



Land Monitoring

COPERNICUS LAND MONITORING SERVICE

Den Haag, 13.06.2018

hans.dufourmont@eea.europa.eu



Land Monitoring

WAAROM EEN COPERNICUS LAND MONITORING DIENST?





Land
Monitoring

COPERNICUS LAND MONITORING SERVING DECISION MAKING



Source: EEA. Launch SOER2015



Land
Monitoring

ADDRESSING EMERGING USER NEEDS

1. Protect, conserve and enhance the EU's natural capital



2. Turn the EU into a resource-efficient, green and competitive low-carbon economy



3. Safeguard EU citizens from environment-related pressures and risks to health and wellbeing



© Keith Arkins, Environment & Me /EEA

Source: 7th Environment Action Programme 2020



Land Monitoring

DEVELOPING A SUSTAINABLE URBAN ENVIRONMENT



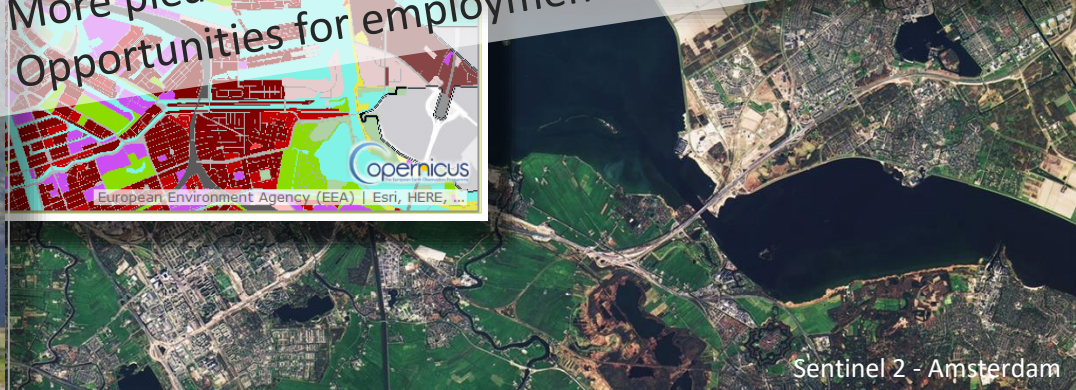
A WALK TO THE PARK?
ASSESSING ACCESS TO GREEN AREAS IN EUROPE'S CITIES
UPDATE USING COMPLETED COPERNICUS URBAN ATLAS DATA

Ruigo Poelman

Working Paper
A technical report based on ongoing research and preliminary findings. It is intended for internal use only.
WP 01/2018

Regenerational Urban Policy

- 😊 Improved air quality
- 😊 Noise reduction and human health
- 😊 Improved climatic conditions – mitigating heat stress
- 😊 Outdoor recreation and physical activity
- 😊 More pleasant, less stressful environment
- 😊 Opportunities for employment



Sentinel 2 - Amsterdam



Land
Monitoring

SUSTAINABLE USE OF AGRICULTURAL LAND

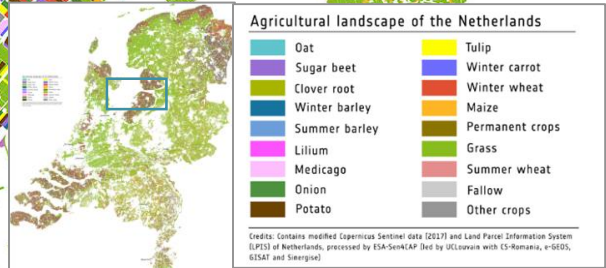
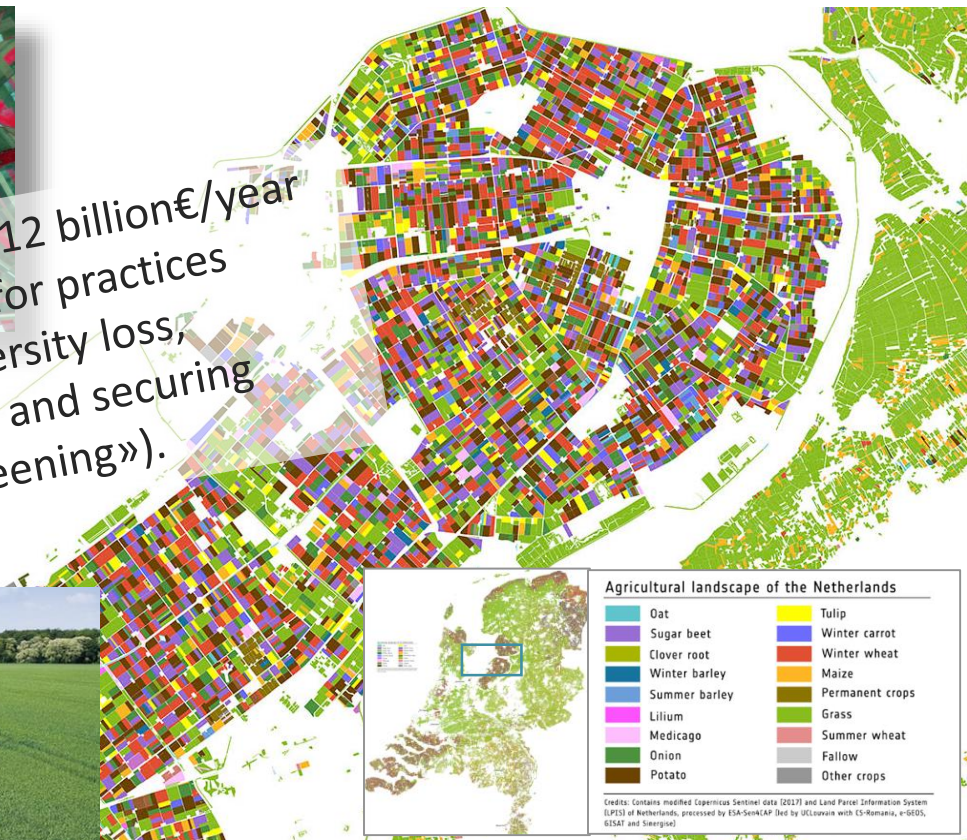


Sentinel 2

☺ From 2015 onwards roughly 12 billion€/year direct payments to farmers for practices aimed at addressing biodiversity loss, avoiding crop monoculture and securing carbon sequestration («greening»).



Smart farming



© modified Copernicus Sentinel data (2017), processed by ESA-Sen4CAP (led by UCLouvain with CS-Romania, e-GEOS, GISAT and Sinergise)

European Environment Agency



European
Commission





Land
Monitoring

MONITORING CHANGES IN ECOSYSTEMS

😊 By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems.



Technical Report - 2014 - 050

Mapping and Assessment of Ecosystems and their Services

Indicators for ecosystem assessments under Action 5 of the EU Biodiversity Strategy to 2020

