



This project is funded by the European Union

## ENI SEIS II East

Implementation of the Shared Environmental Information System (SEIS) principles and practices in the ENP East region



Land Monitoring

# Land monitoring use cases

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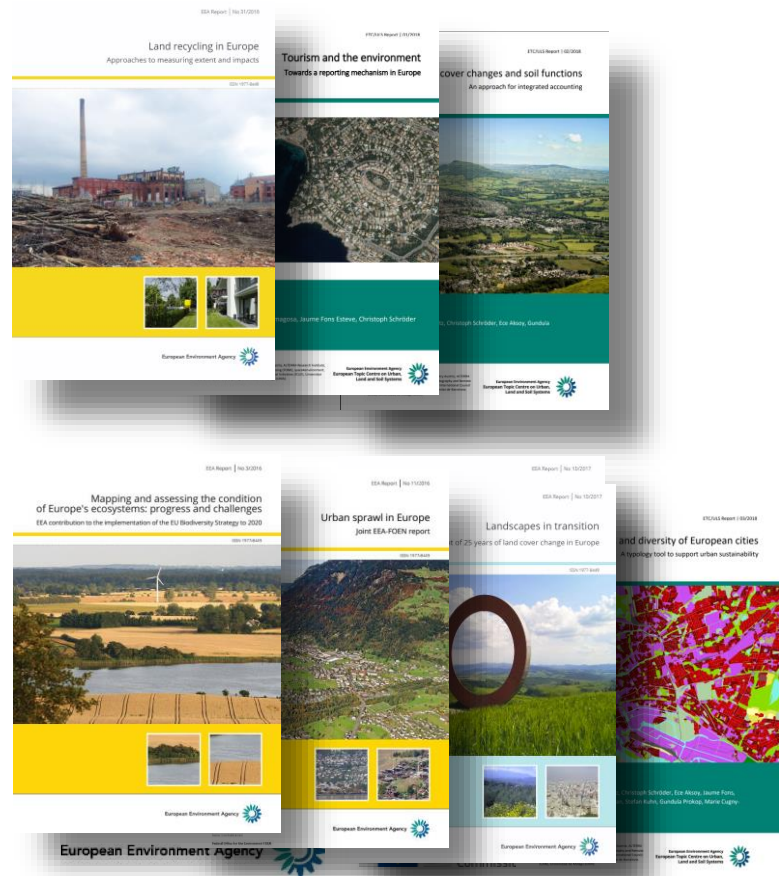




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# EEA & ETC/ULS selected reports based (partly) on Copernicus Land Monitoring data

- **Land cover changes and soil functions.** An approach for integrated accounting ETC/ULS Report 02/2018
- **Tourism and the environment.** Towards a reporting mechanism in Europe. ETC/ULS Report 01/2018
- **Landscapes in transition.** An account of 25 years of land cover change in Europe. EEA Report No.10/2017.
- **Similarities and diversity of European cities.** A typology tool to support urban sustainability. ETC/ULS Report 03/2018
- **Land recycling in Europe.** Approaches to measuring extent and impacts. EEA Report No.31/2016.
- **Urban sprawl in Europe** EEA/FOEN joint Report, 11/2016 – w. ETC ULS
- **Mapping and assessing the condition of Europe's ecosystems: progress and challenges.** EEA contribution to the implementation of the EU Biodiversity Strategy to 2020. EEA Report No. 3/2016





