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Ecological Connectivity based on Remote Sensing Land Cover Classes as a Biodiversity Pilot Case for the Green Deal Data Space

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EUROPEAN GREEN DEAL

Green Deal Data Space

The common European Green Deal Data Space (GDDS) will interconnect currently **fragmented** and **dispersed data** from various ecosystems, both for/from the private and public sectors, to support the objectives of the European Green Deal. It will offer an **interoperable**, trusted IT environment for **data processing**, and a set of rules of legislative, administrative and contractual nature that determine rights of **access to and use** of the data.

The **European Green Deal**. **Accessible and interoperable data** are at the heart of data-driven innovation. This data, combined with **digital infrastructure** and **artificial intelligence** solutions, facilitate evidence-based decisions and expand the capacity to understand and tackle environmental challenges.

The European Green Deal
- CLIMATE PACT AND CLIMATE LAW
- PROMOTING CLEAN ENERGY
- INVESTING IN SMARTER, MORE SUSTAINABLE TRANSPORT
- STRIVING FOR GREENER INDUSTRY
- PROTECTING NATURE
- ELIMINATING POLLUTION
- FROM FARM TO FORK
- ENSURING A JUST TRANSITION FOR ALL
- LEADING THE GREEN CHANGE GLOBALLY
- FINANCING GREEN PROJECTS
- MAKING HOMES ENERGY EFFICIENT

- **Legally protect at least 30%** of the EU's land area.
- **Strictly protect** at least a third of the EU's protected areas - representing **10% of the EU land** - including all remaining primary and old-growth forests as well as other carbon rich ecosystems.
- **Create and integrate ecological corridors** as part of a **Trans European Nature Network** to prevent genetic isolation, allow for species migration and to maintain and enhance healthy ecosystems.
- Effectively **manage all protected areas**, defining clear conservation objectives and measures, and monitoring them appropriately.
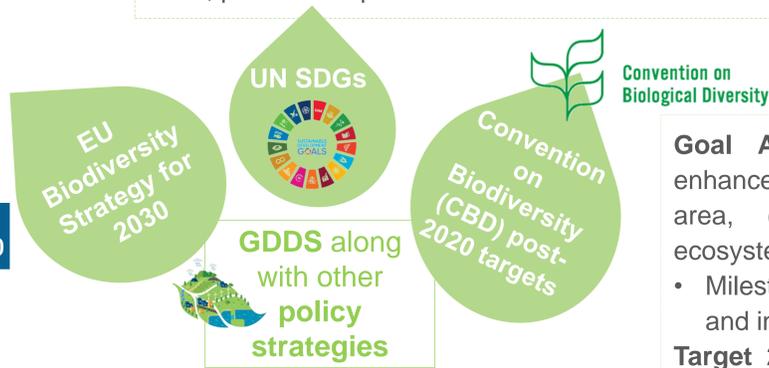
EU Biodiversity Strategy for 2030

15 LIFE ON LAND

15.1. By 2020, ensure the **conservation**, **restoration** and sustainable use of terrestrial and inland freshwater ecosystems and their services.
15.2. By 2020, implement sustainable **management** of all types of forests, halt deforestation, restore degraded forests and increase afforestation and reforestation.
15.5. Action to reduce the **degradation** of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species.

EU Biodiversity Strategy for 2030 · **UN SDGs** · **Convention on Biodiversity (CBD) post-2020 targets** · **GDDS along with other policy strategies**

Convention on Biological Diversity

Goal A. The integrity of all ecosystems is enhanced, with an increase of at least 15% in the area, connectivity and integrity of natural ecosystems.
- Milestone A.1. Net gain in the area, **connectivity** and integrity of natural systems of at least 5%.
Target 2. Ensure that at least 20% of degraded terrestrial ecosystems are under restoration, ensuring **connectivity** and focusing on priority ecosystems.
Target 3. Ensure that at least 30% globally of land areas, especially areas of particular importance are conserved, ecologically representative and **well-connected systems of protected areas** and other effective.

Ecological Connectivity as a testbed to define Data Spaces on Biodiversity in EU-funded AD4GD

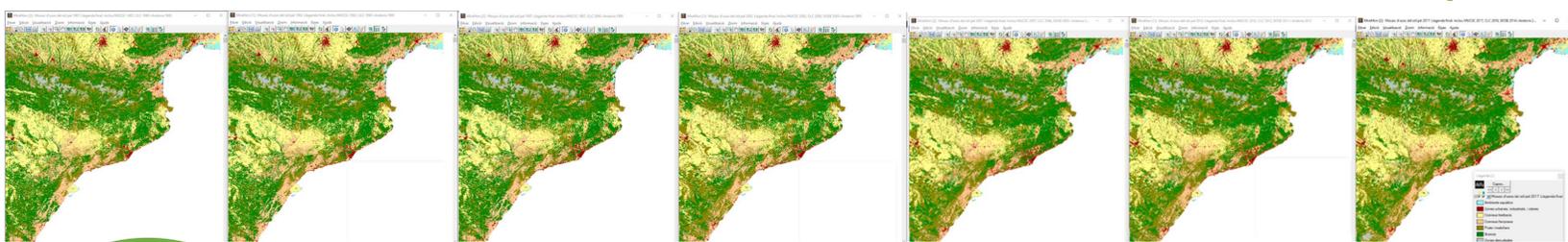**All Data 4 Green Deal. An Integrated, FAIR Approach for the Common European Data Space**
Co-create and shape the European Green Deal Data Space as an open hub for FAIR data and standards-based services that support the key priorities of pollution, biodiversity and climate change

