

BII

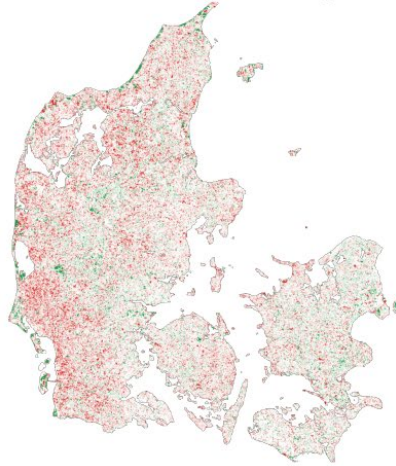
Biodiversity Intactness Index

- Land use intensity
- Urban minimal
 - Urban light
 - Urban intense
 - Plantation minimal
 - Plantation light
 - Plantation intense
 - Pasture minimal
 - Pasture light
 - Pasture intense
 - Crop minimal
 - Crop light
 - Crop intense
 - SV Mature minimal
 - SV Mature light
 - SV Mature intense
 - SV Intermediate minimal
 - SV intermediate light
 - SV intermediate intense
 - SV Young minimal
 - SV Young light
 - SV Young intense
 - SV Indeterminate minimal
 - SV Indeterminate light
 - SV Indeterminate intense

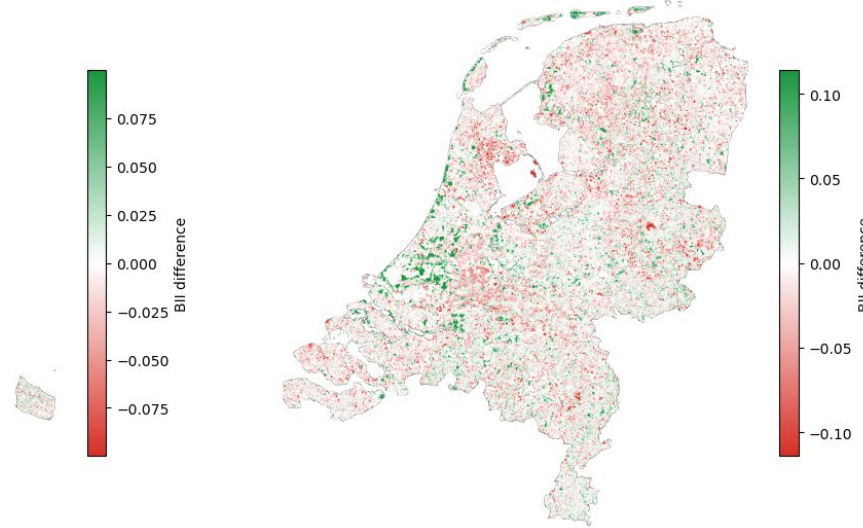


Biodiversity Intactness Index — Hotspots of Change

Denmark: BII Change 2018→2023



Netherlands: BII Change 2018→2023



Year	Denmark	Netherlands
2018	0.5465	0.5624
2019	0.5447	0.5626
2020	0.5459	0.5637
2021	0.5434	0.5647
2022	0.5413	0.5625
2023	0.5386	0.5595
Change	0.0079	0.0029

$$\text{Current annual welfare loss}_{2018} = (BII_{\text{within}} - BII_{2018}) * WTP * N_{\text{area}} * HH$$

BII_{within} : 0.9 as proposed by Steffen et al. (2015) to stay within planetary boundaries

BII_{2018} : 0.5465

WTP (Willingness To Pay): EUR 3 based on Uggeldahl et al. (2025), for a 0.01 unit change in BII for a 100 km² area

N_{area} : Number of 100 km² areas (in Denmark 420)

HH: number of households (in Denmark 3.2 million in 2025)

$$\text{Current annual welfare loss}_{2018} = \text{EUR } 1,3 \text{ billion}$$

Denmark

Current annual welfare loss from loss of biodiversity intactness, real 2025-prices, Denmark



Denmark
 Welfare loss to current population for 6 years
€ 8,1 billion

Netherlands
 Welfare loss to current population for 6 years
€ 22,3 billion

* Welfare loss for the Netherlands calculated using the same WTP estimate (Uggeldahl et al. 2025), adjusted for PPP, number of households, area and growth rate – benefit transfer always adds uncertainty.