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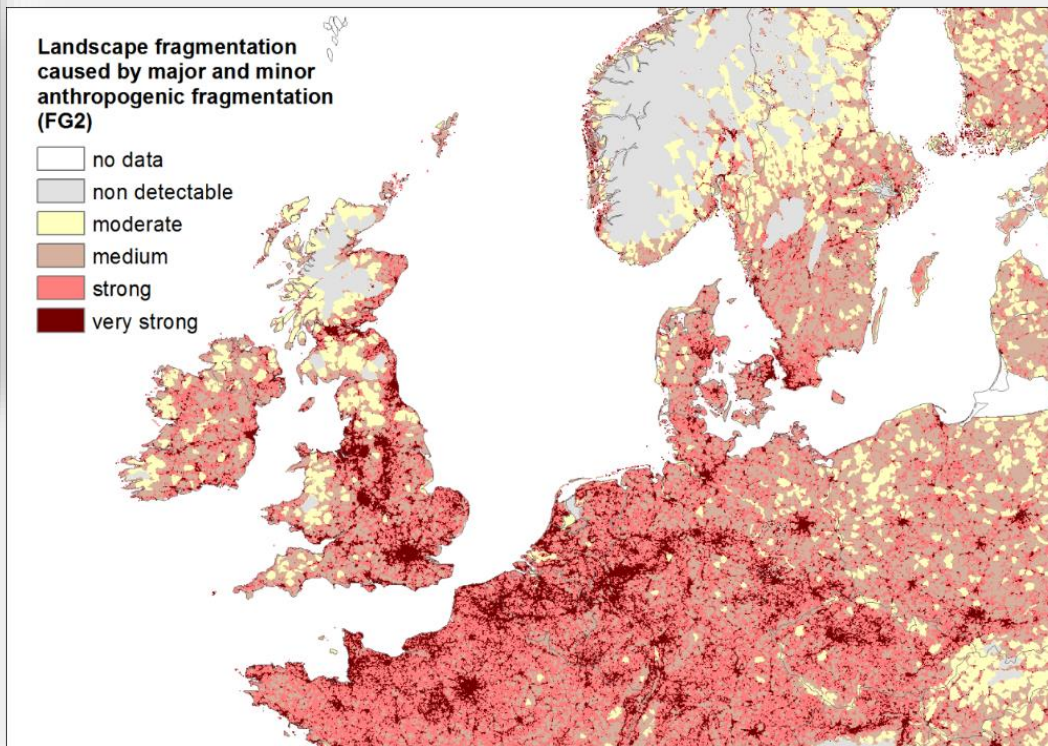
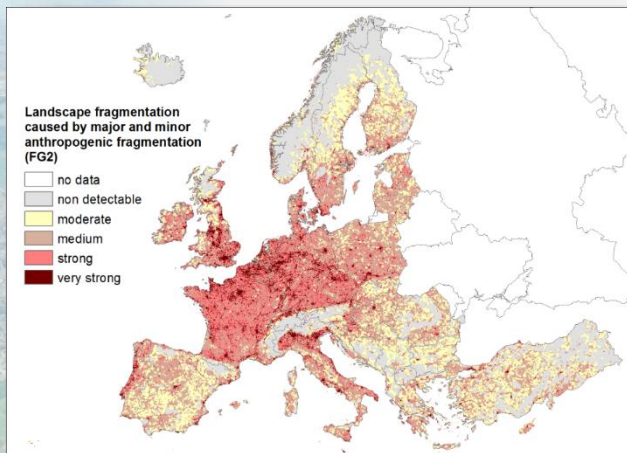
## Existing and planned EEA indicators based on Copernicus data

- **Land take (based on CLC)**
  - Following Corine Land Cover updates, every 6 years – last update in 2017 based on 2012 data
- **Imperviousness and imperviousness change**
  - (existing for 2009-2012, update for 2006-209-2012-2015 in preparation)
- **Urban sprawl ‘indicator’** (developed and published, but not implemented)
- **Land recycling and densification (published July 2018)**
  - Based on Corine LC and Urban Atlas LC change flows 2006-2012
  - Set of 13 (sub)indicators
- **Landscape fragmentation pressure from urban and transport infrastructure expansion (published 2018)**
  - Based on HRL Imperviousness 2012 with corresponding Open Street Map (OSM) transport networks
- **Forest indicator(s) (in preparation 2018/2019)**
  - Partly based on Copernicus forest products
- **Peri-urban areas (in preparation)**
- **Grassland (in preparation)**



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# Landscape fragmentation pressure of urban and transport expansion





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## Use case 3: Monitoring Urban Sprawl





