WORLD RESOURCES INSTITUTE

GLOBAL FOREST WATCH

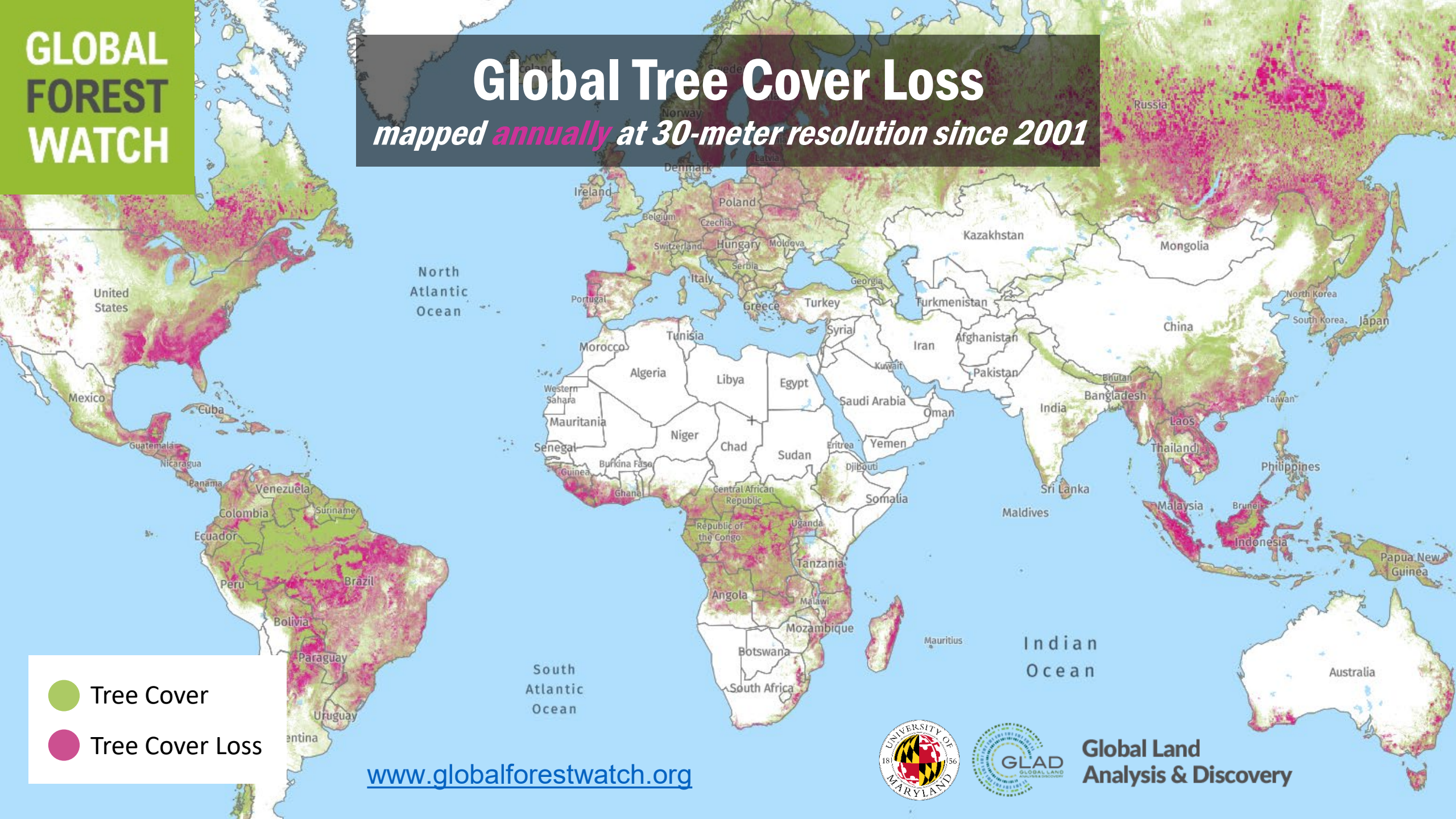
THE POTENTIAL OF SATELLITE-BASED FOREST MONITORING

European Parliament, 12 October 2023
FORESTS' HIDDEN SECRETS
WHY WE NEED BETTER FOREST MONITORING

SARAH CARTER, RESEARCH ASSOCIATE WRI & MANY COLLEAGUES, MARTIN HEROLD, PROFESSOR GFZ, & COLLEAGUES

DATA FOR BETTER FOREST MANAGEMENT IN EUROPE

- Better data leads to **better managed and healthier forests**
- **New policy and monitoring needs demand better, more up to date information**
- There is an **increasing role for satellite data** to support transparent compliance assessment, and enforcement of EU policies
- **Open, timely and transparent data** needs to be **operational available** to meet varied stakeholder needs, including evolving policies