2nd Report - Final, February 2014

Environment

European Environment Agency



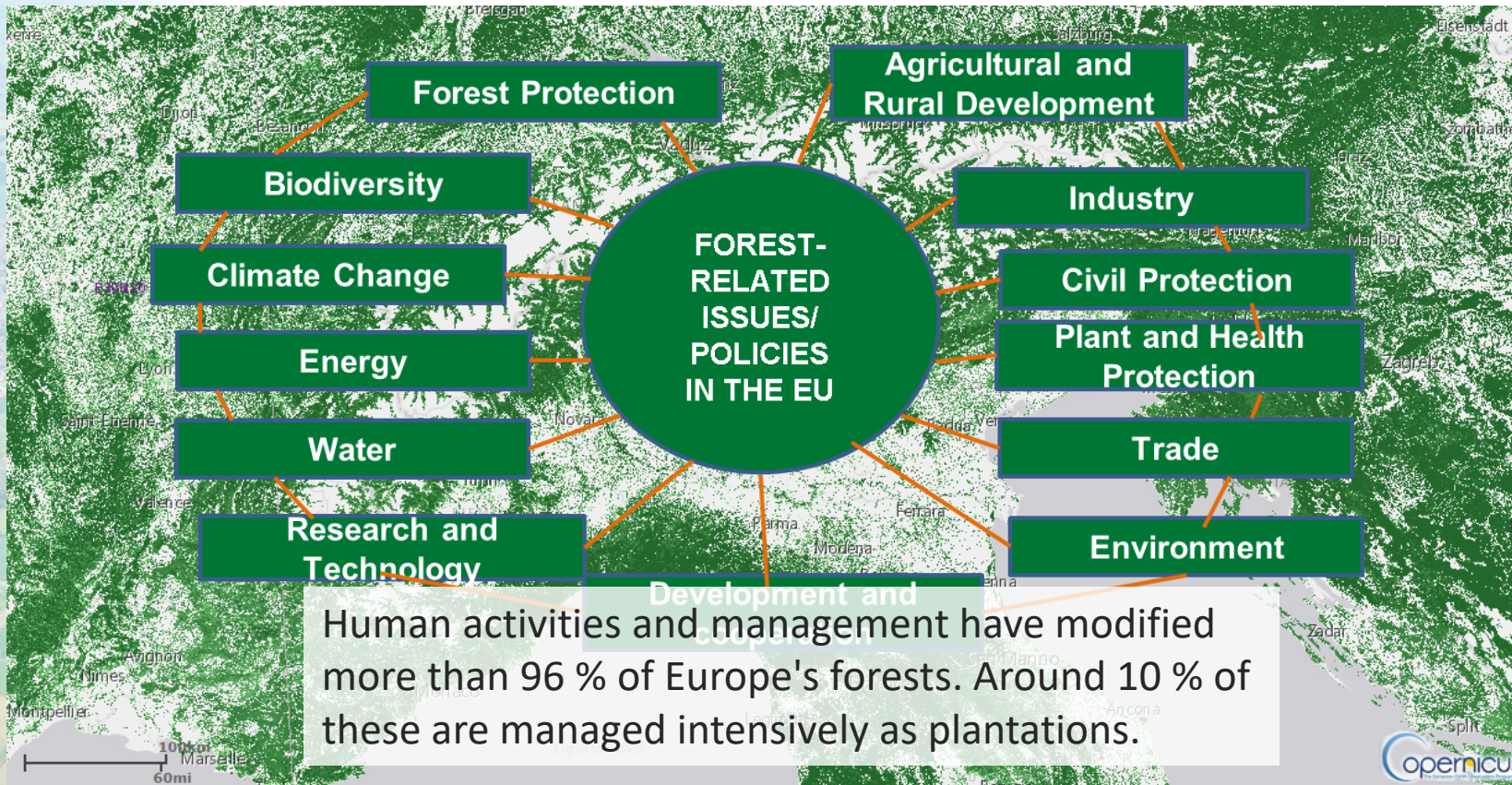
European Commission

Copernicus
Europe's eyes on Earth



Land
Monitoring

SUPPORTING SUSTAINABLE FOREST MANAGEMENT





Land Monitoring

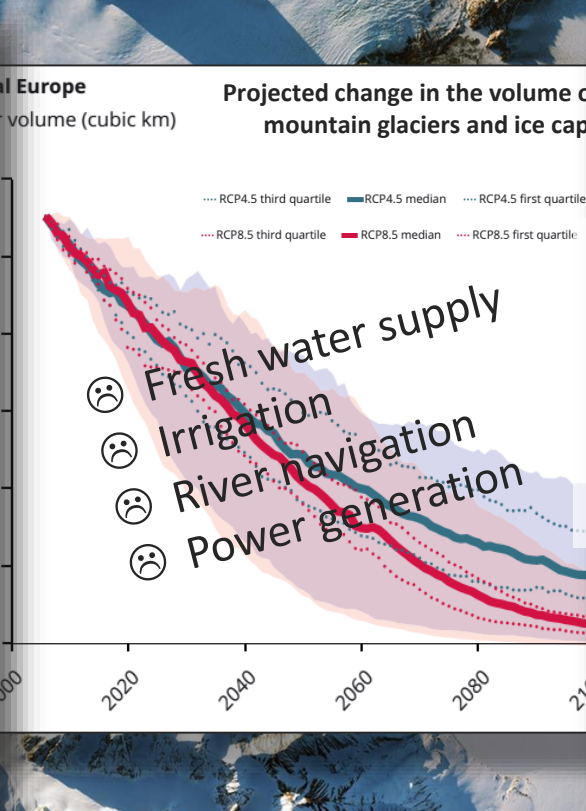
MONITORING CLIMATE CHANGE, IMPACT AND VULNERABILITY

EEA Report | No 1/2017

Climate change, impacts and vulnerability in Europe 2016
An indicator-based report

ISSN 1977-8449

European Environment Agency



EEA Report | No 2/2017

Financing urban adaptation to climate change

ISSN 1977-8449

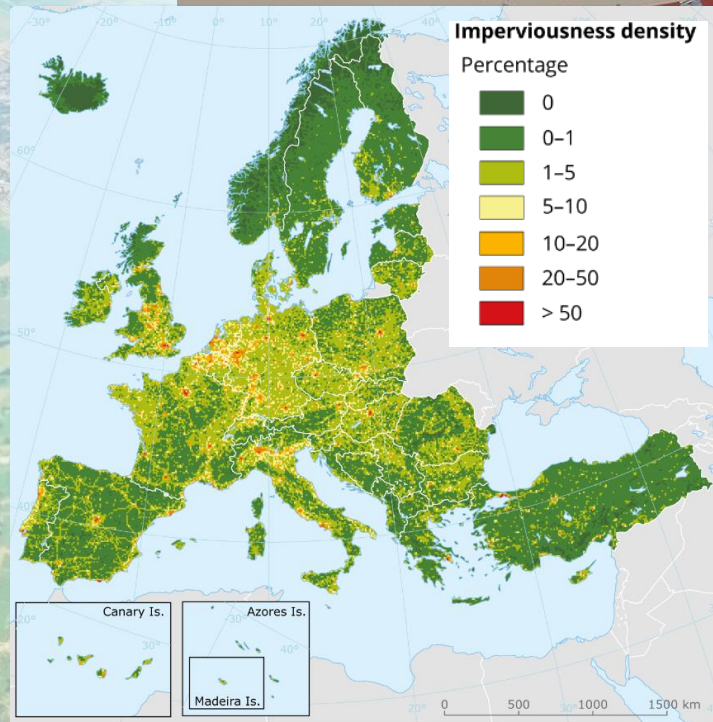
😊 At least 20 % of all EU expenditures in the MFF2014-2020 earmarked for climate change action, for both mitigation and adaptation.

European Environment Agency



Land
Monitoring

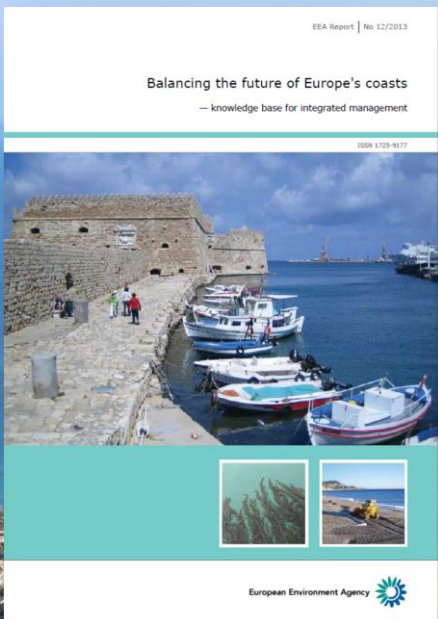
SAFEGUARDING CITIZENS FROM RISKS TO HEALTH AND WELL-BEING



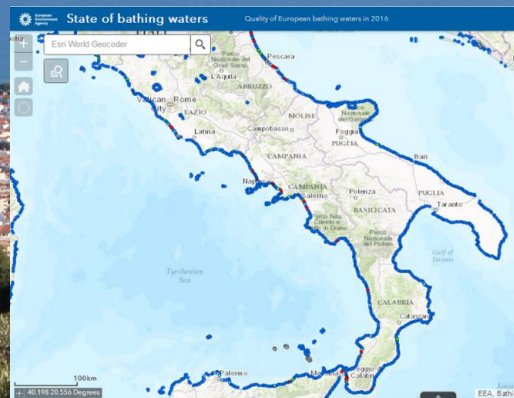


Land
Monitoring

SUPPORTING INTEGRATED COASTAL ZONE MANAGEMENT



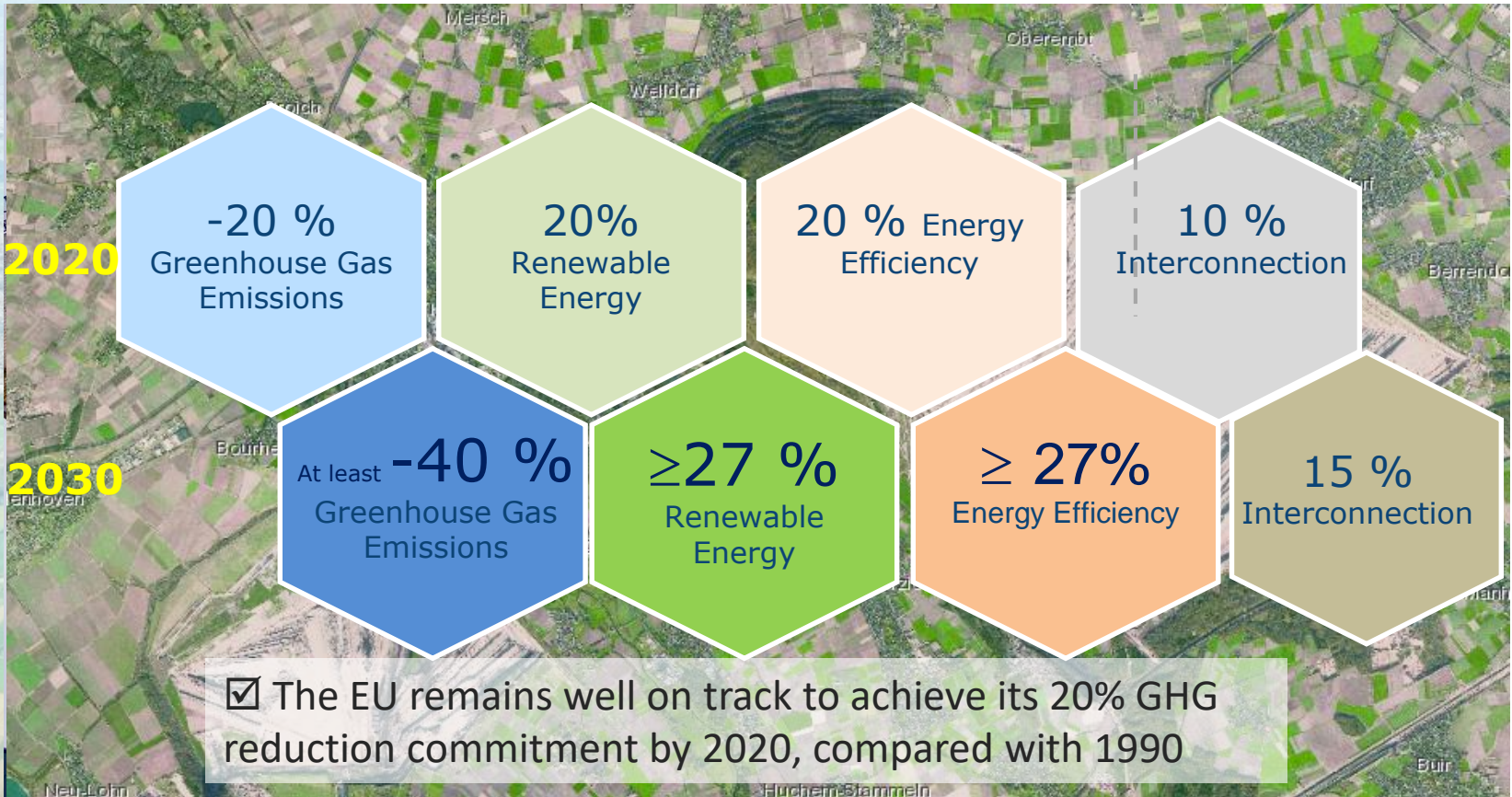
Europe is the world's primary tourism destination and tourism generates 10 % of EU GDP.





