

Using a continental-scale geo-spatial accounting system to support EU decision-making

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European Environment Agency
European Topic Centre
Data integration and digitalisation





Key developments at EU level

- **EU Green Deal:** tackle climate and biodiversity crises; addresses many components of economy and society (e.g. ‘Farm-to-fork strategy’)
- **Implementation of LULUCF Regulation** to decrease greenhouse gas emissions and increase removals in the LULUCF sector
- **Eurostat proposal for an ecosystem accounting module** to be included in EU environmental accounts regulation (yet to be adopted)
- This obliges statistical offices in EU Member States to develop:
 - Ecosystem extent accounts
 - Ecosystem condition accounts
 - Ecosystem service accounts





We need to translate geospatial data to meaningful, transparent messages

- Efficient design of nature restoration plans: understand where impacts occur, address the magnitude of impacts and address these synergically with drivers of change and resulting pressures
 - Good news: there is an ever-increasing set of EO data, e.g. CLMS and Sentinels, and information on the extent and condition of ecosystems.
-
- But:
 1. Geospatial datasets need to be translated into meaningful and transparent messages to assess impacts.
 2. Information is scattered and hence it is increasingly challenging to find and access the data – both EO data and derived indicators.
 - There is a need for an operational analytical environment for experts.




We need to translate geospatial data to meaningful, transparent messages: assessment framework

Land use cycle in EEA
Land use cycle
Overview
SIGN IN

Land use cycle in land systems

Land is used to produce biomass, such as food, feed, fibres and fuels and together with healthy soils it is needed to support biodiversity, clean air and water. With the increase of human population, there is a growing need to use the productive land for biomass production. However, the availability of productive land is limited and hence the increasing human need to use land for forestry, agriculture and infrastructure increases the competition for the available productive land resources. With that, natural ecosystems face losing land resources against the increasing pressures from land use demands. Land use and its change impact food security, carbon cycling, and landscapes and their features, among others. Land use and associated changes influence the integrity of ecosystems and our natural capital, which in turn are directly associated to a healthy environment and human well-being.



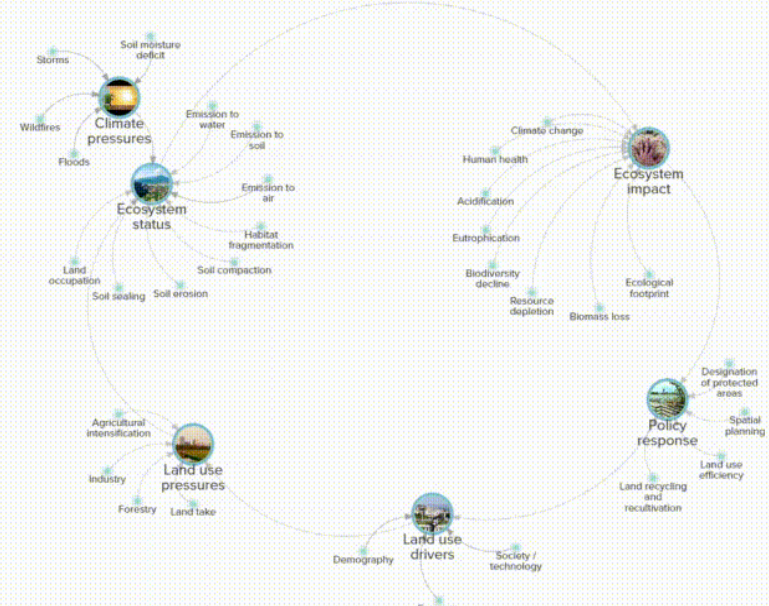
[Find useful land systems datasets by clicking here.](#)

Zoom in the various elements of the cycle:

- * Land use drivers
- * Land use pressures
- * Climate pressures
- * Ecosystem state
- * Ecosystem impact
- * Policy response

Land use, the intensity of land use and the increasing and competing demand for land resources result in variety of interlinked processes. Land use is addressed by measuring land