GLOBAL FOREST WATCH
Global Tree Cover Loss
mapped annually at 30-meter resolution since 2001
Tree Cover
Tree Cover Loss
www.globalforestwatch.org
Global Land Analysis & Discovery
North Atlantic Ocean
South Atlantic Ocean
Indian Ocean
United States
Mexico
Cuba
Guatemala
Nicaragua
Panama
Venezuela
Colombia
Suriname
Ecuador
Peru
Brazil
Bolivia
Paraguay
Uruguay
Ireland
Denmark
Norway
Latvia
Poland
Belgium
Czechia
Switzerland
Hungary
Moldova
Serbia
Italy
Portugal
Greece
Turkey
Georgia
Russia
Kazakhstan
Mongolia
Turkmenistan
Syria
Iran
Afghanistan
China
North Korea
South Korea
Japan
Morocco
Tunisia
Algeria
Libya
Egypt
Western Sahara
Mauritania
Senegal
Guinea
Burkina Faso
Ghana
Niger
Chad
Sudan
Eritrea
Yemen
Djibouti
Kuwait
Saudi Arabia
Oman
Pakistan
India
Bhutan
Bangladesh
Laos
Thailand
Taiwan
Philippines
Sri Lanka
Maldives
Malaysia
Brunei
Indonesia
Papua New Guinea
Central African Republic
Republic of the Congo
Uganda
Somalia
Tanzania
Angola
Malawi
Mozambique
Botswana
South Africa
Mauritius
Australia


GLOBAL FOREST WATCH
FOREST CHANGE
TREE COVER CHANGE
Tree cover loss
(annual, 30m, global, Hansen/UMD/Google/USGS/NASA)
Tree cover gain
(12 years, 30m, global, Hansen/UMD/Google/USGS/NASA)
Gran Chaco deforestation
(monthly, 30m, Gran Chaco, Guyra)
PRODES deforestation
(annual, 30m, Brazilian Amazon, INPE)
TREE COVER LOSS ALERTS
(near real-time)
GLAD alerts
(weekly, 30m, select countries, UMD/GLAD)
FORMA alerts
(monthly, January 2006-August 2015, 500m, humid tropics, WRI/CGD)
Terra-i alerts
(monthly, 250m, tropics, CIAT)
SAD alerts
(monthly, 250m, Brazilian Amazon, Imazon)
VIIRS active fires
(daily, 375 m, global, NASA)
LAND COVER
Tree cover
(2000, Hansen/UMD/Google/USGS/NASA)
Intact Forest Landscapes
(2000/2013)
Aboveground live woody biomass density
Mangrove forests
Land cover
(2009)
Tree plantations
(2013-2014, select countries)
by type
by species
LAND USE
CONCESSIONS
Managed forests
(select countries)
Mining
(select countries)
Oil palm
(select countries)
Wood fiber
(select countries)
INFRASTRUCTURE
Major dams
Congo Basin logging roads
CONSERVATION
Protected areas
Biodiversity hotspots
BirdLife Endemic Bird Areas
Alliance for Zero Extinction sites
Tiger Conservation Landscapes
PEOPLE
Resource rights
(select countries)
Land rights
(select countries)
Population density
(2000)
STORIES
User stories
Mongabay stories
Earth Journalism Network stories
UGANDA
Add your own data to the GFW Interactive Map
Uganda protected areas

GLOBAL FOREST WATCH

CUSTOMIZABLE DATA

GLOBAL FOREST WATCH

CUSTOMIZABLE DATA

LOCATION OF TREE COVER LOSS IN FINLAND

In **Finland**, the top **2** regions were responsible for **60%** of all tree cover loss between **2001** and **2022**. **Western Finland** had the most tree cover loss at **1.51 Mha** compared to an average of **876 kha**.