Land
Monitoring

ENERGY UNION - MONITORING, REPORTING AND VERIFICATION LULUCF



The EU remains well on track to achieve its 20% GHG reduction commitment by 2020, compared with 1990



Land
Monitoring

UN SUSTAINABLE DEVELOPMENT GOALS (SDG)

| | | | | | |
|-------------------------------|--|--|------------------------------------|--|---|
| 1 NO POVERTY | 2 NO HUNGER | 3 GOOD HEALTH | 4 QUALITY EDUCATION | 5 GENDER EQUALITY | 6 CLEAN WATER AND SANITATION |
| 7 RENEWABLE ENERGY | 8 GOOD JOBS AND ECONOMIC GROWTH | 9 INNOVATION AND INFRASTRUCTURE | 10 REDUCED INEQUALITIES | 11 SUSTAINABLE CITIES AND COMMUNITIES | 12 RESPONSIBLE CONSUMPTION |
| 13 CLIMATE ACTION | 14 LIFE BELOW WATER | 15 LIFE ON LAND | 16 PEACE AND JUSTICE | 17 PARTNERSHIPS FOR THE GOALS | |

THE GLOBAL GOALS
For Sustainable Development



Land Monitoring

OVERZICHT VAN DE COPERNICUS LAND MONITORING SERVICE PORTFOLIO



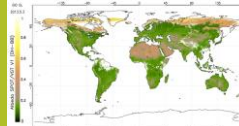


Land
Monitoring

COPERNICUS LAND MONITORING SERVICE (CLMS)



Systematic Biophysical Monitoring



Land Cover & Land Use mapping



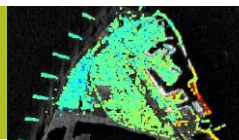
Thematic hotspot mapping



Reference data

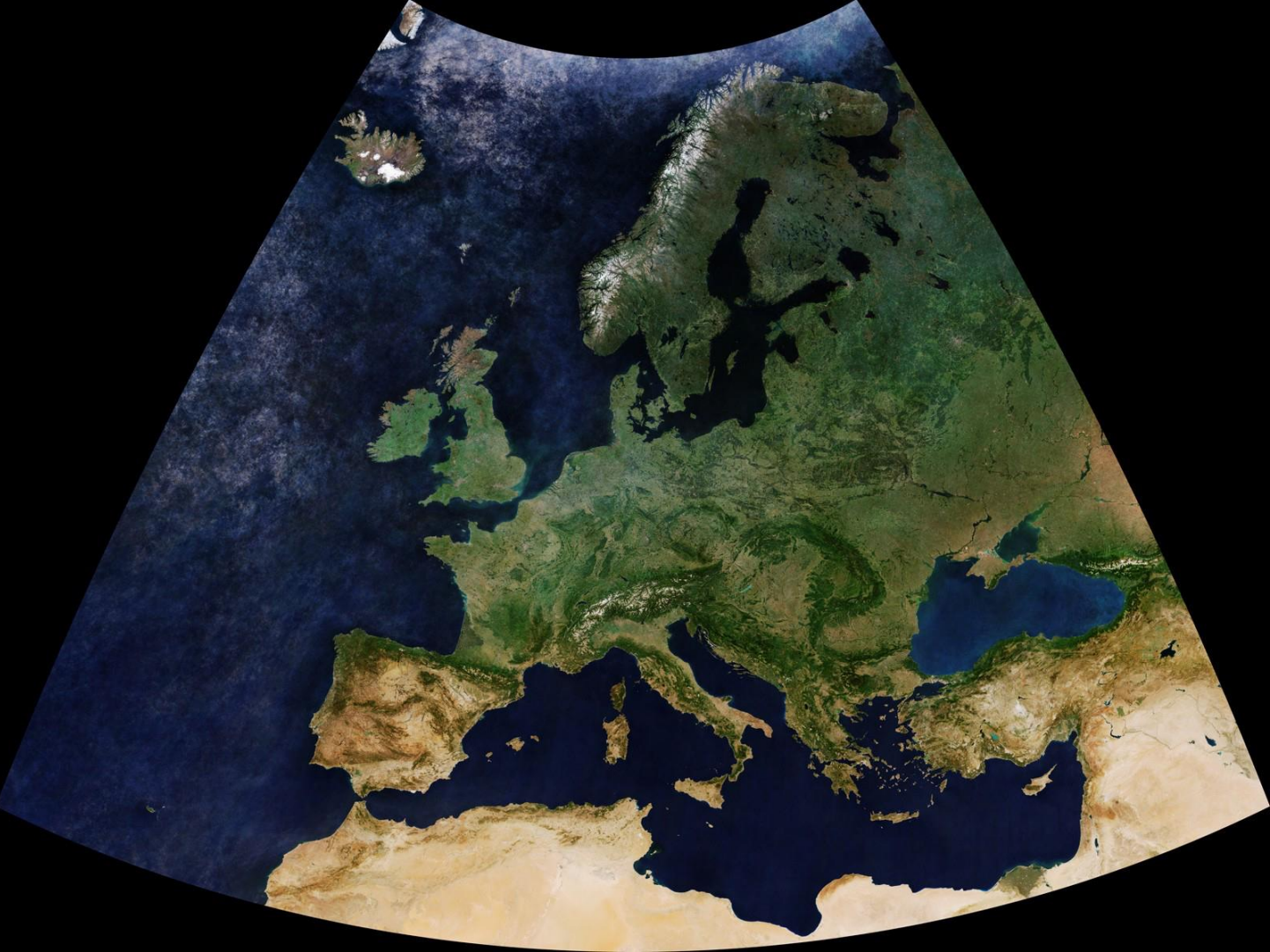


Ground Motion service





Land
Monitoring

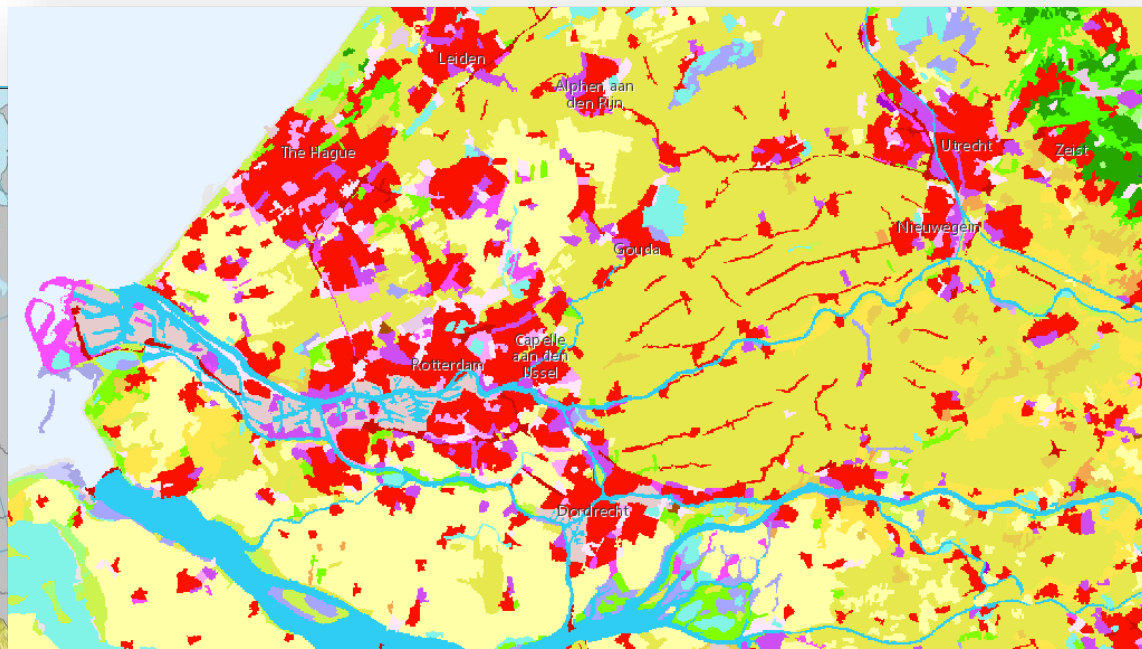
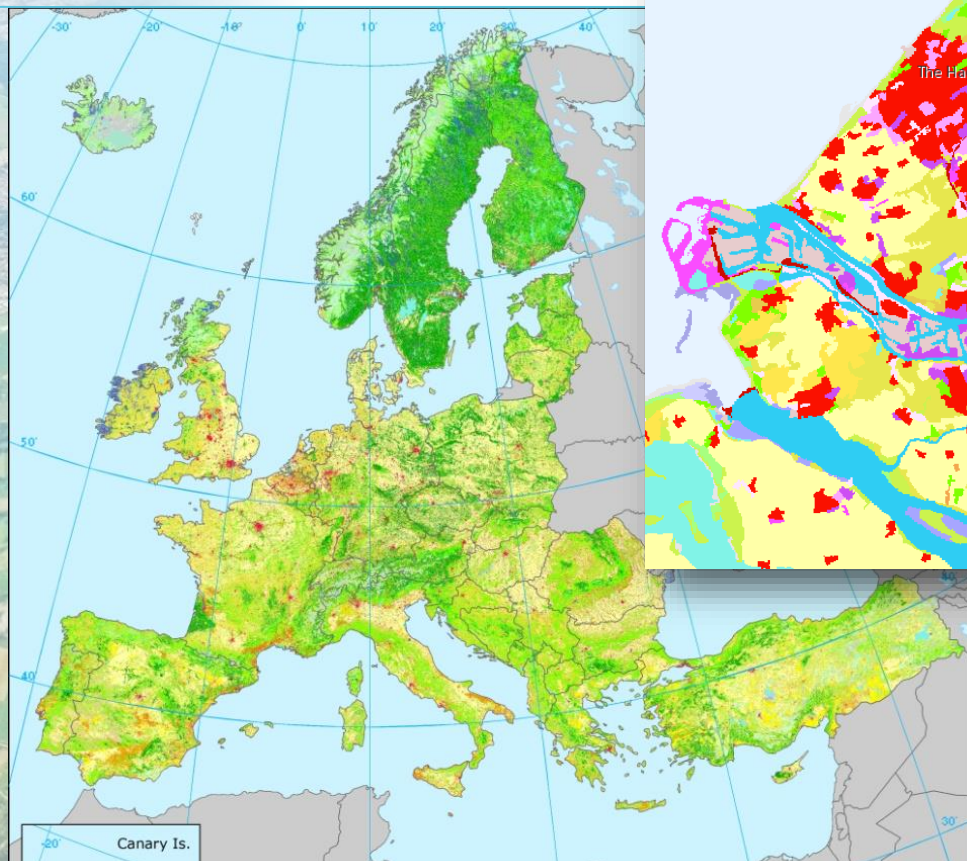