Search



Legend

- Opposite
- Indicators

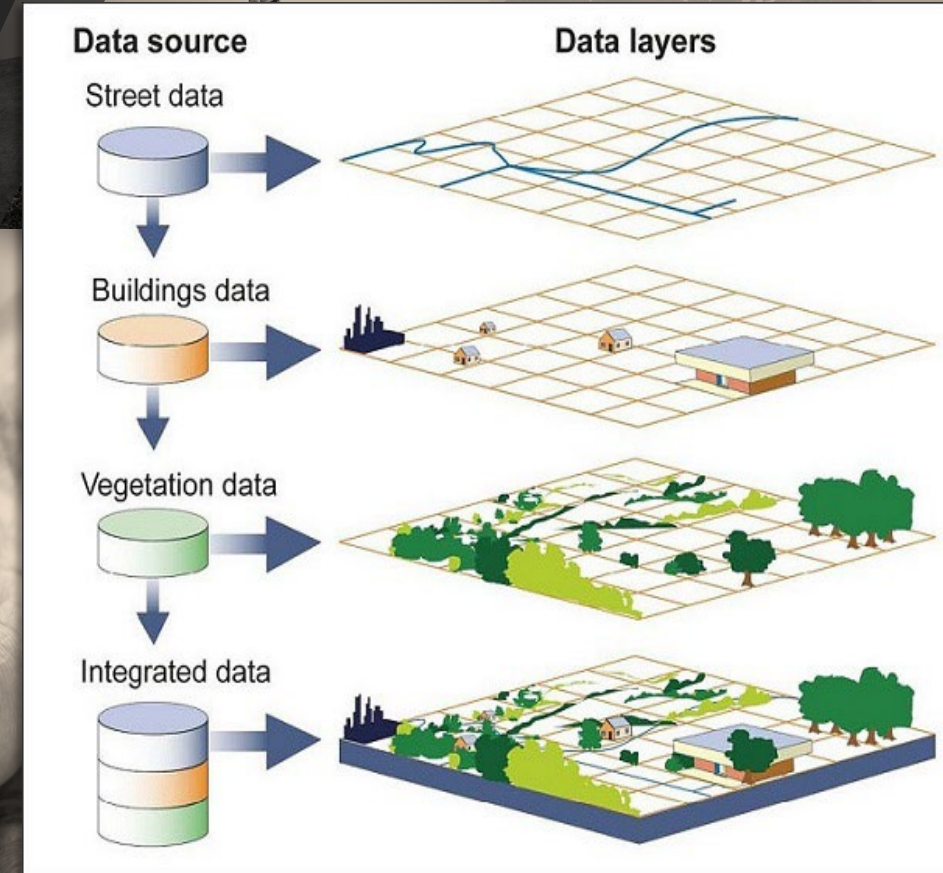


We need to translate geospatial data to meaningful, transparent messages

FAIR-principles :

- **Findable** (results are easy to be found)
- **Accessible** (Results are fast, effective, efficient, “on-demand”)
- **Interoperable** (Quality assured and controlled)
- **Reusable** (transparent processes, known sources, known methods)

Meaningful and transparent messages to support policy intervention



Translating geospatial data to meaningful, transparent messages

Finding the meaningful data

“According to research from data protection specialist Veritas Technologies, **employees are losing two hours a day searching for data**, and data management challenges are costing businesses as much as \$2 million a year.”

<https://betanews.com/2019/03/12/two-hours-wasted-searching-data/>

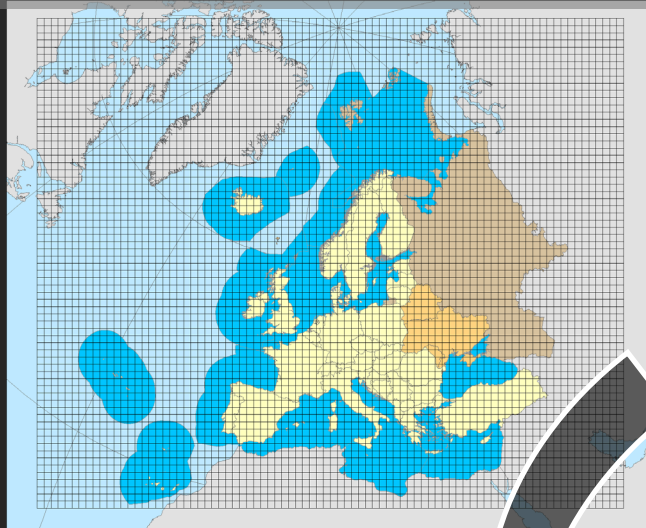




Translating geospatial data to meaningful, transparent messages

Storing the meaningful data: spatial data infrastructure

EEAs accounting grid for data harmonization



Harmonized
QA/QC
criteria

EEA's Spatial Data Infrastructure and metadata catalogue with standardised file system storage