1	Western Finland	1.51 Mha
2	Eastern Finland	1.12 Mha
3	Oulu	830 kha
4	Lapland	491 kha
5	Southern Finland	425 kha

2000 tree cover extent | >30% tree canopy

TREE COVER LOSS IN FINLAND COMPARED TO OTHER AREAS

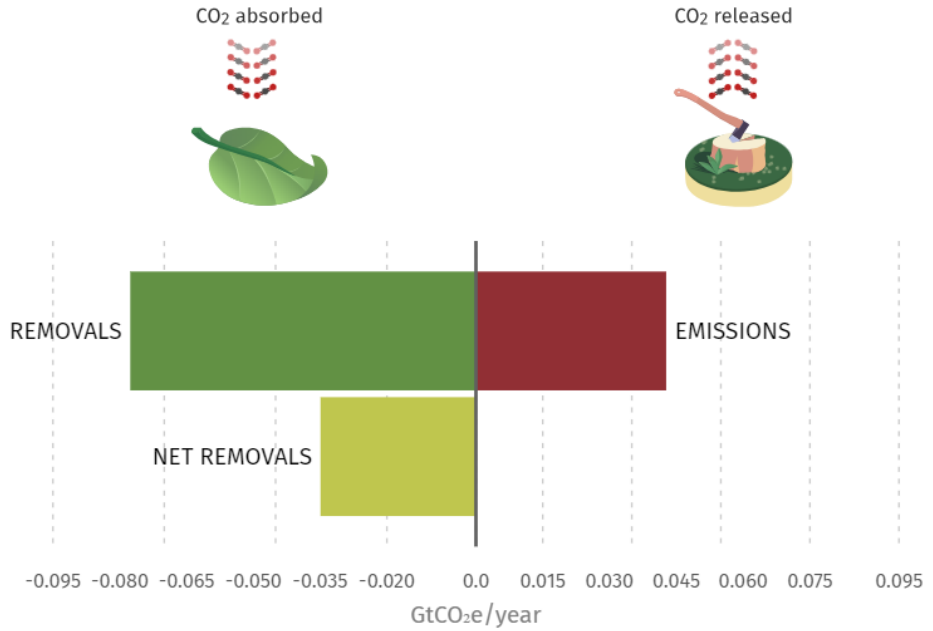
From **2001** to **2022**, **Finland** lost **4.38 Mha** of relative tree cover, equivalent to a **20%** decrease since **2000** and **0.95%** of the global total.

16	Madagascar	4.62 Mha
17	Myanmar	4.56 Mha
18	Finland	4.38 Mha
19	Laos	4.37 Mha
20	Mozambique	4.03 Mha

2000 tree cover extent | >30% tree canopy | these estimates do not take tree cover gain into account

FOREST-RELATED GREENHOUSE GAS FLUXES IN FINLAND

Between **2001** and **2022**, forests in **Finland** emitted **42.7 $MtCO_2e$/year**, and removed **-77.6 $MtCO_2e$/year**. This represents a **net carbon sink** of **-34.9 $MtCO_2e$/year**.



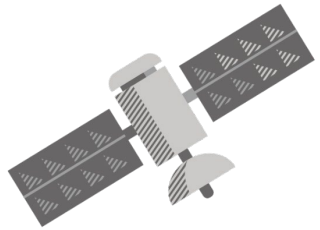
>30% tree canopy and tree cover gain

GLOBAL FOREST WATCH

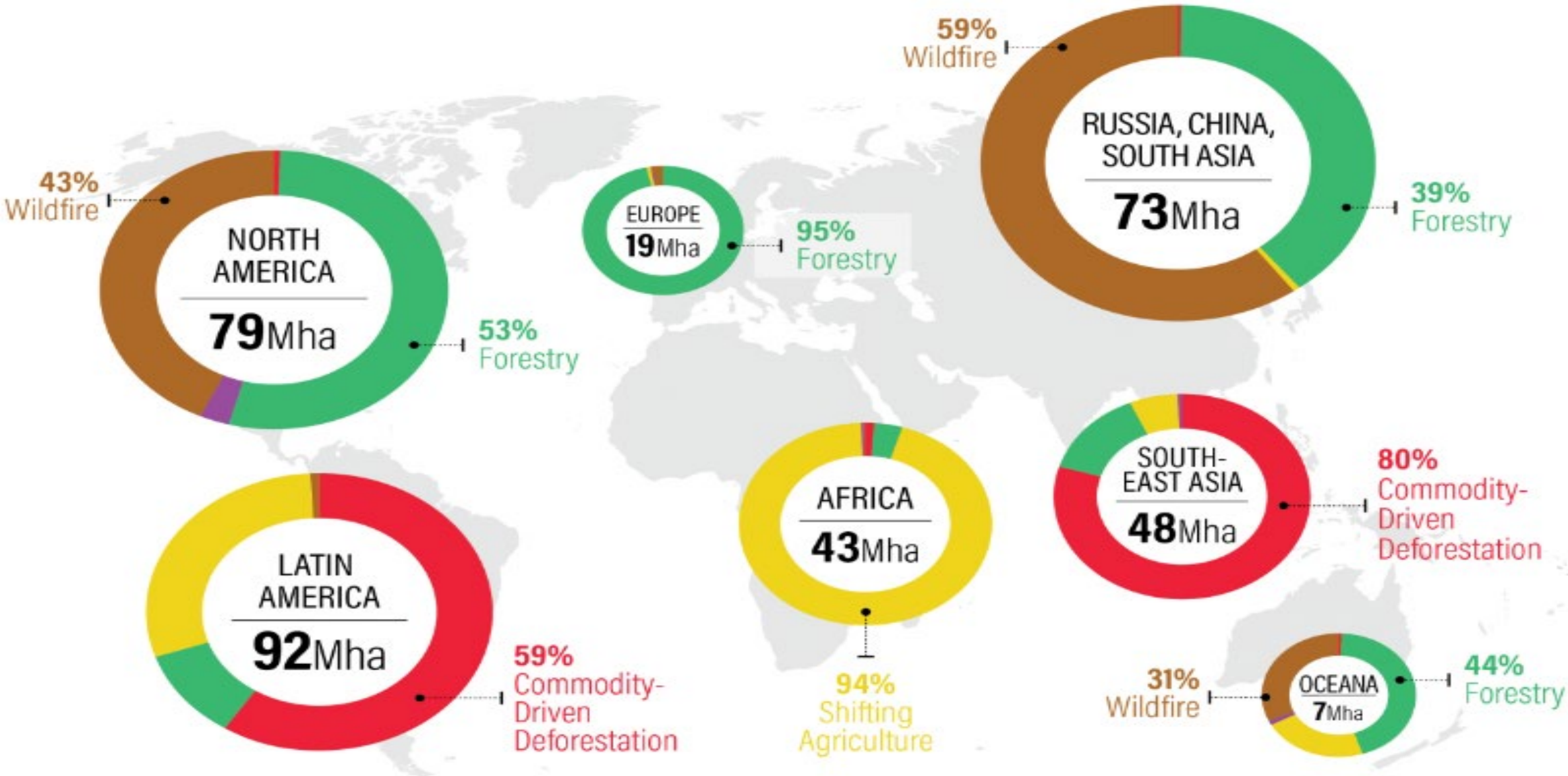
- Over **5 million** people reached
- Over **500 million** hectares of forest monitored
- Over **8,000** civil society users trained
- Over **400** user stories documented