Source:
Sinergise,
S3 mosaic



Land
Monitoring

CORINE LAND COVER TIME SERIES: 1990 – 2000 – 2006 – 2012 - 2018



European Environment Agency



European
Commission

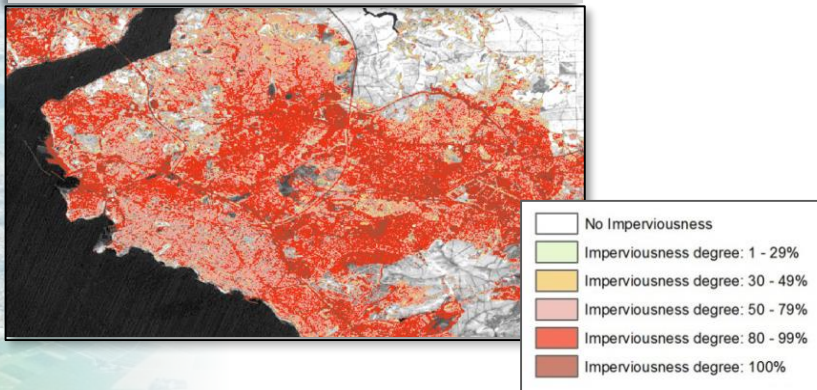
Copernicus
Europe's eyes on Earth



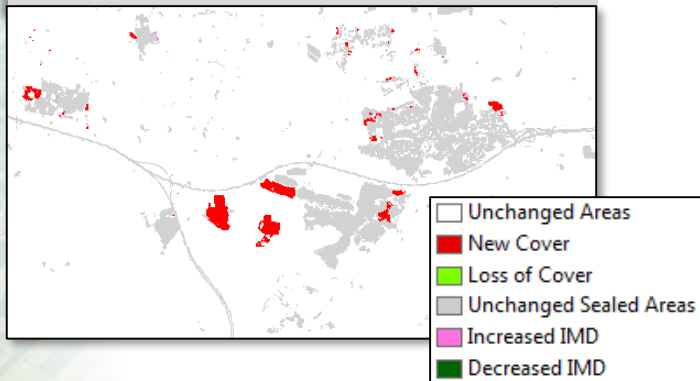
Land
Monitoring

HRL IMPERVIOUSNESS (IMP)

Degree of Imperviousness 2015

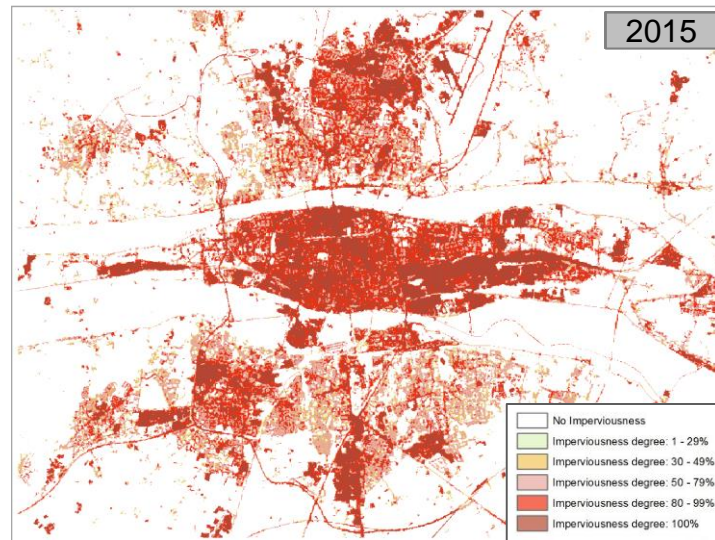


Imperviousness Classified Change 2012-2015



Level of sealing of soil:

High-quality information on
imperviousness change in Europe
(2006/2009/2012/2015).



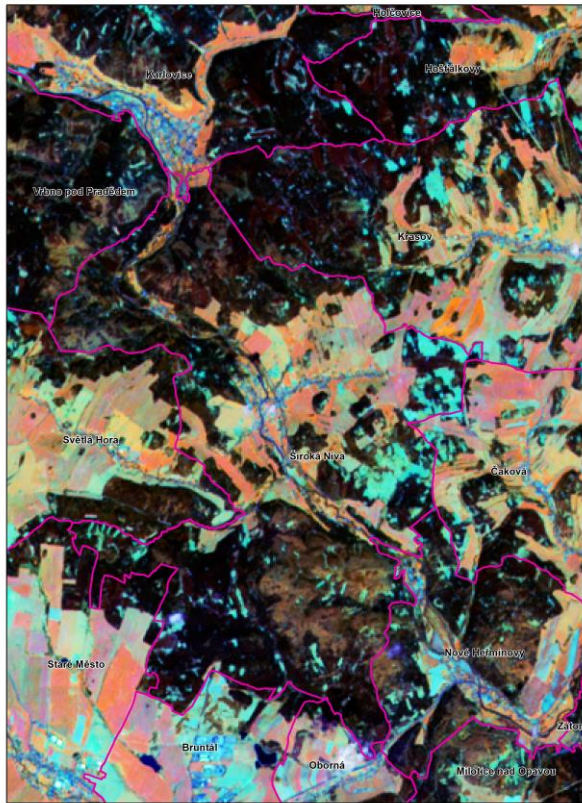


Land
Monitoring

MONITORING FOREST DEGRADATION IN CZ (2011 – 2017)

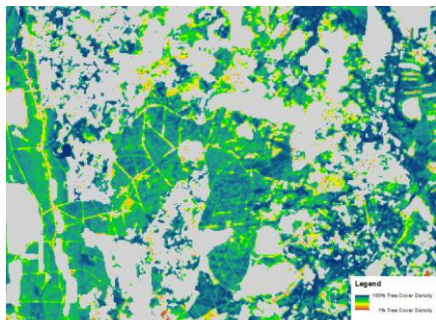
květen 2011

2011



Top: Bark beetle affecting forests

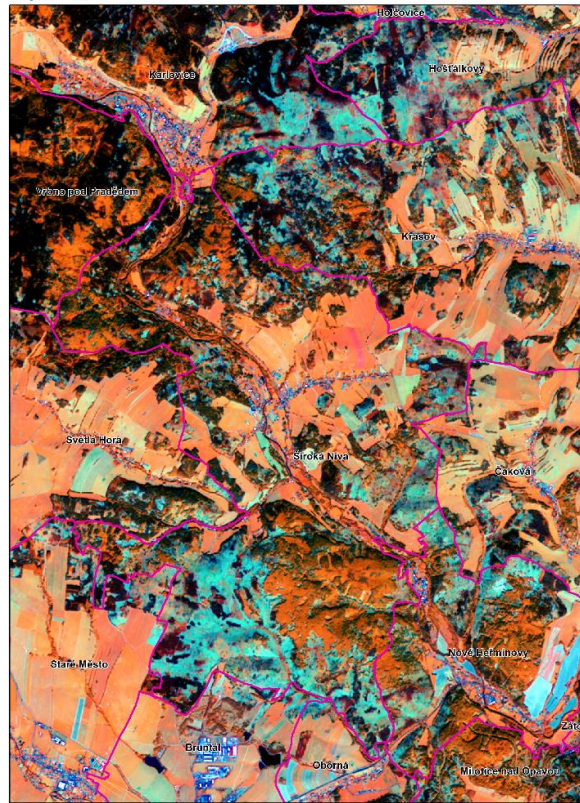
Bottom: Tree Cover Density Map



20m Tree Cover Density 2015. Produced using modified Copernicus Sentinel data [2016]

srpen 2017

2017





PAN-EUROPEAN COMPONENT – HIGH RESOLUTION LAYERS (HRL'S)

Imperviousness and imperviousness change products

- Degree of Imperviousness and Imperviousness Change (0-100%)
- 2006-2009-2012-2015
- 20 m and 100 m

Forest

- Tree Cover Density (0-100%)
- Dominant Leaf Type
- 2012-2015
- 20 m and 100 m

Grassland

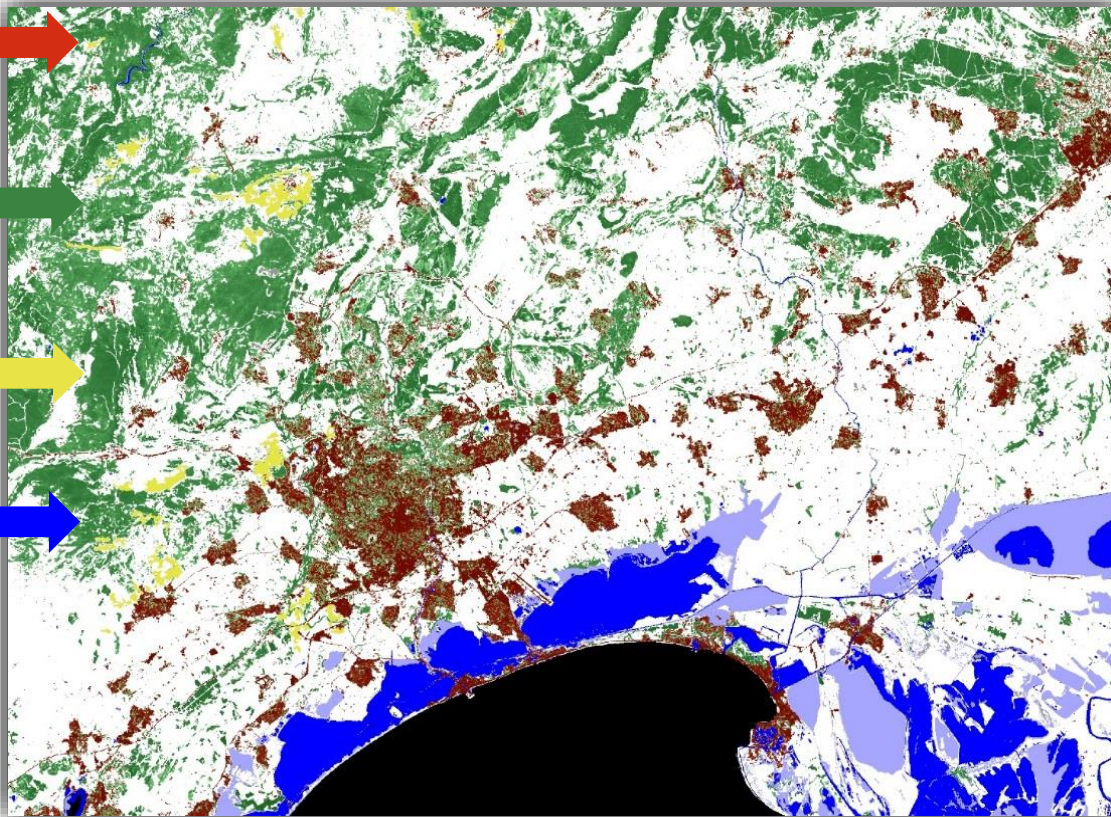
- Grassland (binary)
- 2012
- 20 m and 100 m