The screenshot shows the EEA's Spatial Data Infrastructure and metadata catalogue website. The search results for 'forest biodiversity' are displayed, showing several resource cards with titles like 'EUNIS woodland, forest and other wooded land habitats, predicted potential...' and 'EUNIS woodland, forest and other wooded land habitats, Braun-Blanquet project...'. The website includes a search bar, navigation menu, and a sidebar with filters for 'TYPE OF RESOURCES', 'INSPIRE THEMES', 'GEMET KEYWORDS', 'KEYWORDS', 'CONTACT FOR THE RESOURCE', 'YEARS', and 'FORMATS'.

<https://sdi.eea.europa.eu/>



Translating geospatial data to meaningful, transparent messages

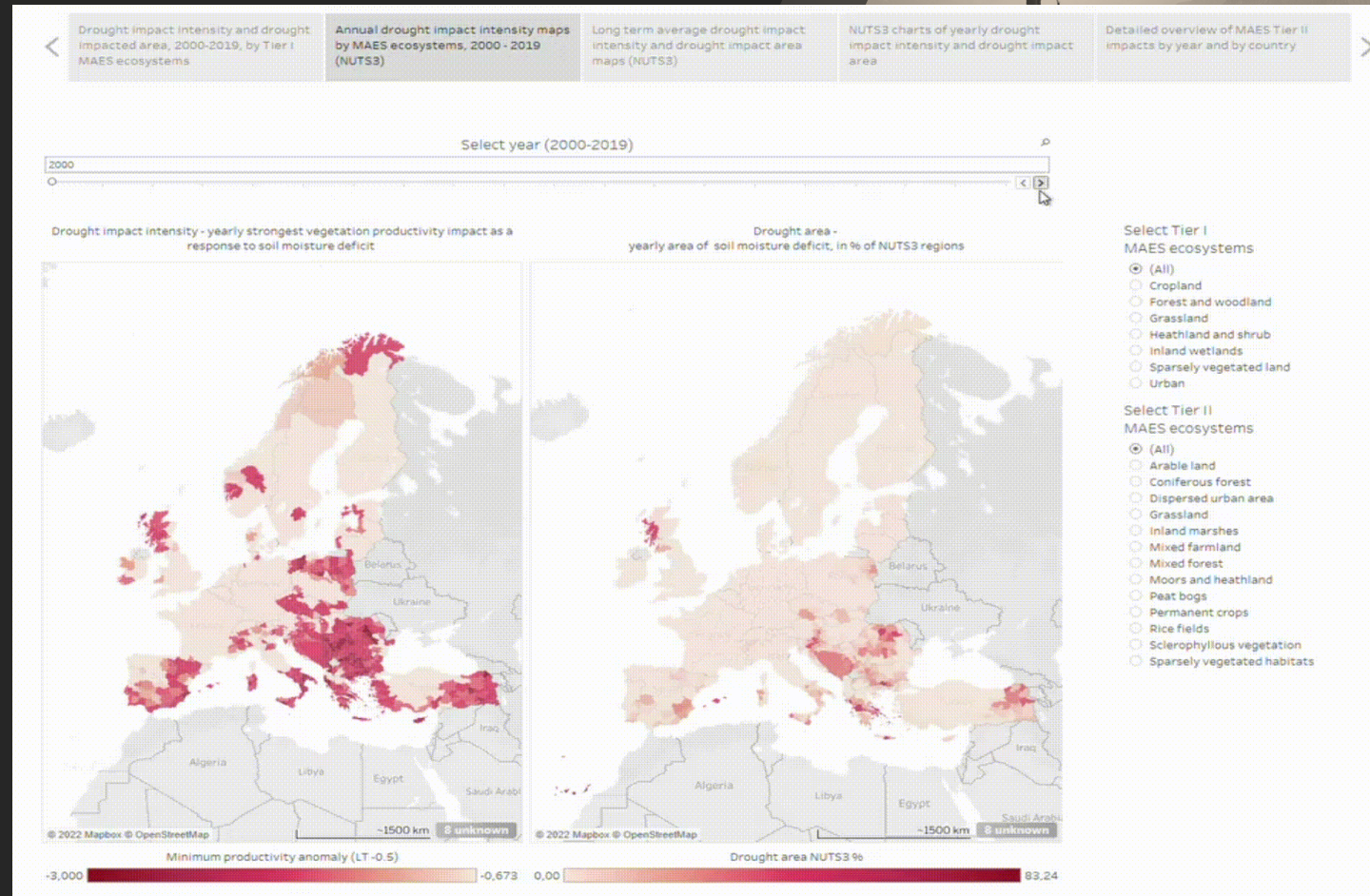
Understanding if the data is meaningful: web map platform