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# Assessing flash flood risks

## München ist die am stärksten versiegelte

SPIEGEL ONLINE SPIEGEL

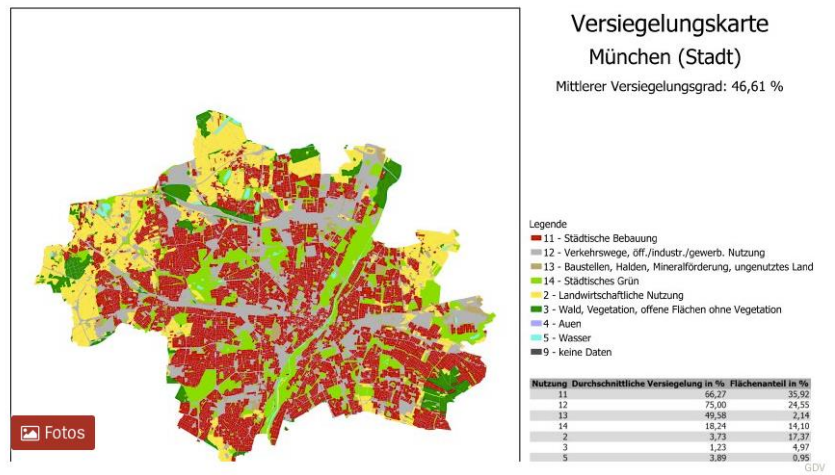
Menü | Politik Meinung Wirtschaft Panorama Sport Kultur Netzwelt Wissenschaft mehr

WIRTSCHAFT Schlagzeilen | DAX 11.466,39 | TV-Programm | Abo

Nachrichten > Wirtschaft > Verbraucher & Service > Stadtplanung > München: Von allen Städten am meisten bebaut und asphaltiert

### Versiegelte Flächen In diesen Städten ist Starkregen besonders gefährlich

Weil immer mehr Flächen versiegelt sind, drohen bei Starkregen Überschwemmungen. Eine Datenanalyse zeigt, wie viel Fläche deutsche Großstädte verbaut haben - und wer Beton-Spitzenreiter ist.