FOUNDATIONAL ISSUES FOR NEW SATELLITE DATA PRODUCTS

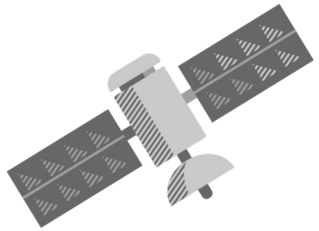
1. Dynamic - must track changes
2. Timely to enable quick action
3. Spatial explicit
4. High enough spatial resolution
5. Independent and trustworthy
6. Accessible to everyone – and operational
7. Accompanied by communication activities



REGIONAL TREE COVER LOSS BY DRIVER 2001-2018



INFORMATION EXISTS BUT GAPS REMAIN

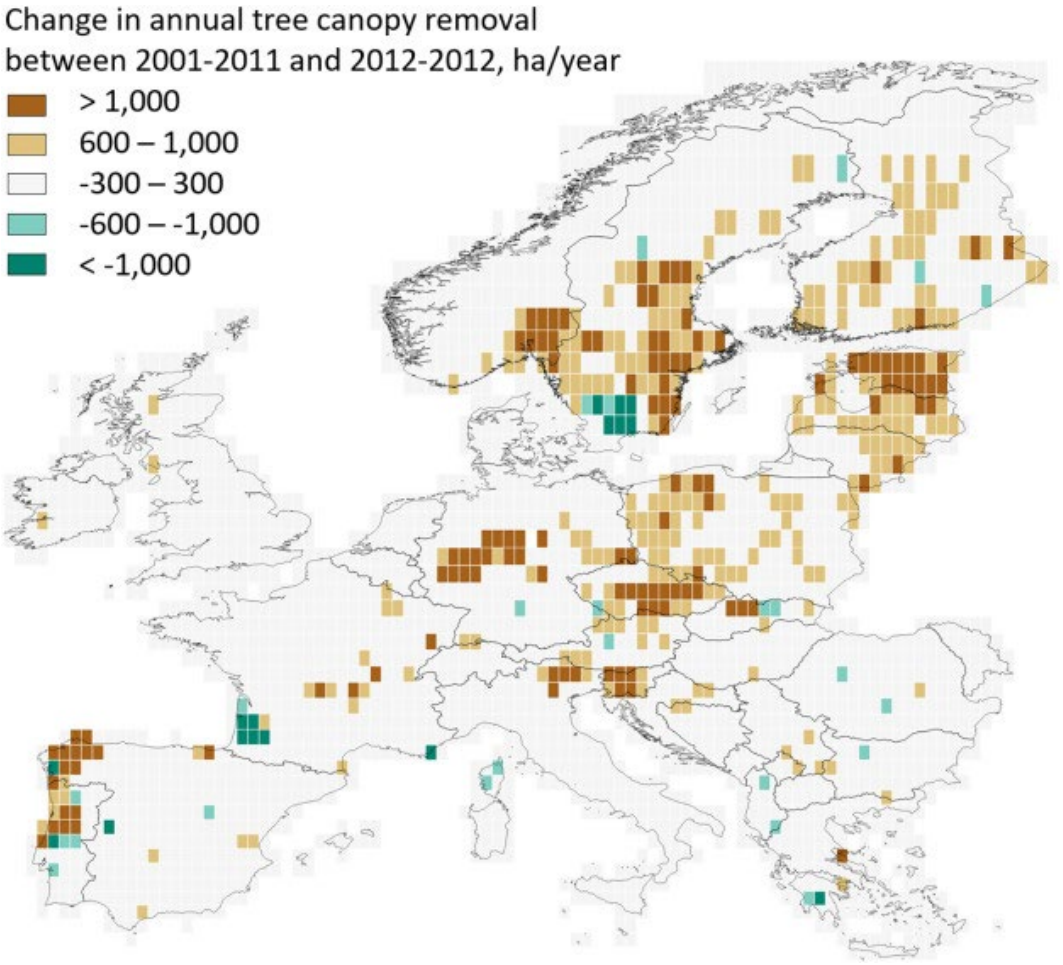


- EU Copernicus data and products, and other **existing datasets** are extremely valuable, but often **lack the detail and timeliness required by users and policy**
- Currently, **EU countries** for their own monitoring **use relatively little satellite** info compared to other areas (i.e. tropics, US, Canada)