Biodiversity pilot challenges:
- Monitor ecological connectivity in terrestrial ecosystems through the integration of state-of-the-art
(1) **multi-sensor remote sensing** imagery, (2) **ecological models**, (3) **in-situ** biodiversity observations and (4) **sensors**.
- Assessing habitat species distribution and **fragmentation**.
- Forecasting ecological connectivity to help to define effective **actions** to reduce terrestrial biodiversity loss.
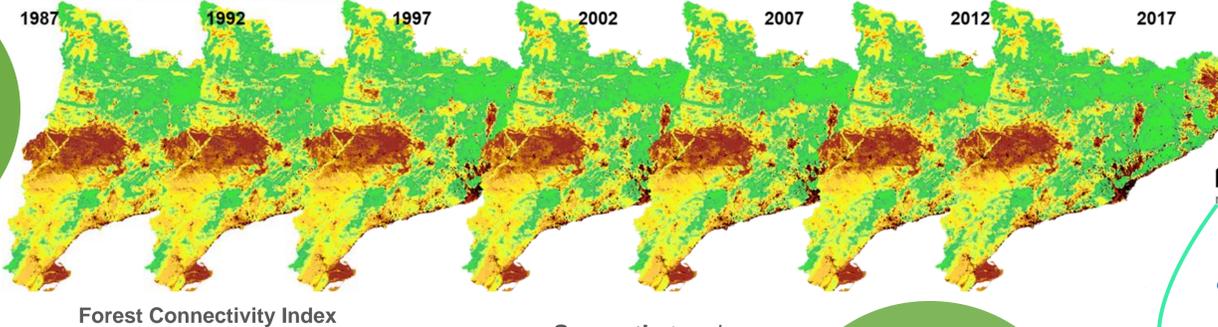
Catalonia as a pilot area

(1) Time series Land Use/Land Cover map based on Sentinel 2 & Landsat imagery

1987 · 1992 · 1997 · 2002 · 2007 · 2012 · 2017

(2) From LULC maps to Ecological Connectivity Index based ecological models
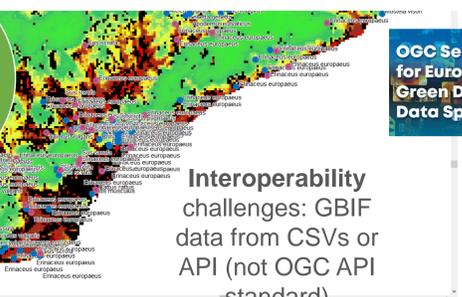
Forest Connectivity Index

Based on:
- **González-Guerrero, O., Pons, X. 2020. The 2017 Land Use/Land Cover Map of Catalonia based on Sentinel-2 images and auxiliary data**. Revista de Teledetección, 55, 81-92. https://doi.org/10.4995/raet.2020.13112

Based on:
- **Marull Joan, Mallarach Josep M. (2005). A GIS methodology for assessing ecological connectivity: application to the Barcelona Metropolitan Area**. Landscape and Urban Planning. Volume 71, Issues 2–4. Pages 243-262. https://doi.org/10.1016/j.landurbplan.2004.03.007
- **Pino, Joan. (2012). Ecological networks: Are they enough for connectivity conservation? A case study in the Barcelona Metropolitan Region (NE Spain)**. Land Use Policy. 29. https://doi.org/10.1016/j.landusepol.2011.11.004

rasdaman raster data management · **OPEN DATA CUBE** · **FAIRICUBE**

(3) In-situ observations on species occurrences, i.e. GBIF

Interoperability challenges: GBIF data from CSVs or API (not OGC API standard)

Semantic tagging using GEO **Essential Variables** and OGC RAINBOW Definition Server

OGC SensorThings API for European Green Deal Data Spaces

(4) Integration of data sensors: IoT, camera traps, species tracking

Solution for the Green Deal data Space

AD4GD

Open data — **Protected sensitive data**

FAIR

GEO · GEO community activity report: Mainstreaming EVs across GEO

Open Geospatial Consortium

INTERNATIONAL DATA SPACES ASSOCIATION (connectors, offerings)

eosc