### Gesamtranking: Versiegelungsgrad der 50 einwohnerstärksten Städte

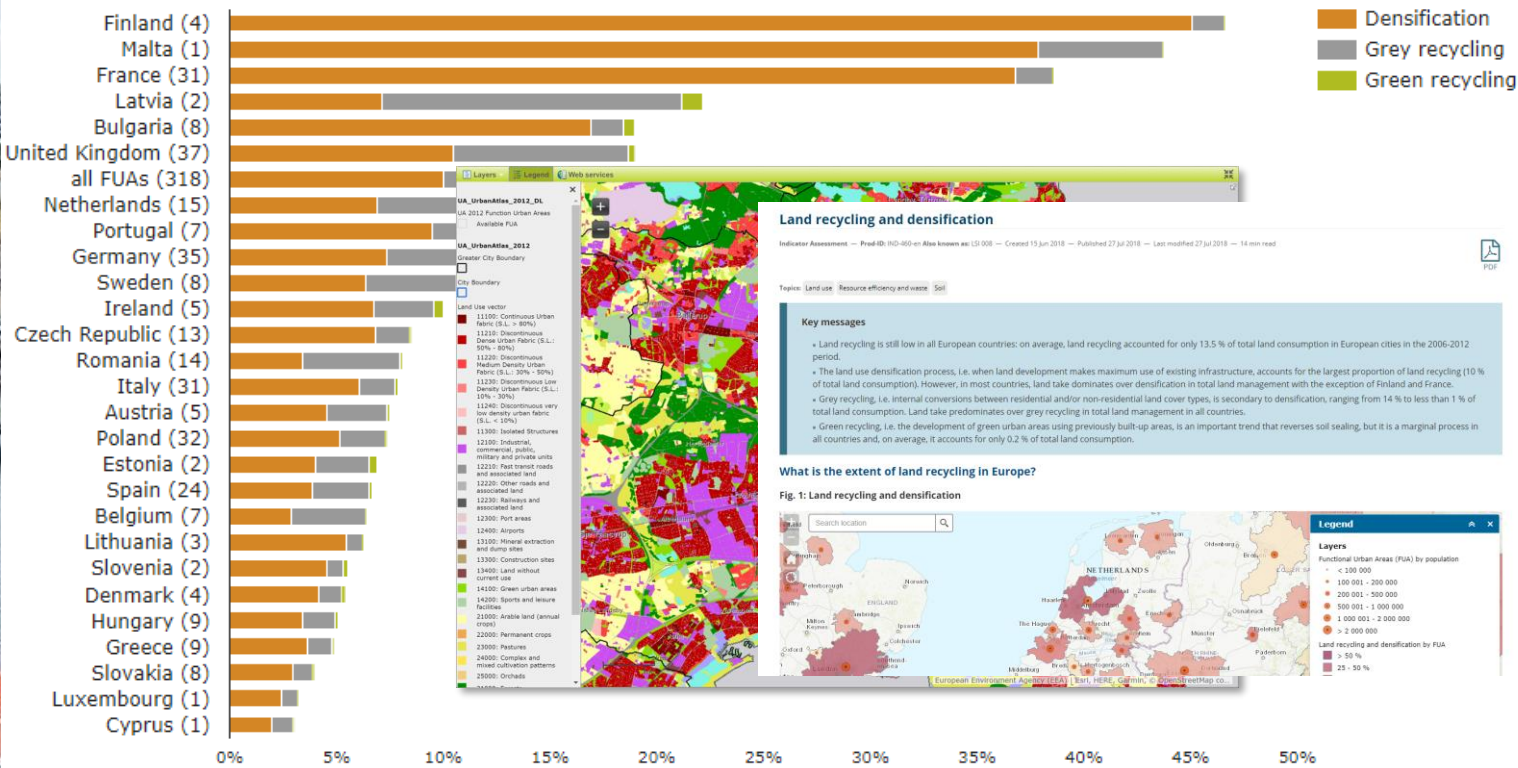
Rang	Stadt	Versiegelungsgrad in %
1	München	46,6
2	Oberhausen	44,2
3	Hannover	42,6
4	Ludwigshafen am Rhein	42,3
5	Nürnberg	40,4
6	Mannheim	40,2
7	Gelsenkirchen	39,4
8	Berlin	39,0
9	Bochum	37,9
10	Duisburg	37,0
11	Frankfurt am Main	45
12	Essen	46
13	Oldenburg	47
14	Düsseldorf	48
15	Hamburg	49
45	Heidelberg	18,8
46	Saarbrücken	18,5
47	Münster	17,9
48	Hamm	17,8
49	Freiburg im Breisgau	17,6
50	Potsdam	12,7



# Land recycling and densification based on Urban Atlas



Chart – Components of land recycling as a percentage of total land consumption, per country



### Land recycling and densification

Indicator Assessment — Prod ID: IND-600-en Also known as: US 008 — Created 15 Jun 2018 — Published 27 Jul 2018 — Last modified 27 Jul 2018 — 14 min read

Topics: Land use, Resource efficiency and waste, Soil

#### Key messages

- Land recycling is still low in all European countries; on average, land recycling accounted for only 13.5 % of total land consumption in European cities in the 2006-2012 period.
- The land use densification process, i.e. when land development makes maximum use of existing infrastructure, accounts for the largest proportion of land recycling (10 % of total land consumption). However, in most countries, land take dominates over densification in total land management with the exception of Finland and France.
- Grey recycling, i.e. internal conversions between residential and/or non-residential land cover types, is secondary to densification, ranging from 14 % to less than 1 % of total land consumption. Land take predominates over grey recycling in total land management in all countries.
- Green recycling, i.e. the development of green urban areas using previously built-up areas, is an important trend that reverses soil sealing, but it is a marginal process in all countries and, on average, it accounts for only 0.2 % of total land consumption.