Water and Wetness

- Permanent/Temporary Water
- Permanent/Temporary Wetness
- Based on 2009-2016 time series

Small Woody Features

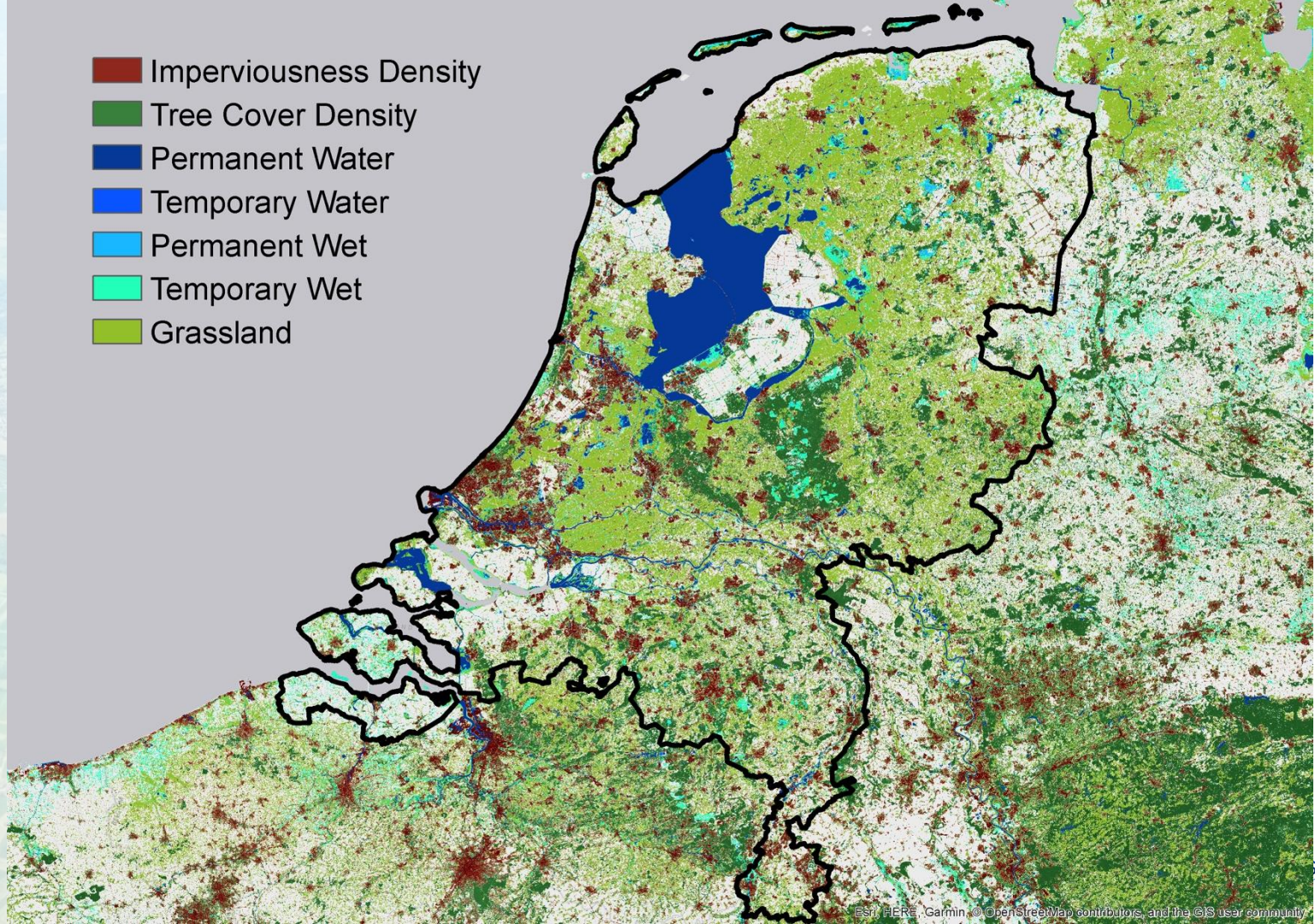
- Linear and patchy structures (binary)
- 2015





Land
Monitoring

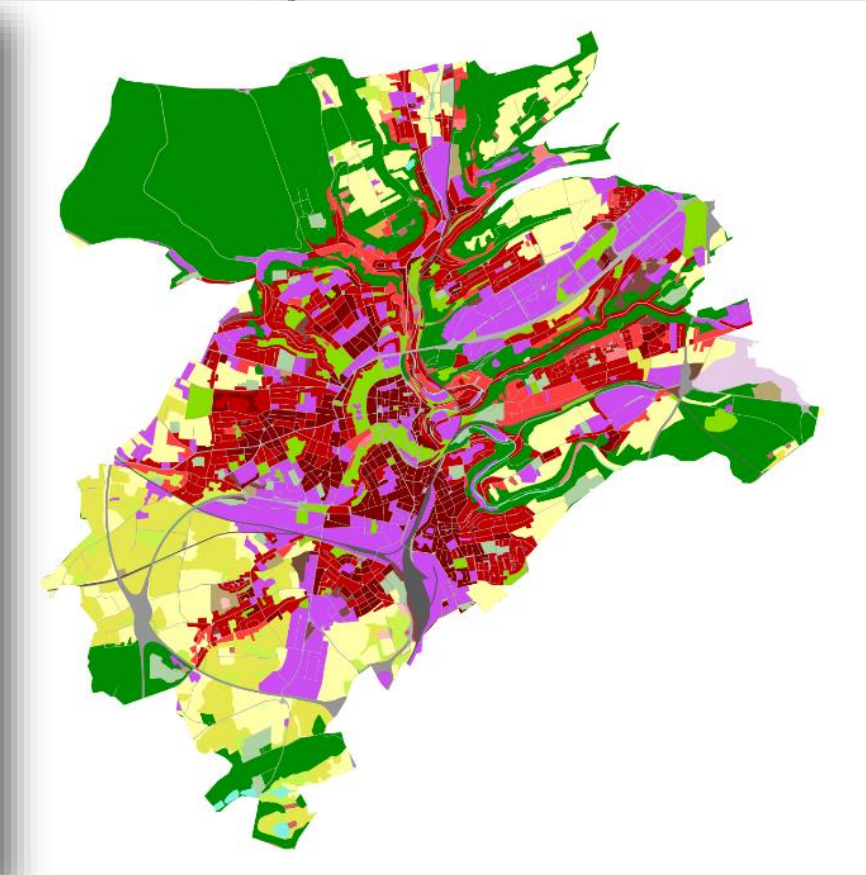
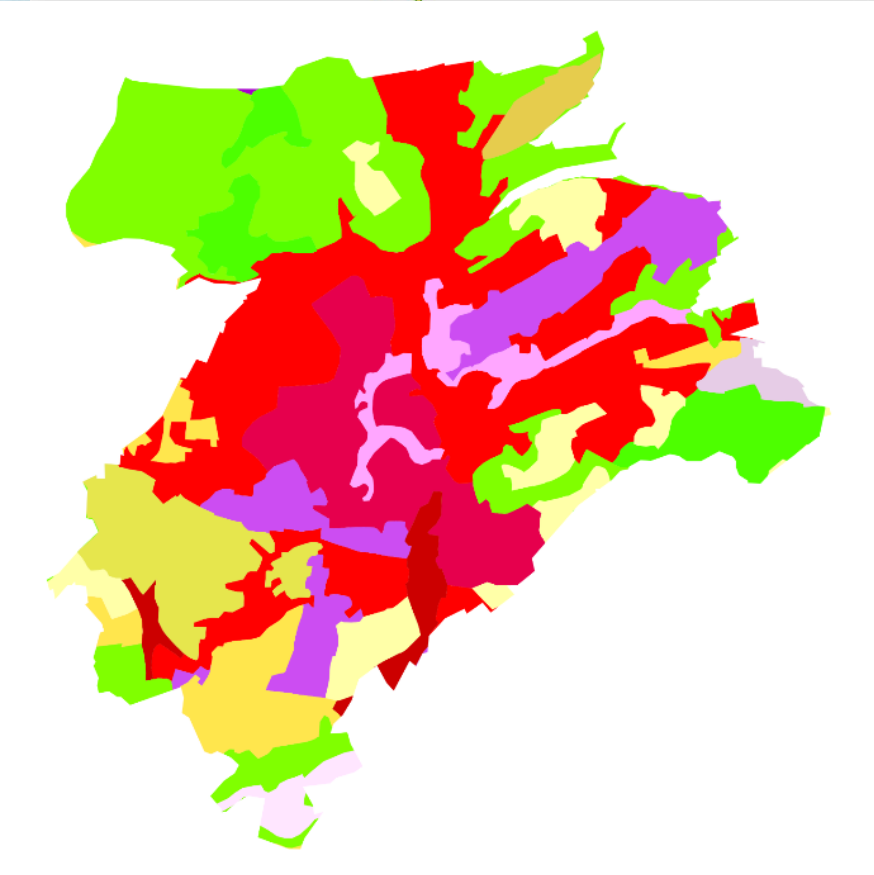
- Imperviousness Density
- Tree Cover Density
- Permanent Water
- Temporary Water
- Permanent Wet
- Temporary Wet
- Grassland