- New satellite-based information could fill this gap

NESHA ET AL., 2021. AN ASSESSMENT OF DATA SOURCES, DATA QUALITY AND CHANGES IN NATIONAL FOREST MONITORING CAPACITIES IN THE GLOBAL FOREST RESOURCES ASSESSMENT 2005–2020, ERL

THE LATEST ON EUROPE'S FORESTS

- **Forests are getting shorter**: tall forests (over 15 m) lost 3% of their area, meaning lower biomass, younger forests
- **Forests were 18% more disturbed** when comparing 2001-2011 and 2012-2021



TURUBANOVA ET AL. 2023 TREE CANOPY EXTENT AND HEIGHT CHANGE IN EUROPE, 2001–2021, QUANTIFIED USING LANDSAT DATA ARCHIVE - SCIENCEDIRECT

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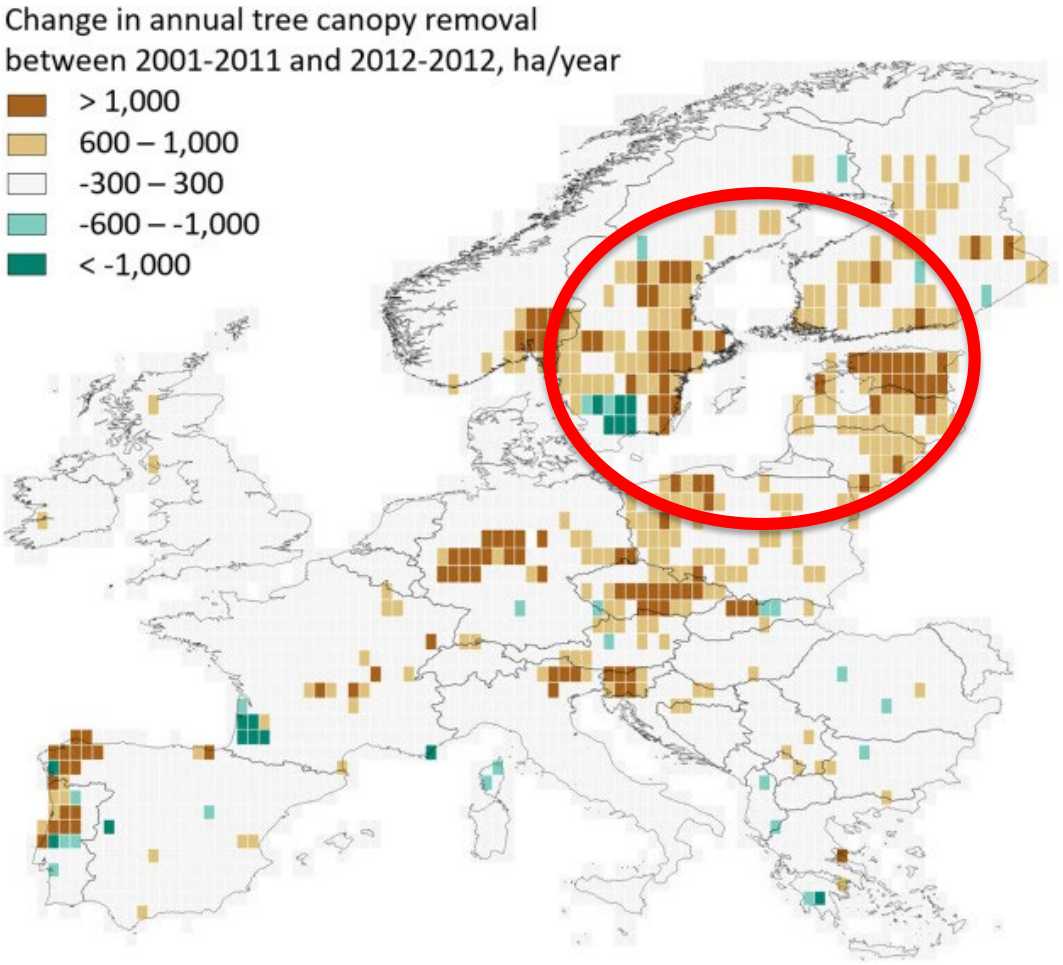