#### What is the extent of land recycling in Europe?

Fig. 1: Land recycling and densification

Legend

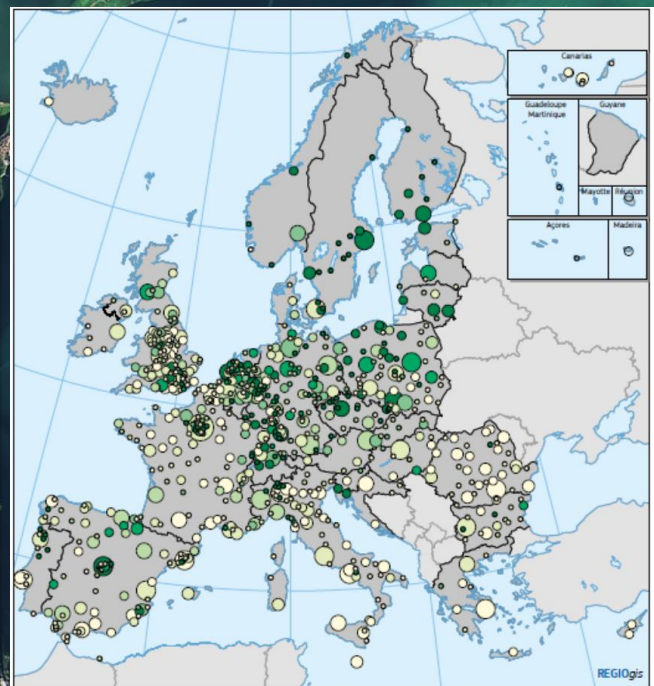
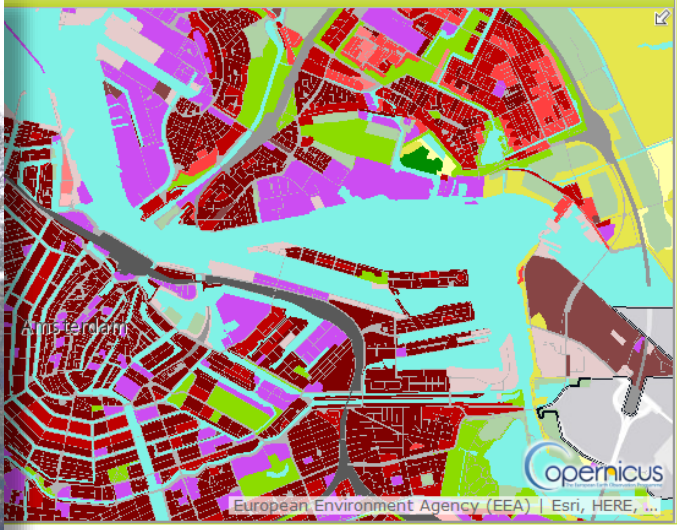
- Functional Urban Areas (FUAs) by population
  - < 100 000
  - 100 001 - 200 000
  - 200 001 - 500 000
  - 500 001 - 1 000 000
  - 1 000 001 - 2 000 000
  - > 2 000 000
- Land recycling and densification by FUAs
  - > 50 %
  - 25 - 50 %

Land recycling and densification indicator: <https://www.eea.europa.eu/data-and-maps/indicators/land-recycling-and-densification>



# Use case: Access to green areas in cities using Urban Atlas

Map View Metadata Download



[https://ec.europa.eu/regional\\_policy/sources/docgener/work/2018\\_01\\_green\\_urban\\_area.pdf](https://ec.europa.eu/regional_policy/sources/docgener/work/2018_01_green_urban_area.pdf)