The screenshot displays the 'Integrated Data Platform Map Viewer' interface. The main map shows a topographic view of Europe with various geographical features and country borders. The interface includes a search bar at the top left, a 'Find address or place' input field, and a search button. On the right side, there is a 'Add layers to map' panel with a search bar and a list of available layers. Each layer entry includes a small thumbnail, the layer name, a description, and 'ADD' and 'DETAILS' buttons.

Layer Name	Description	Action
European_Mountain_Areas	Map Service by wms_100	ADD DETAILS
Natura2000_2019	Map Service by wms_100	ADD DETAILS
Biogeographical_regions	Map Service by wms_100	ADD DETAILS
EUDEM	Map Service by wms_100	ADD DETAILS
Bathing_water_quality	Map Service by wms_100	ADD DETAILS
UrbanAtlas_2006	Map Service by wms_100	ADD DETAILS
ECRINS_Drainage_Network	Map Service by wms_100	ADD DETAILS
Marine_regionsMarine_subregions	Map Service by wms_100	ADD DETAILS
Accounting_administrative_boundaries	Map Service by wms_100	ADD DETAILS
UrbanSprawl_UP_09	Map Service by wms_100	ADD DETAILS
Ecosystem_types	Map Service by wms_100	ADD DETAILS
EUHYDRO_RN	Map Service by wms_100	ADD DETAILS
Coastline	Map Service by wms_100	ADD DETAILS
EUDEM	Map Service by wms_100	ADD DETAILS
UWWTD_Treatment_Plants	Map Service by wms_100	ADD DETAILS

Translating geospatial data to meaningful, transparent messages

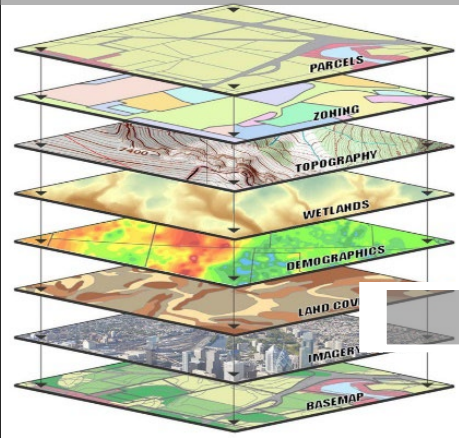
Understanding if the data is meaningful: time series