Contributions & Next Steps

Contribution

Open access framework to derive LUI and BII
 implemented in open EO, everyone can use (for Europe)

Green GDP Integration
 Framework to integrate Biodiversity as a measurable metric in National Accounts (Denmark)

Annual monitoring of biodiversity change to track economic welfare loss and support evidence-based planning

Next steps

01 Scale up coverage

Expand Europe-wide LUI mapping framework to global
 → Test and adapt in other regions

02 Connect to nature finance, statistics & policy

Action for Biodiversity and EO community

01 Improve and keep updating LUI inputs (CLMS)

02 Align with biodiversity monitoring strategies

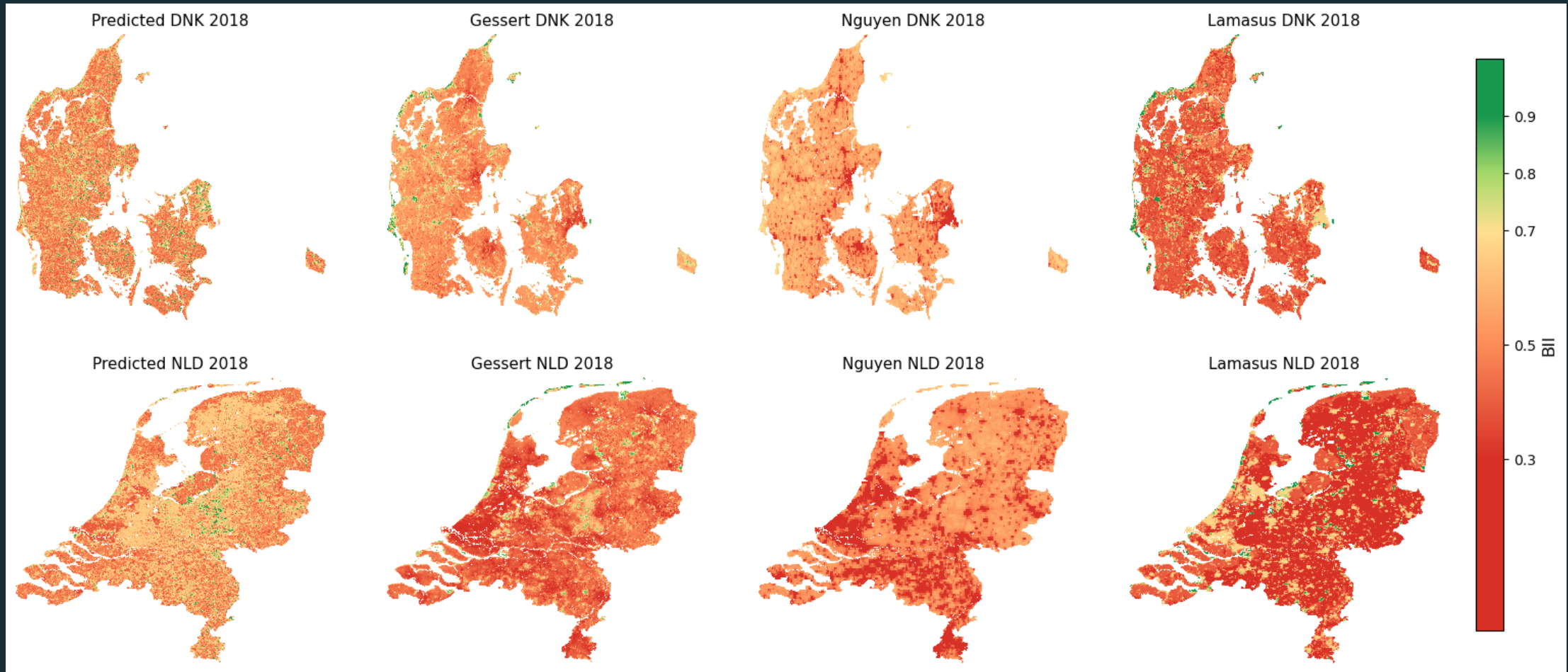


THANK YOU

Project LEON: <https://www.leon-naturefinance.org/>
Contact: georg.kodl@assimila.eu



Validation – Compare BII products



Validation – Compare gridded Biodiversity Denmark