Land
Monitoring

FROM PAN-EUROPEAN (CLC) TO HOTSPOT (URBAN ATLAS) MAPPING

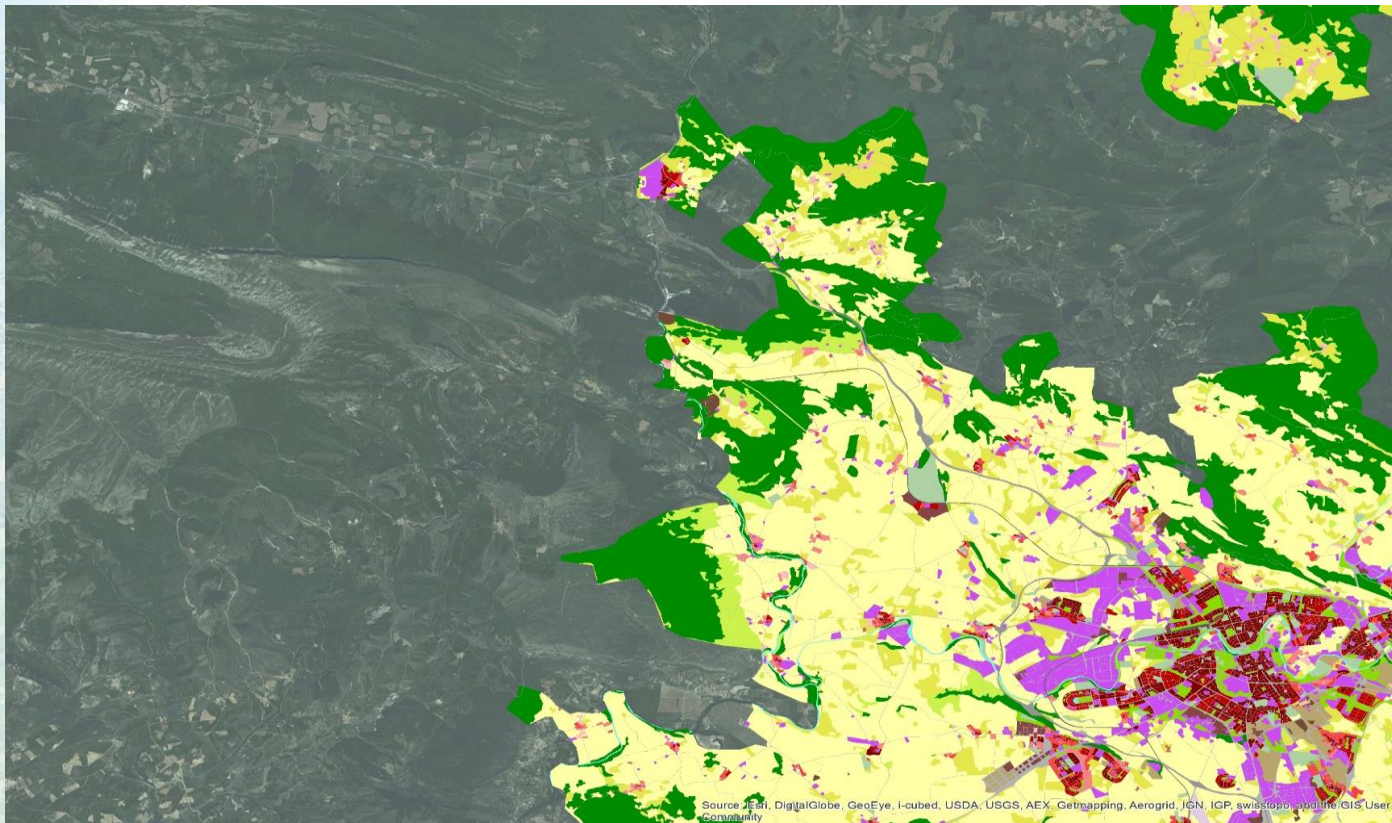


Luxembourg



Land
Monitoring

URBAN ATLAS (REGION OF PAMPLONA, SPAIN)

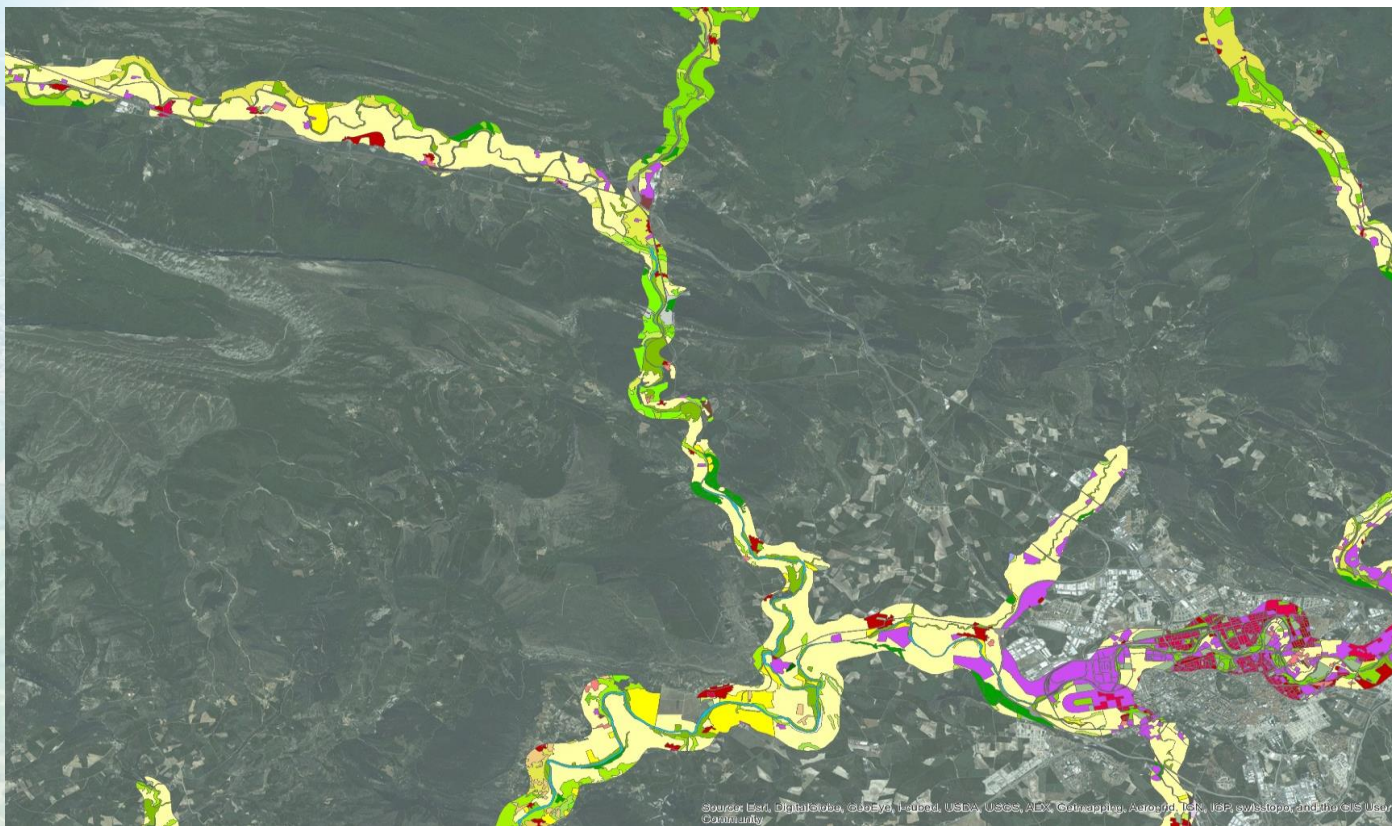


Source: Esri, DigitalGlobe, GeoEye, I-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



Land
Monitoring

RIPARIAN ZONES (REGION OF PAMPLONA, SPAIN)



Source: Esri, DigitalGlobe, GeoEye, IGN, USDA, USAF, AeroGRID, IGN, Esri, DeLorme, NAVTEQ, Swisstopo, and the GIS User Community



Land
Monitoring

NATURA 2000 (REGION OF PAMPLONA, SPAIN)

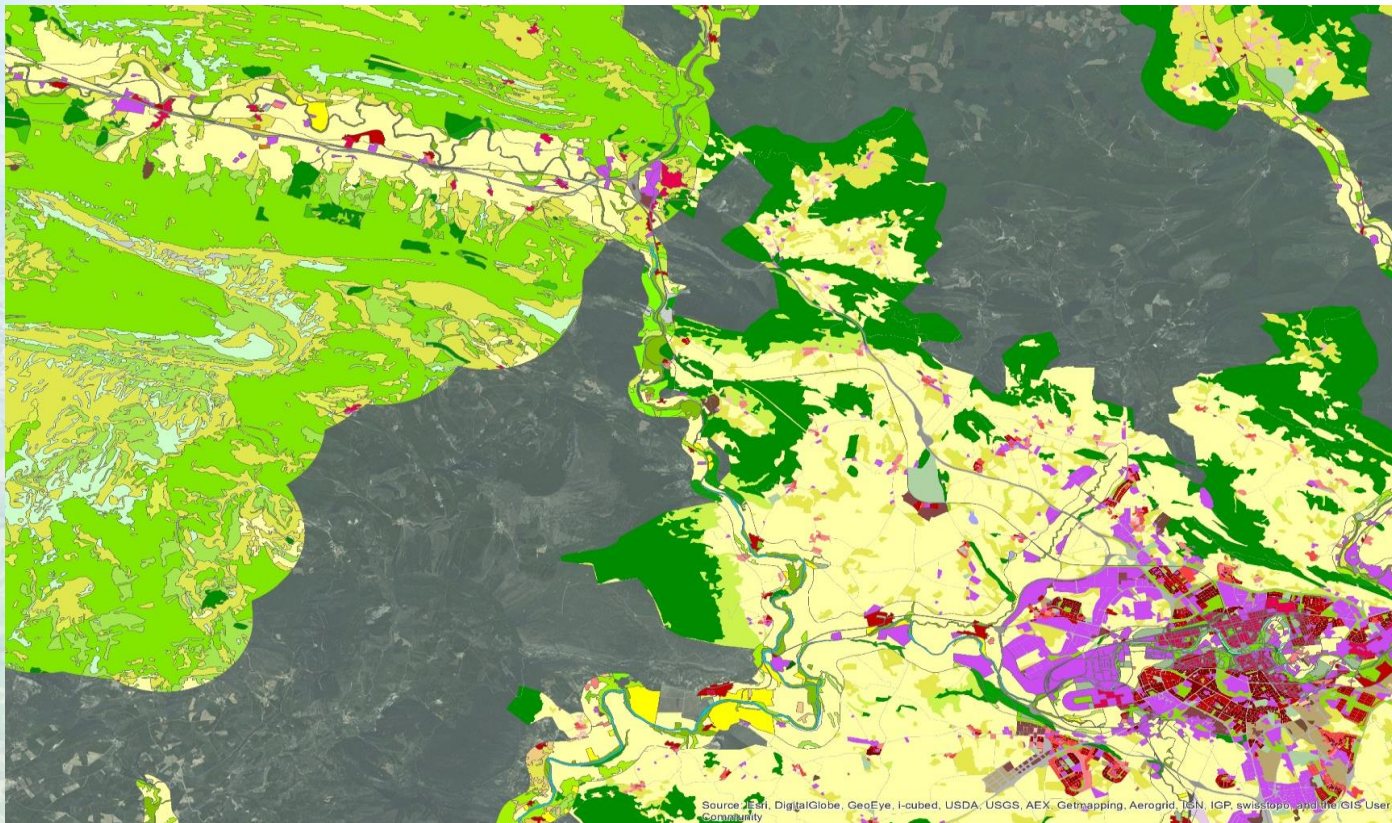


Source: Esri, DigitalGlobe, GeoEye, IGN, USDA, USAF, AeroGRID, IGN, Esri, Swiretopo, and the GIS User Community