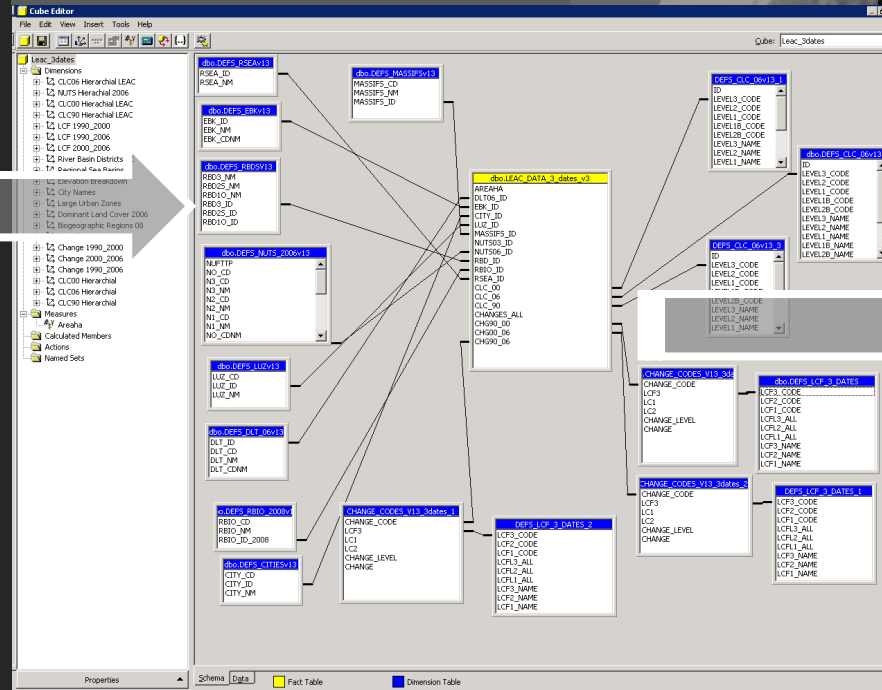
Translating geospatial data to meaningful, transparent messages