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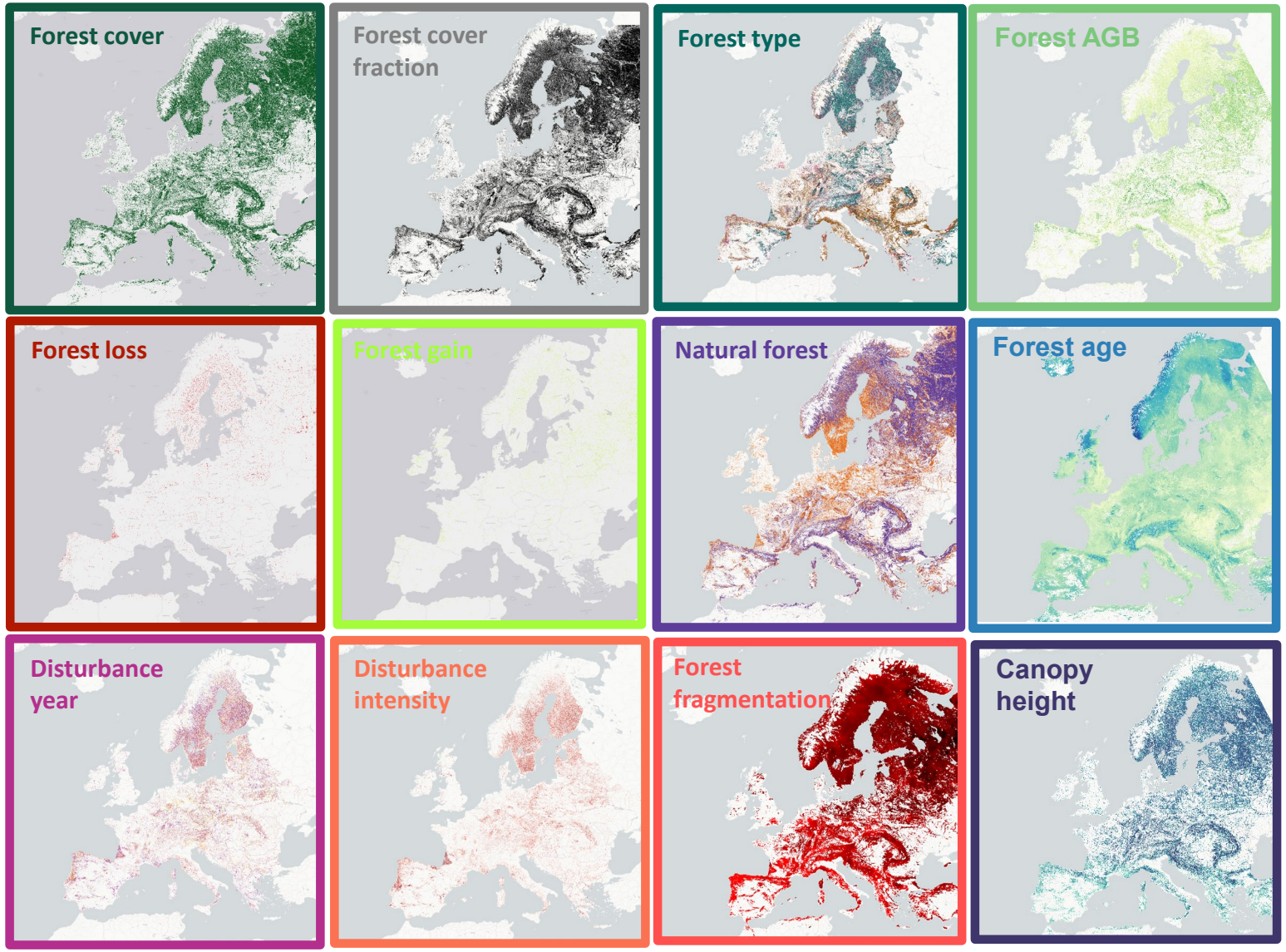