Land
Monitoring

UA + RZ + N2K (REGION OF PAMPLONA, SPAIN)

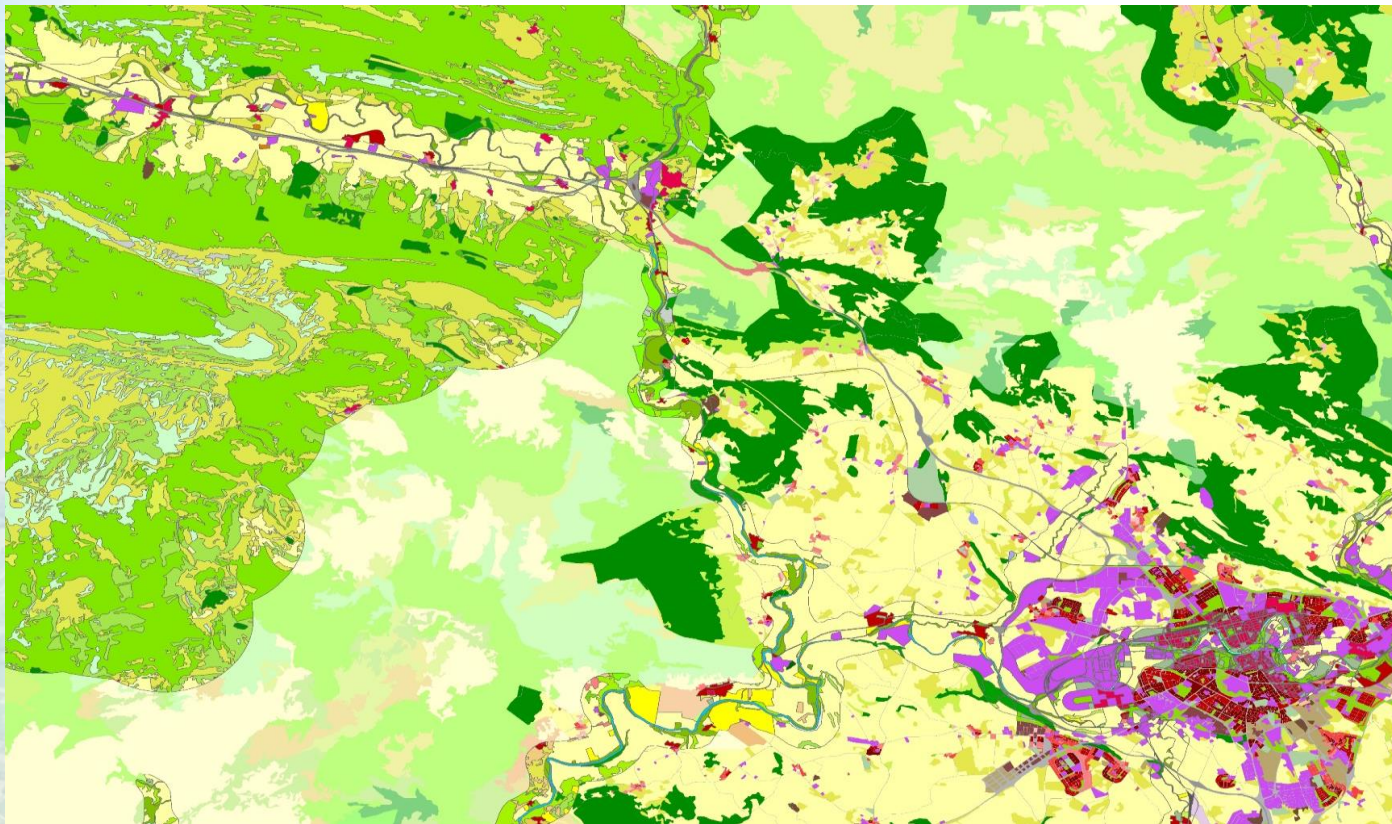


Source: Esri, DigitalGlobe, GeoEye, I-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



Land
Monitoring

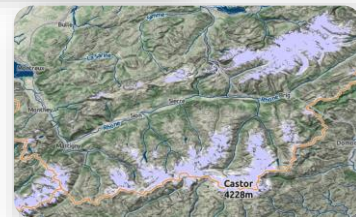
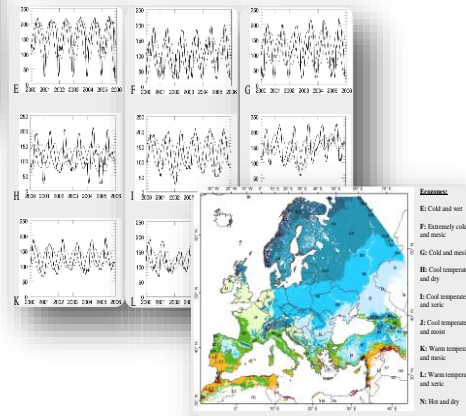
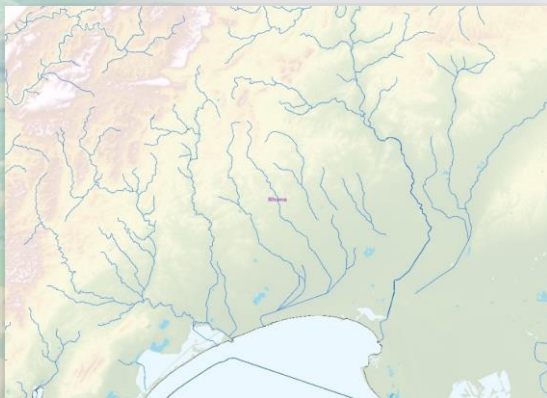
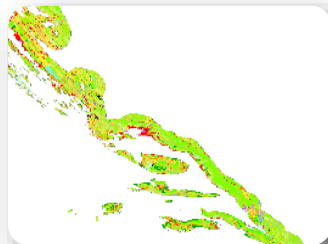
ALL + CLC (REGION OF PAMPLONA, SPAIN)





Land
Monitoring

REFERENCE DATA (EU-DEM & EU-HYDRO) & NEW PRODUCTS (CZ, HR-PHEN, S&I)