Converting meaningful data to accounting ready datasets

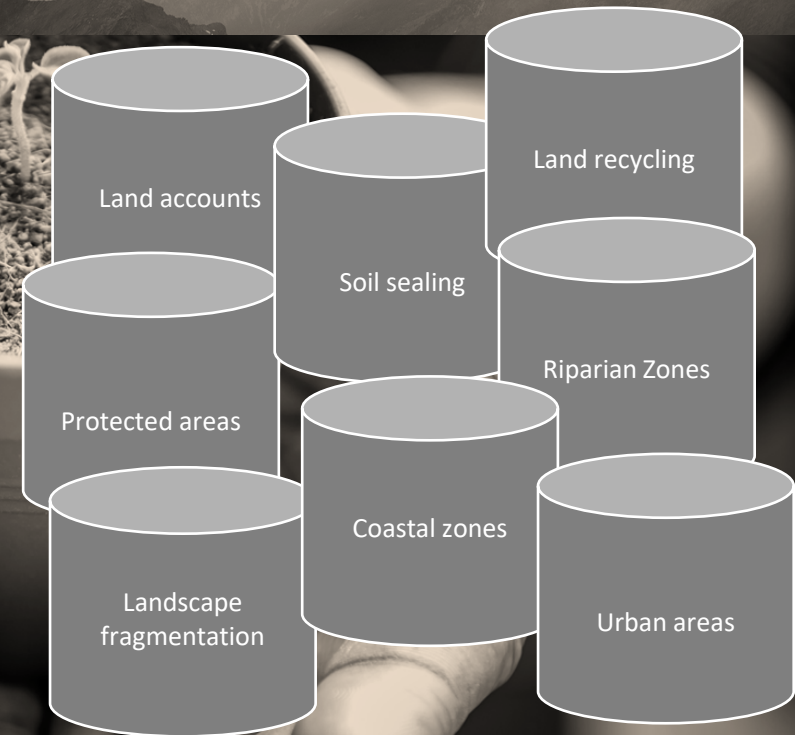
Spatial Data Infrastructure



Integrated Data Platform: analysis ready format Azure data bricks



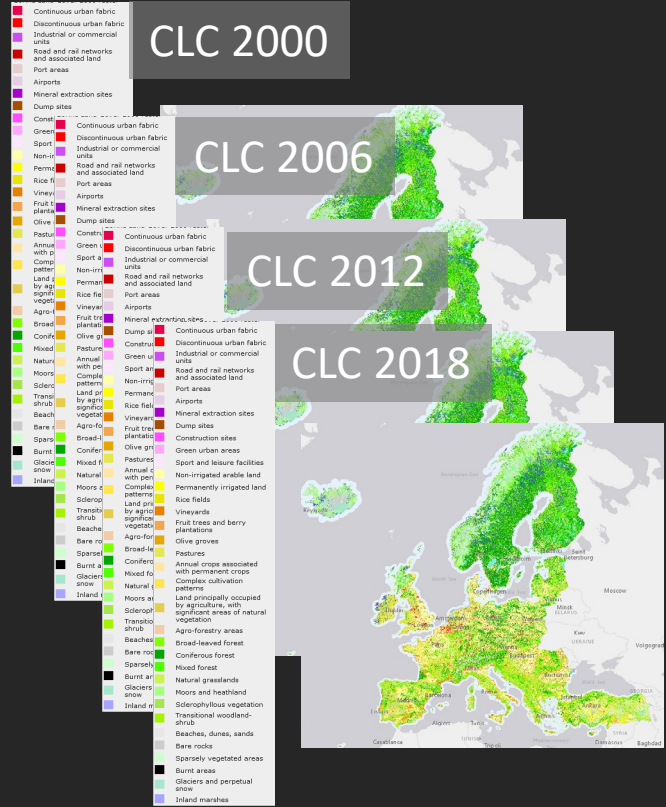
Data cubes: analytical databases with various and numerous dimensions as basis for assessment platform



Translating geospatial data to meaningful, transparent messages

Example: The land accounting system

Addressing “from” “to” changes results in a matrix of changes
(44 x 43 possibilities = 1892 possible changes)