Sentinel 2 - Amsterdam

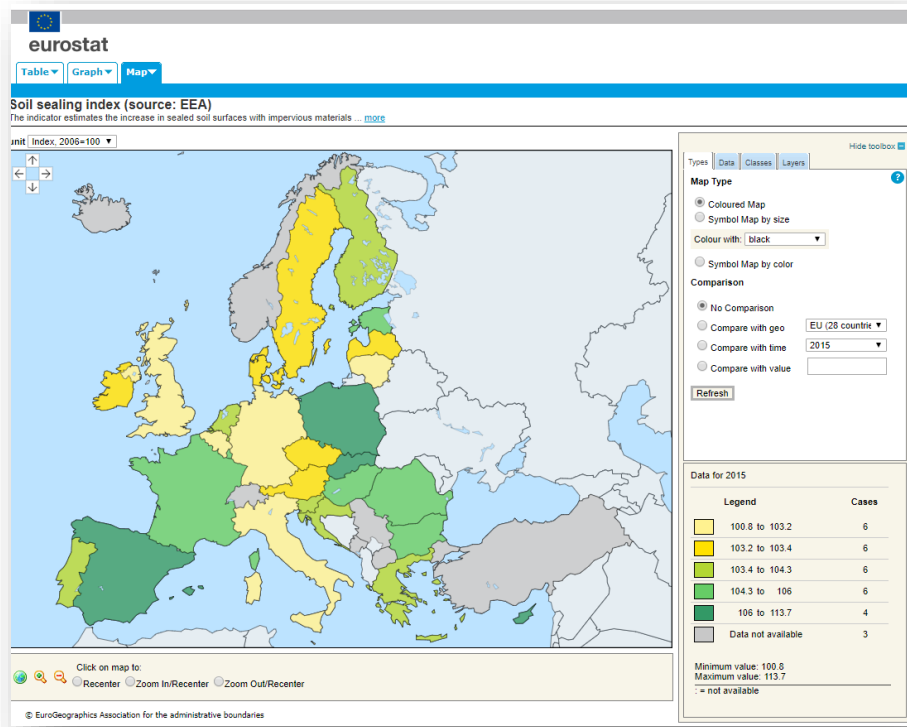




# European SDG indicator set

- **EU SDG (Sustainable Development Goals) indicator set** of around 100 indicators developed and updated by Eurostat and published in annual monitoring report on progress towards the SDG's
- EU SDG indicator set open to **annual review** to incorporate indicators from new data sources and to take into account new EU policy priorities





- **Potential** of using a number of CLMS (Copernicus Land Monitoring Service) products for SDG indicators, **but currently very limited use**
  - Today: Only **one European SDG indicator using a CLMS product (15\_41 Soil sealing index**, using the Imperviousness product)
  - *“Another important source for geospatial information being used for SDG indicators in an EU context is Copernicus (.). **Other SDG indicators on land cover and land use might also benefit from higher frequency data provided by Copernicus in the future.**”*
- [p.5/59 Doc. DIMESA 2019/02]



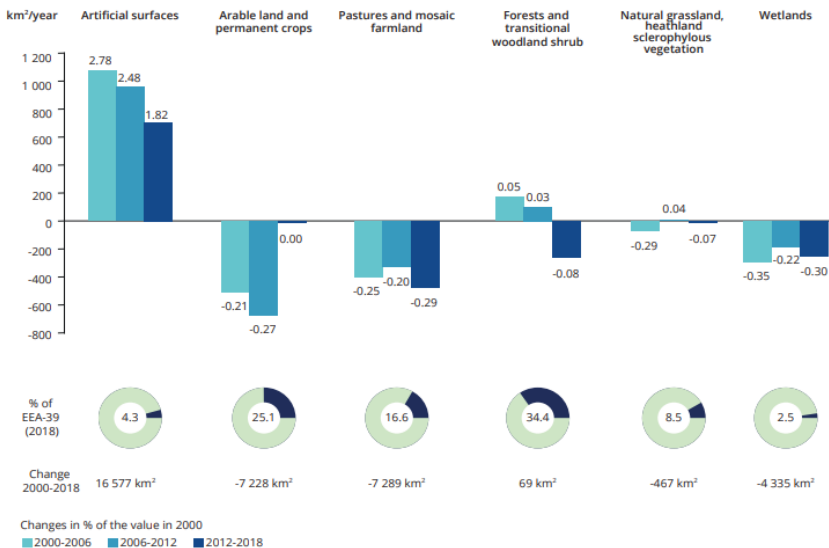
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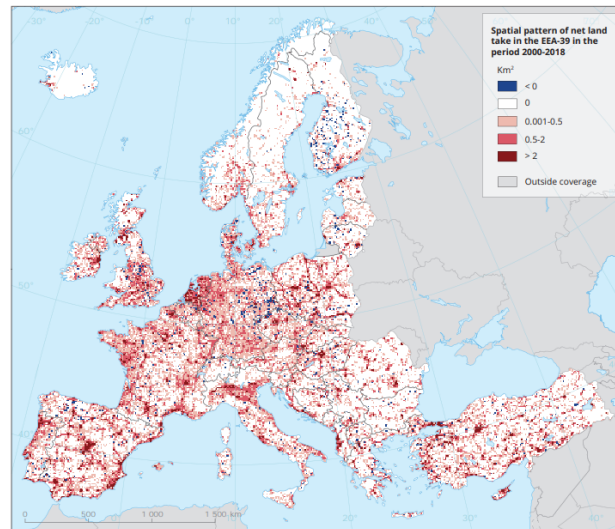
# Use of Copernicus data at EEA: SOER2020