Forest data cube for Europe (v1)

- EU wide
- Consistent
- High-resolution
- Comprehensive
- Transparent/open
- Timely

COMING SOON

1. Higher spatial resolution information on trees and forests
2. Near real-time information
3. Annual tree height
4. Forest age at multiple time periods
5. More detail on forest management and forest types
6. Recent biomass information for better carbon estimates
7. Insights into degradation (structural diversity, old growth information)
8. Moving towards biodiversity relevant information (species etc.)

Natural forest map – improved for Europe

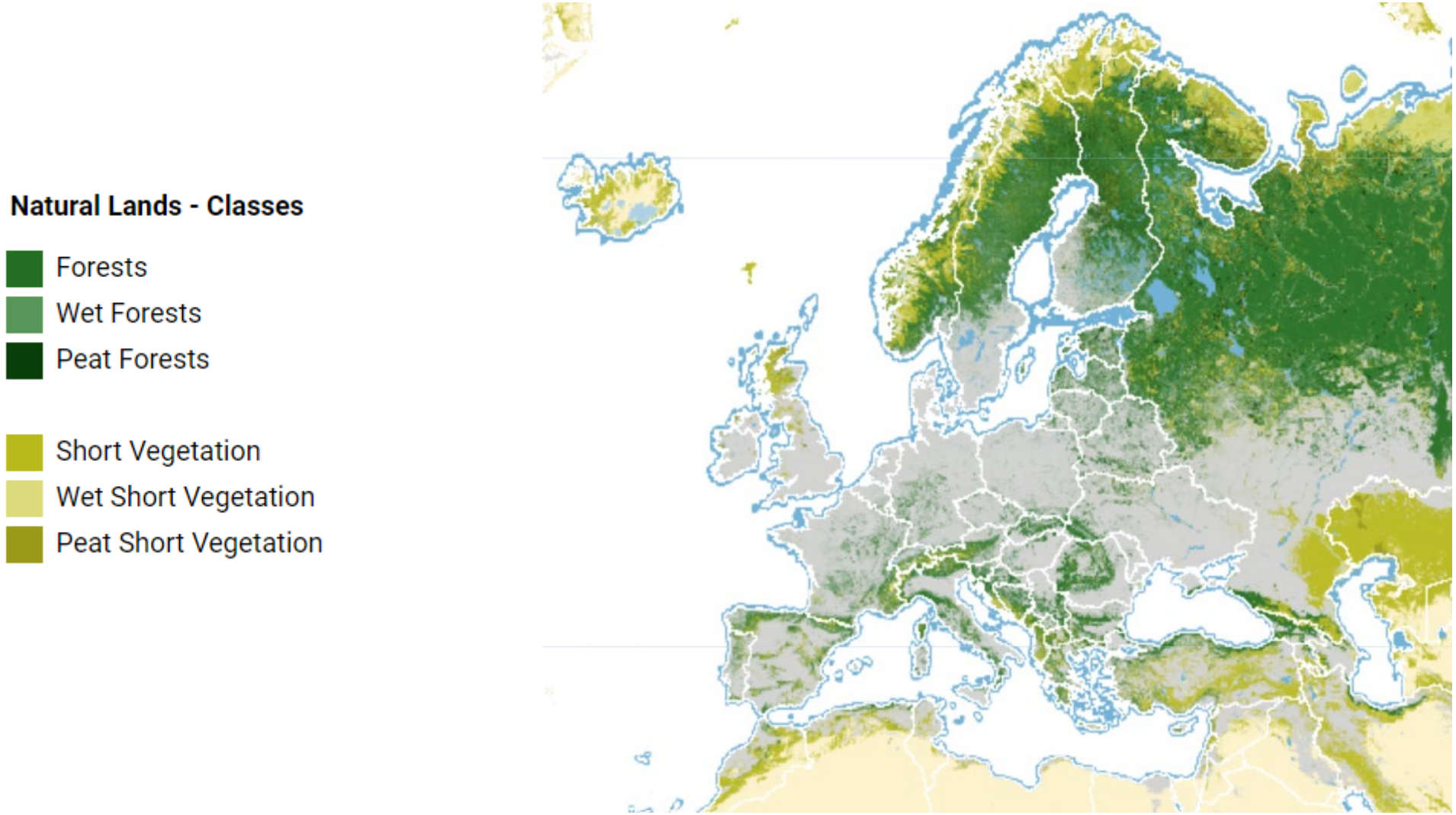
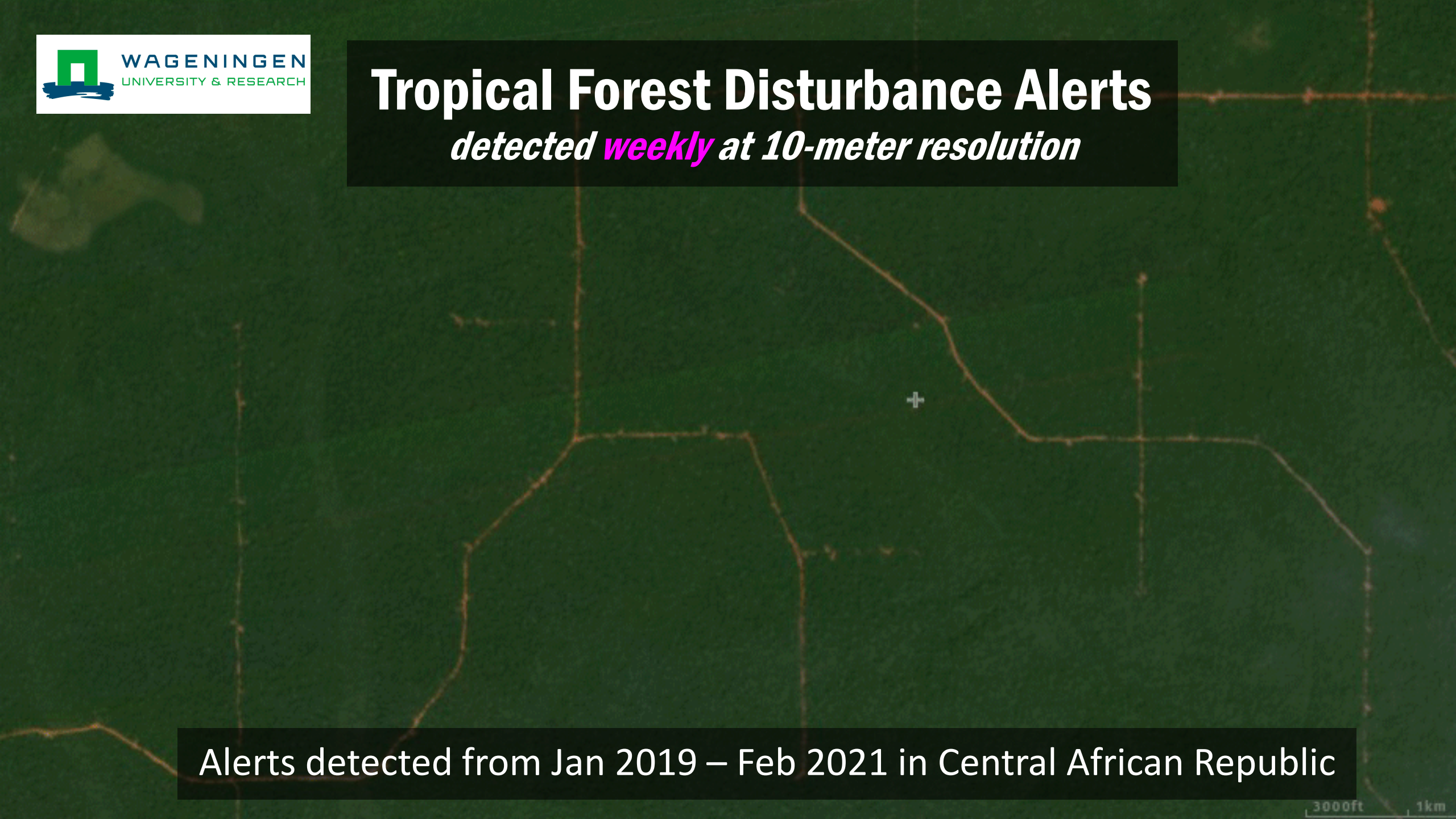


Image WRI: [Natural Lands Map Provides Baseline for Companies' No Conversion Targets — Land & Carbon Lab (landcarbonlab.org)]


WAGENINGEN
UNIVERSITY & RESEARCH
Tropical Forest Disturbance Alerts
detected weekly at 10-meter resolution
Alerts detected from Jan 2019 – Feb 2021 in Central African Republic
3000ft
1km

KEY TAKEAWAYS

- Better forest monitoring benefits Europe's forests
- Ambitious new policies can be supported by satellite data for compliance assessments and enforcement
- New data should be aligned with evolving policy and user needs

THANK YOU

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This presentation was made possible by many collaborators, for whom we thank for their contributions

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