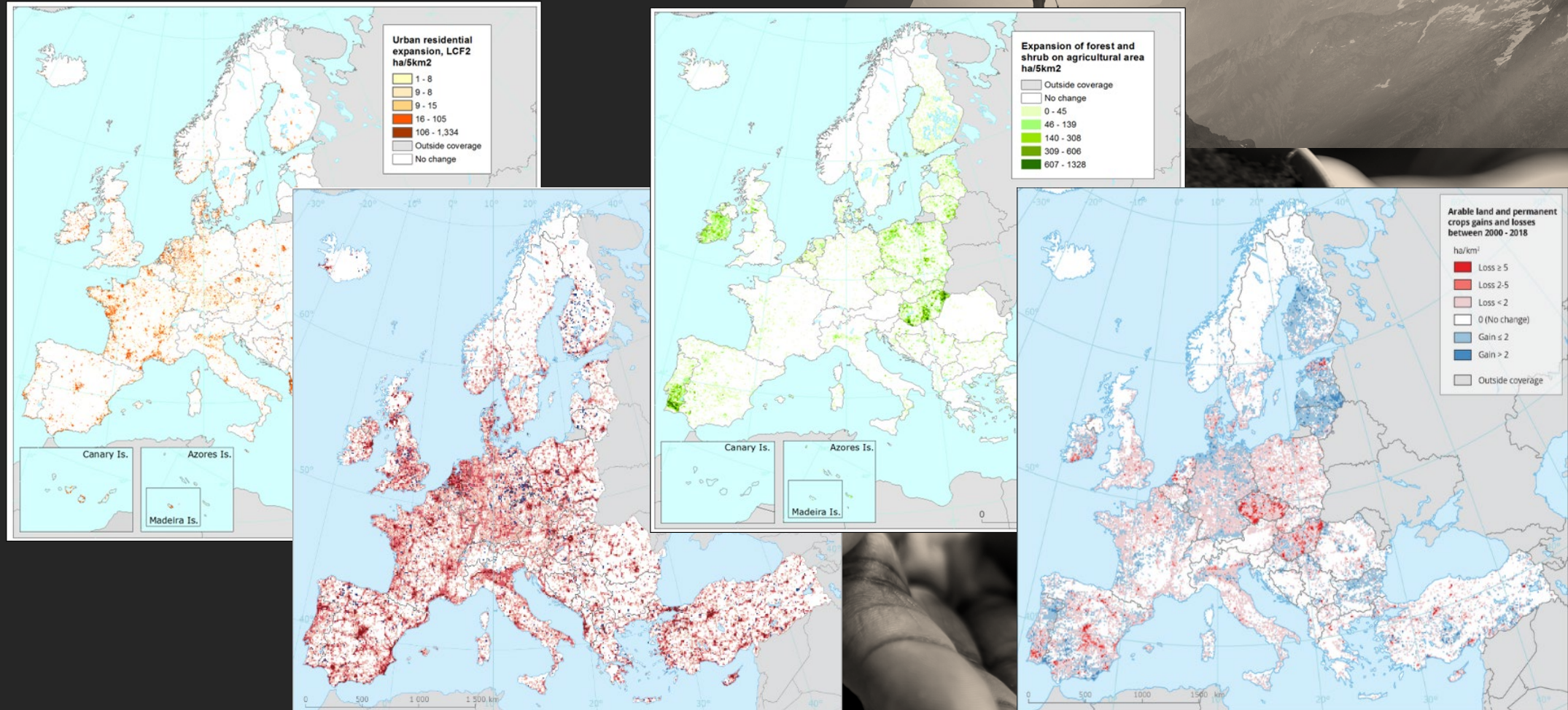
Land Cover Flows

- 9 Level 1 Land Cover Flows
- 50 Level 2 Land Cover Flows



Translating geospatial data to meaningful, transparent messages

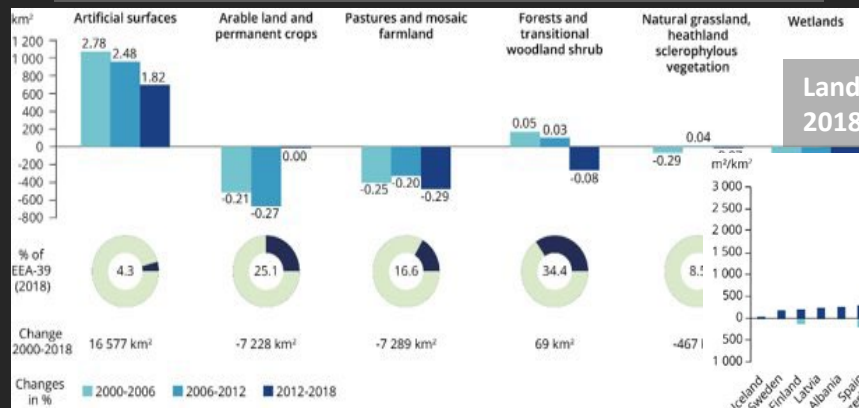
Land accounts in maps, for example:



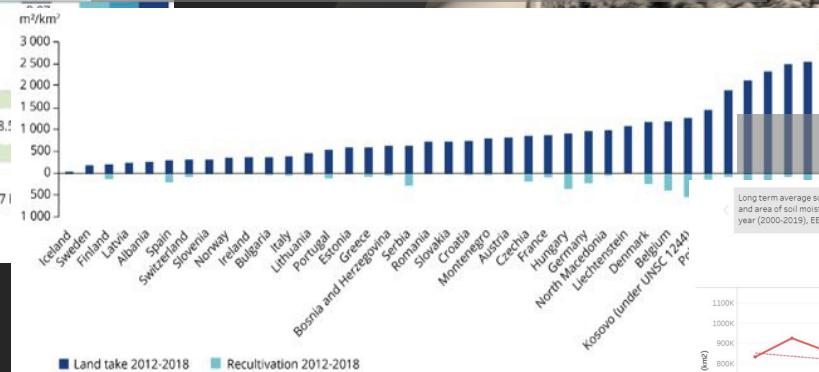
Translating geospatial data to meaningful, transparent messages

Land accounts in charts, for example:

Change in six major land cover types (in km²) in the EEA-39 during the period 2000-2018



Land take and land reclamation in the period 2012-2018 (as a share of the country's area)



Ecosystem pressure: soil moisture deficit



Translating geospatial data to meaningful, transparent Messages

New report on land take accounts in Functional Urban Areas (FUAs)

<https://www.eea.europa.eu/highlights/urban-sprawl-continues-at-the>

Drivers of land take: population growth, the need for transport infrastructure, cultural preferences and economic welfare.

Land use pressures: expansion of industrial and commercial units, sprawl of residential areas and the expansion of construction sites.