- Flagship report of EEA, every 5 years: State of the Environment Report (SOER)
- 2020 report (published December 2019): <https://www.eea.europa.eu/publications/soer-2020>
- Copernicus Land Monitoring Service data mainly included in **chapter 5: Land and Soil**

FIGURE 5.1 Change in six major land cover types in the EEA-39 during the period 2000-2018



MAP 5.1 Spatial pattern of net land take in the EEA-39 in the period 2000-2018



Source: EEA.

Note: Open spaces and water bodies are not shown, which is why the percentages do not add up to 100 %.



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Data and maps Dashboards Land cover and change...

## Land cover and change 2000-2018

Dashboard (Tables) — Prod 09 04G-08-en — Published 24 Sep 2018 — 1 min read

Topics: Land use

This interactive data viewer provides an easy and comprehensive access to land cover accounts for Europe (EEA39 and EU28) derived from the CORINE land cover data series. Statistics are derived for every 6 years of the acquisition period as well as for the entire period (2000-2018). The viewer facilitates the assessment of land cover consumed or created over a specific period and the reason for the observed change (e.g. urban sprawl or arable land loss), which can be analyzed within user defined spatial units such as administrative regions, biogeographical regions or land cover classes.

Introduction	Land cover statistics (km <sup>2</sup> )	Land cover statistics (%)	Land cover statistics as charts	Accounting for land cover changes - tables	Accounting for land cover changes - charts	Country map	NUTS3 map
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The understanding of the implications of changes in land cover and land use is a fundamental part of planning for sustainable development. On the one hand, the transformation of land cover and land use by human interactions can affect the integrity of natural resources, i.e. our natural capital, and the output of ecosystem goods and services. By careful planning, sustainable development of land cover and land use may enhance the natural capital and at the same time support the well-being of people.



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Integrated Data Platform (IDP)

More information

Land accounts describe, in a consistent and systematic way, the amount of land stock and its changes over time. All land covers may change into another category which would end up in numerous combinations too large for a transparent assessment. Therefore, the possible land cover changes are grouped into meaningful categories, the so called Land Cover Flows, such as urban land management (LCF1) or forest creation and management (LCF7). This enables to address drivers of land cover changes.



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## Use of Copernicus data at EEA – interactive data exploration

20 years CLC changes:

<https://www.eea.europa.eu/data-and-maps/dashboards/land-cover-and-change-statistics>

20 years land take statistics:

<https://www.eea.europa.eu/data-and-maps/dashboards/land-take-statistics>

Imperviousness:

<https://www.eea.europa.eu/data-and-maps/dashboards/imperviousness-in-europe>

Land recycling:

<https://www.eea.europa.eu/data-and-maps/dashboards/land-recycling>

Natura2000 data viewer:

<https://www.eea.europa.eu/data-and-maps/dashboards/natura-2000-data-viewer>



Land Monitoring

Where to find out  
more and use the  
products?