Land Monitoring

EVOLUTION OF THE SERVICE

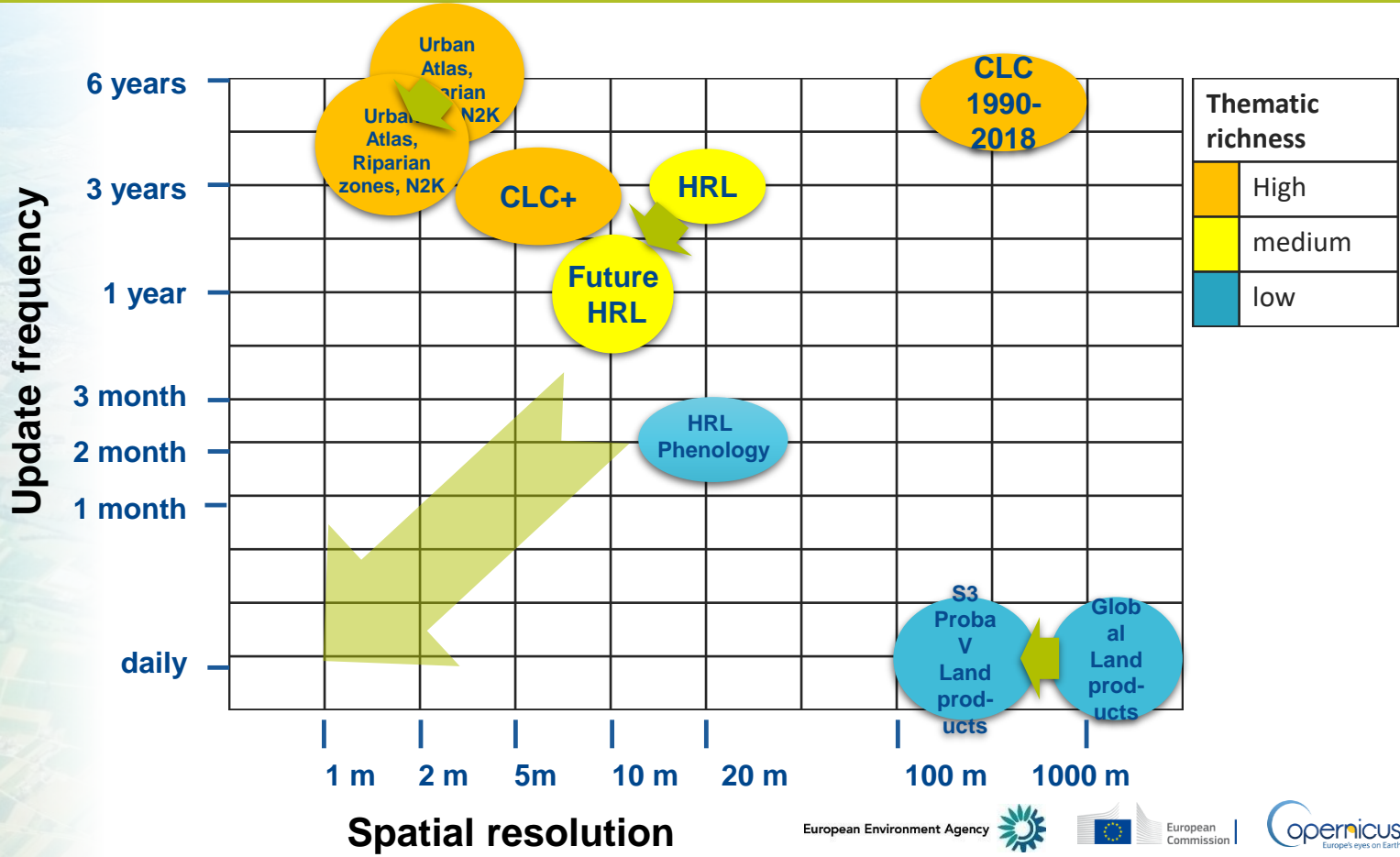
challenges and opportunities





Land Monitoring

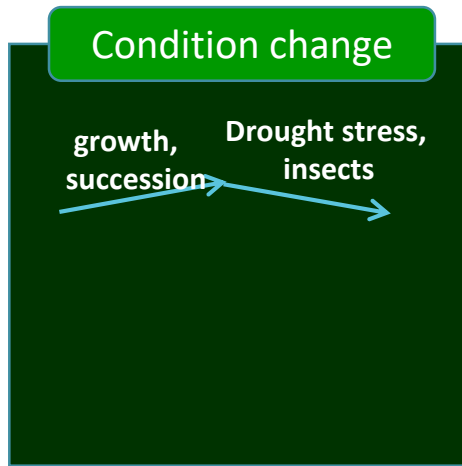
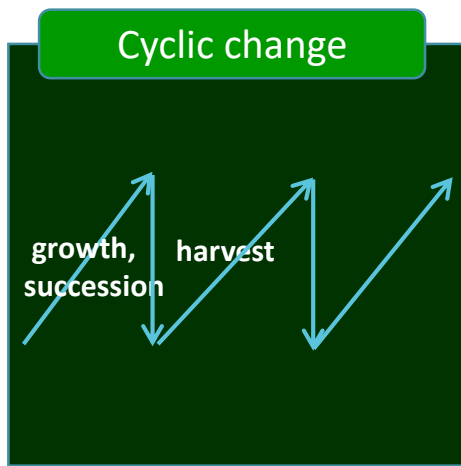
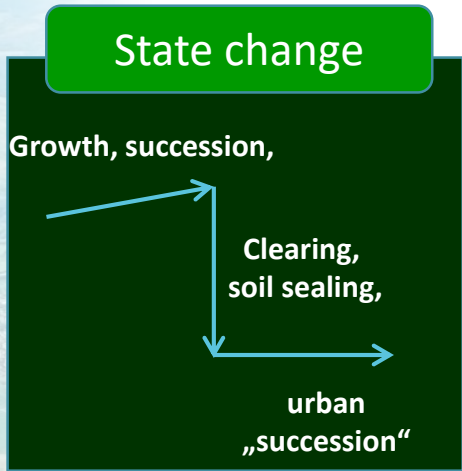
COPERNICUS LAND MONITORING: UPDATE FREQUENCY, CONTENT & RESOLUTION



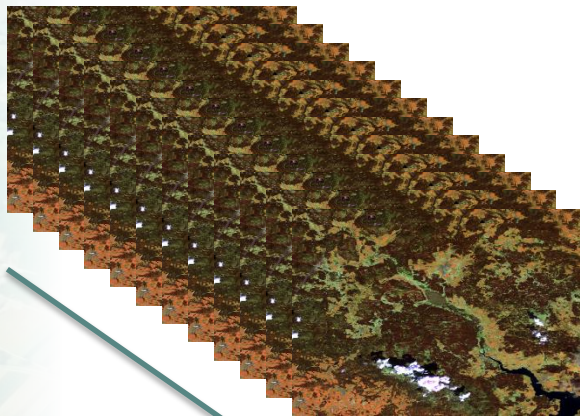


Land Monitoring

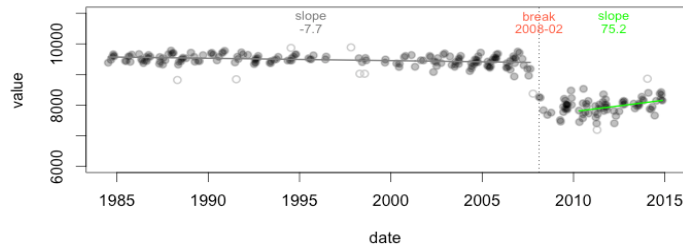
THE CHALLENGE OF CHANGE DETECTION IN LAND MONITORING



© Wulder, Berlin, 2014, EARSeL



Time series analysis





Land
Monitoring

MORE DEMANDING POLICY NEEDS FOR LC/LU INFORMATION

- Continuity of land monitoring information over Europe
- Thematic considerations:
 - New or revised/updated Community legislation, (incl. new MS reporting):
 - Climate change
 - low carbon economy
 - circular economy
 - Energy Union
 - Greening the CAP
 - Forestry
 - Urban planning
 - Biodiversity strategy
 - natural capital
- Global policy: Sustainable Development Goals (SDGs)

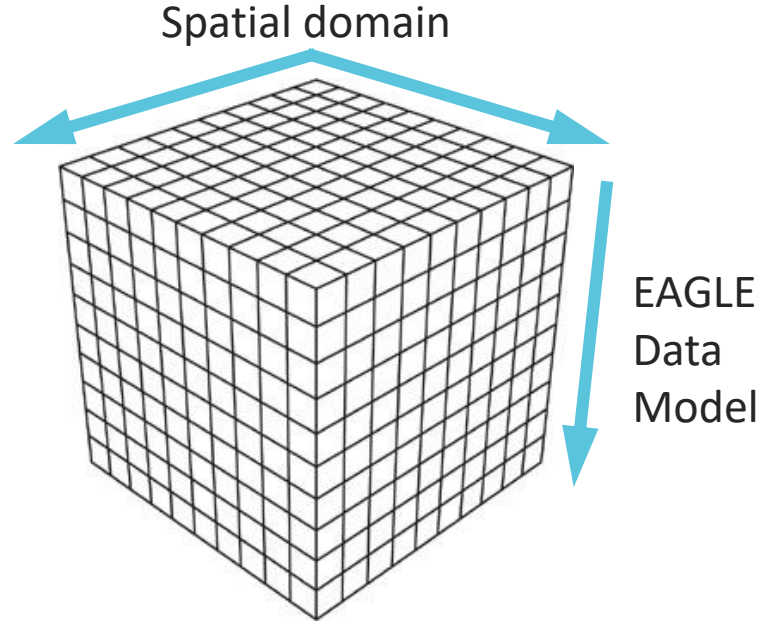
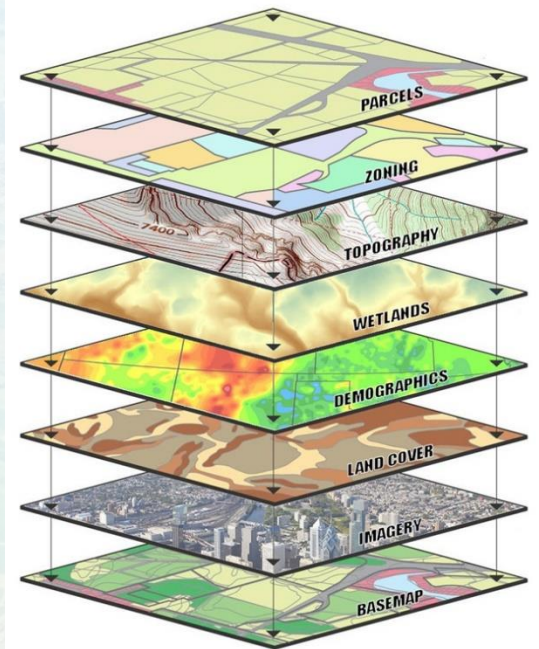
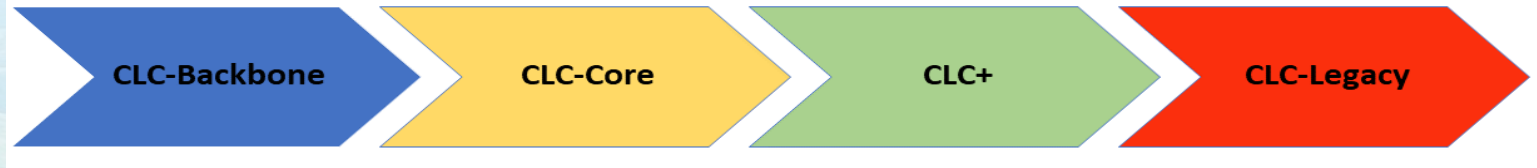
- need for LC/LU information:
- full EU28 / EEA39 coverage,
 - harmonised specifications
 - sufficient spatial detail
 - timely availability
 - regular updates (yearly)





Land
Monitoring

CLC+ A NEW CONCEPT IN LAND COVER / LAND USE



Source: CSU,
<http://heleneloyan.cikeys.com/update/gis-layers/>



Land
Monitoring

EUROPEAN LEVEL DISSEMINATION ACTIVITIES: THE LAND PORTAL

Focus on:

- Easy access to the products:
 - discover, view, WMS / download
- INSPIRE compliant metadata
- structural linkages with the open data initiatives on European and global level, in order to promote the use of the Copernicus Land products



EU Open
Data Portal

GOSS Portal



European
Commission

eurostat



European Environment Agency



European
Commission

Copernicus
Europe's eyes on Earth

land.copernicus.eu

Copernicus - The European Earth Observation Programme — Copernicus Land Monitoring Service

Site Map | About | Contact us | Log in | Register

Ask the service desk

Search

Global Pan-European Local Reference data FAQ

Copernicus is an European system for monitoring the... sources, including Earth observation satellites and... provides reliable and up-to-date information... atmosphere, climate change, emergency... into four main components:

Local
focuses on different hotspots, i.e. areas that are prone to specific environmental challenges and problems

Reference data
All of the Copernicus services need access to in-situ data in order to ensure an efficient and effective use of Copernicus space-borne data

Pan-European
The pan-European component provides information about the land cover and land use (LC/LU), land cover and land use changes and land cover characteristics. The latter includes information about imperviousness, forests, natural grasslands, wetlands, and permanent water bodies. Read more



Land
Monitoring

COPERNICUS CLMS: LAND.COPERNICUS.EU

Dank voor uw
aandacht!

Copernicus
Europe's eyes on Earth

Copernicus Sentinel 2