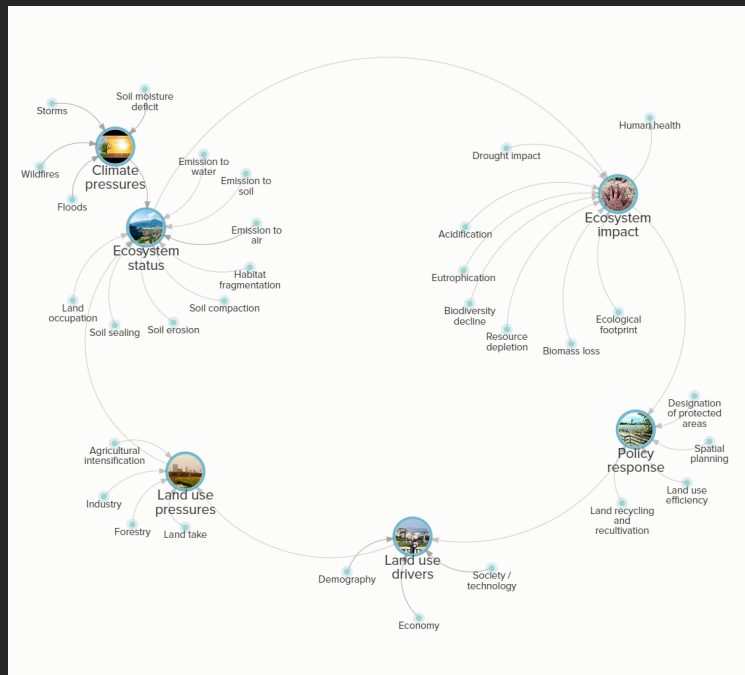
State between 2012 and 2018:

- land take increased by 3 581 km² and soil sealing increased by 1 467 km², **mostly at the expense of croplands and pastures.**
- Almost 80 % of land take took place in commuting zones
- Citizens in commuting zones use far more artificial areas than those in cities

Impacts:

- **46 % of the FUAs strongly fragmented,** forest habitats being most affected, followed by croplands and grasslands.
- **The average habitat size within FUAs is 0.25 km²,** while outside FUAs habitats are 1.4 km² on average.
- The average habitat size in a protected area is approximately 2.5 km²
- Most land take and sealing impacted lands with high productivity potential.
- Soil sealing caused a **loss of carbon sequestration potential estimated at 4 million tonnes of carbon** of the FUAs.
- Sealing also caused an estimated **potential loss of water-holding capacity of 668 million m³.**

• -> Policy response





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

Ecosystem accounts: <https://www.eea.europa.eu/data-and-maps/data/data-viewers/ecosystem-extent-accounts>

Land take: <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>

Soil sealing and ecosystem impacts: <https://www.eea.europa.eu/data-and-maps/dashboards/soil-sealing-and-ecosystem-impacts>

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

Landscape fragmentation: <https://www.eea.europa.eu/data-and-maps/data/data-viewers/landscape-fragmentation-in-europe>

Protected areas (NATURA2000): <https://www.eea.europa.eu/data-and-maps/dashboards/natura-2000-data-viewer>

Floodplains: <https://www.eea.europa.eu/data-and-maps/data/data-viewers/floodplain-areas>

Soil moisture: <https://www.eea.europa.eu/data-and-maps/data/data-viewers/soil-moisture>

Drought impact: <https://www.eea.europa.eu/data-and-maps/data/data-viewers/drought-impact-on-ecosystems-in>

Drought productivity and land use: <https://www.eea.europa.eu/data-and-maps/dashboards/vegetation-productivity-and-land-use>

Urban Green Infrastructure: <https://www.eea.europa.eu/data-and-maps/dashboards/urban-green-infrastructure-2018>

Urban SDG 11.3.1 Land consumption per capita: <https://www.eea.europa.eu/data-and-maps/dashboards/land-use-efficiency-in-functional>



Thank you for your attention

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Please see also:

EEA briefing on Land and ecosystems accounts:
<https://www.eea.europa.eu/themes/landuse/land-accounting>

Technical report on land and ecosystem account method:
<https://www.eionet.europa.eu/etcs/etc-di/products/etc-uls-report-02-2020-land-and-ecosystem-accounts-for-europe-towards-geospatial-environmental-accounting>

EEA report on land take and its impacts:
<https://www.eea.europa.eu/highlights/urban-sprawl-continues-at-the>