# For comprehensive overview of CLMS products see <https://land.copernicus.eu/product-portfolio/overview>

## Copernicus Land Monitoring Service product portfolio overview

In this section you will find a **short overview** of the Copernicus Land Monitoring Service portfolio (both already operational and upcoming). For your easy reference the products are divided into the following categories:

- [Land Cover and Land Use Mapping](#)
- [Hot-spot Monitoring](#)
- [Biophysical Parameters](#)
- [Imagery, In Situ and Reference Data](#)
- [European Ground Motion Service](#)

For more information about the products including available access options (such as on-line map view, download and WMS/WFS services) please click the product link and visit individual product pages.

Note: upcoming products appear in grey.

### Land Cover and Land Use Mapping

Product/ Variable	Reference years or time period available	Geographic coverage	Spatial resolution, map scale or MMU	Update frequency	Delivery timeliness	Main EO data sources used	Status	Roadmap
Land cover classifications								
<a href="#">Global Dynamic Land Cover</a>	2015	Africa	100 m	Yearly	Within 3 months after the end of the year	PROBA-V	Available	Add years 2016, 2017, 2018, 2019
		Global	100 m	Yearly	Within 3 months after the end of the year	PROBA-V	Planned	
<a href="#">CORINE Land Cover</a>	1990, 2000, 2006, 2012, 2018	Increasing: EEA39 for the 2018 reference year	25 ha MMU	6 years	Decreasing: <1 year for the 2018 reference year	Sentinel-2 for the 2018 reference year	Available	
<a href="#">CORINE Land Cover Change</a>	1990-2000, 2000-2006, 2006-2012, 2012-2018	Increasing: EEA39 for the 2018 reference year	5 ha MMU		Decreasing: <1 year for the 2018 reference year	IRS P6 LISS III, RapidEye for the 2012 reference year and Sentinel-2 for the 2018 reference year	Available	
<a href="#">CLC+</a>	2018	EEA39	05 ha MMU	3-6 years	TBD	TBD	Planned	Production of CLC-backbone starts in 2019
Detailed thematic layers								
<a href="#">Dominant Leaf Type</a>	2012-2015	EEA39	30 m	2 years	Decreasing: 1.5 years	Sentinel-2, Landsat-8	Available	Update for the 2018



# Want to know more? Links and resources

<b>Copernicus portal</b> (for the whole programme)	<a href="https://www.copernicus.eu">https://www.copernicus.eu</a>
<b>Copernicus Land portal:</b> Current main portal for information and data view/download from the Land Service	<a href="https://land.copernicus.eu">https://land.copernicus.eu</a>
Copernicus product search engine at EC - <b>product search across all services</b>	<a href="https://services-portfolios.copernicus.eu/">https://services-portfolios.copernicus.eu/</a>
Search for <b>data and information at EEA</b> (European Environment Agency)	<a href="http://search.apps.eea.europa.eu">http://search.apps.eea.europa.eu</a>
<b>EEA data and maps.</b> Includes dashboards ( <b>interactive data viewers</b> ) with links to maps and indicators (under development; land-take already published)	<a href="https://www.eea.europa.eu/data-and-maps/dashboards">https://www.eea.europa.eu/data-and-maps/dashboards</a>
<b>GEOSS portal:</b> online map-based user interface (discover and access EO data) with <b>global focus</b>	<a href="http://www.geoportal.org/">http://www.geoportal.org/</a>
<b>EU open Data</b> portal	<a href="https://data.europa.eu/euodp/data/">https://data.europa.eu/euodp/data/</a>
Information on <b>DIAS</b> (Data and Information Access Services). DIAS will provide centralised access to Copernicus data, information, and processing tools.	<a href="https://www.copernicus.eu/en/access-data/dias">https://www.copernicus.eu/en/access-data/dias</a>







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