
GWF
GEOSPATIAL WORLD FORUM
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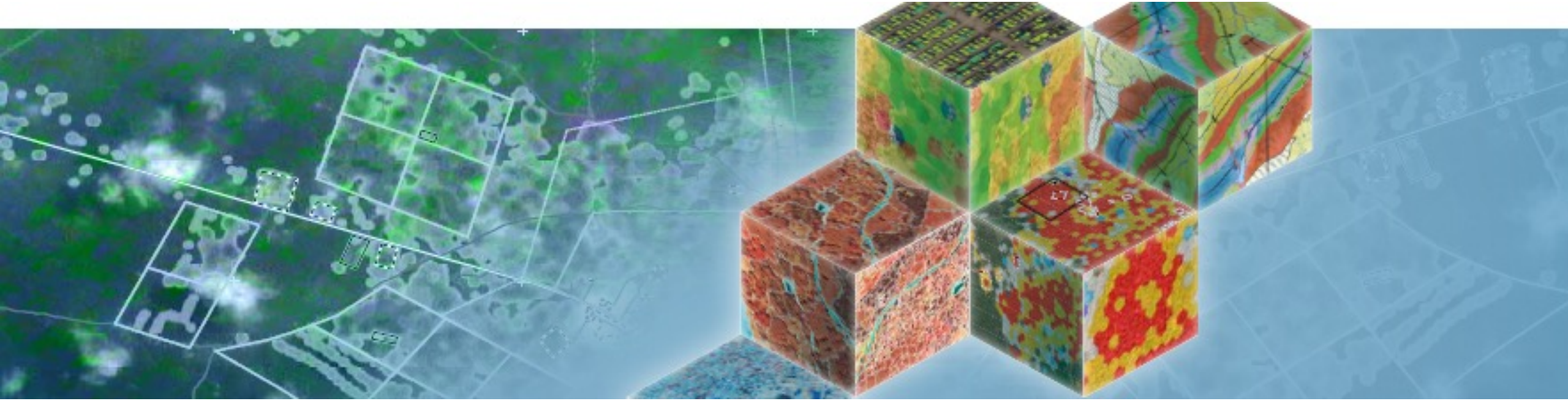

Geospatial workflows and Earth observation for environmental compliance monitoring

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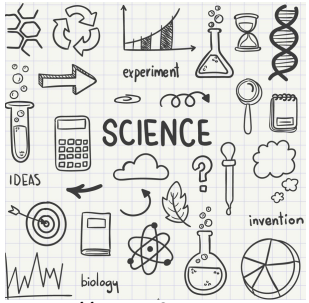
Z GIS

Route

ESG as an umbrella term

today: environmental sustainability compliance monitoring

beyond “nice pictures”



https://www.freepik.com

ESG Concept

Focus: Sustainability impact of business activities

Belief: sustainability enhance financial returns through risk reduction and growth opportunities

Goal: to identify sustainability issues impacting the materiality (financial performance)
-> issues depends on sectors & industries

- Climate
- Resources
- Biodiversity
- Water
- Energy
- Emission
- …

- Working conditions
- CSR
- Human rights
- Health & Safety
- …

- Risk management
- Compliance
- Business ethics
- Diversity
- …

ESG

- Environmental **impact** (of construction)

- Building construction **changes** (extension, new floors, …)

- Environmental **risks**

- Specific **assets** (e.g., solar panels)

- **Energy loss** (buildings)

- **Green / blue areas** in the neighborhood
- …

Mainly the „**E**“ of ESG can be addressed

The indicator framework is still under development

Earth observation plays an important role, but not the only one

ESG / Finance / Insurance

Environment

Satellite technologies to monitor the essential climate variables, support in ocean conservation and restoration of land and forests, to assist companies in monitoring their environmental footprint & ESG compliance.

Finance

Satellite data for investment evaluation, risk assessment, event impact assessment, real-time asset/portfolio monitoring, carbon offsets auditing, etc.

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OXEO oxford earth observation

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ESG CHAIN THE BLOCKCHAIN

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The Conversation: How to Use Free Satellite Data to Monitor Natural Disasters and Environmental Changes

MARCH 14, 2023

Photo by NASA.

Monthly Archives

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posted on October 3, 2023

UT Welcomes Fans for the South Carolina Game
posted on September 27, 2023

UT Welcomes Fans for the Texas A&M Game
posted on October 11, 2023

A satellite view of Northern Brazil, where the Amazon River meets the Atlantic Ocean, provides information about deforestation that can be activities.
Source: ESA

July 27, 2018, 2:34 PM GMT+2

Satellites Reshaping Environmental Monitoring

Andre Tartar, Bloomberg News
Jeff Kearns, Bloomberg News
Jeremy Kahn, Bloomberg News
Shannon Simms, Bloomberg News
Karlis Salna, Bloomberg News
Aaron Clark

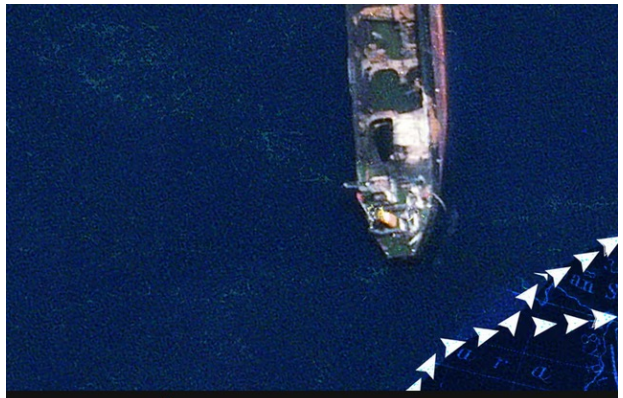
- Satellites being used to monitor climate effects, pollution, and natural disasters
- Also used to counteract deforestation, illegal fishing

WIRED LONG READS BUSINESS CULTURE GEAR SCIENCE SECURITY VIDEO

JONATHAN O'CALLAGHAN SCIENCE 30.08.2022 12:00 PM

Swarms of Satellites Are Tracking Illegal Fishing and Logging

In some of the world's most inaccessible places, tiny satellites are watching—and listening—for signs of destruction.



How a burnt out, abandoned ship reveals the secrets of a shadow tanker network

The number of vessels transporting sanctioned oil is booming and the consequences can be felt across the world - from Iran, to China, to Ukraine

by Jonathan Yerushalmy and Haylena Krishnamoorthy

APPLICATIONS

Trio of Sentinel satellites map methane super-emitters

...check how many trees felled in Ridge'

School And Colleges
Maharashtra Elections
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Abhinav Garg / TNN / Updated: Oct 14, 2022, 11:27 IST

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Delhi: 'Use satellite images to check how many trees felled in Ridge'

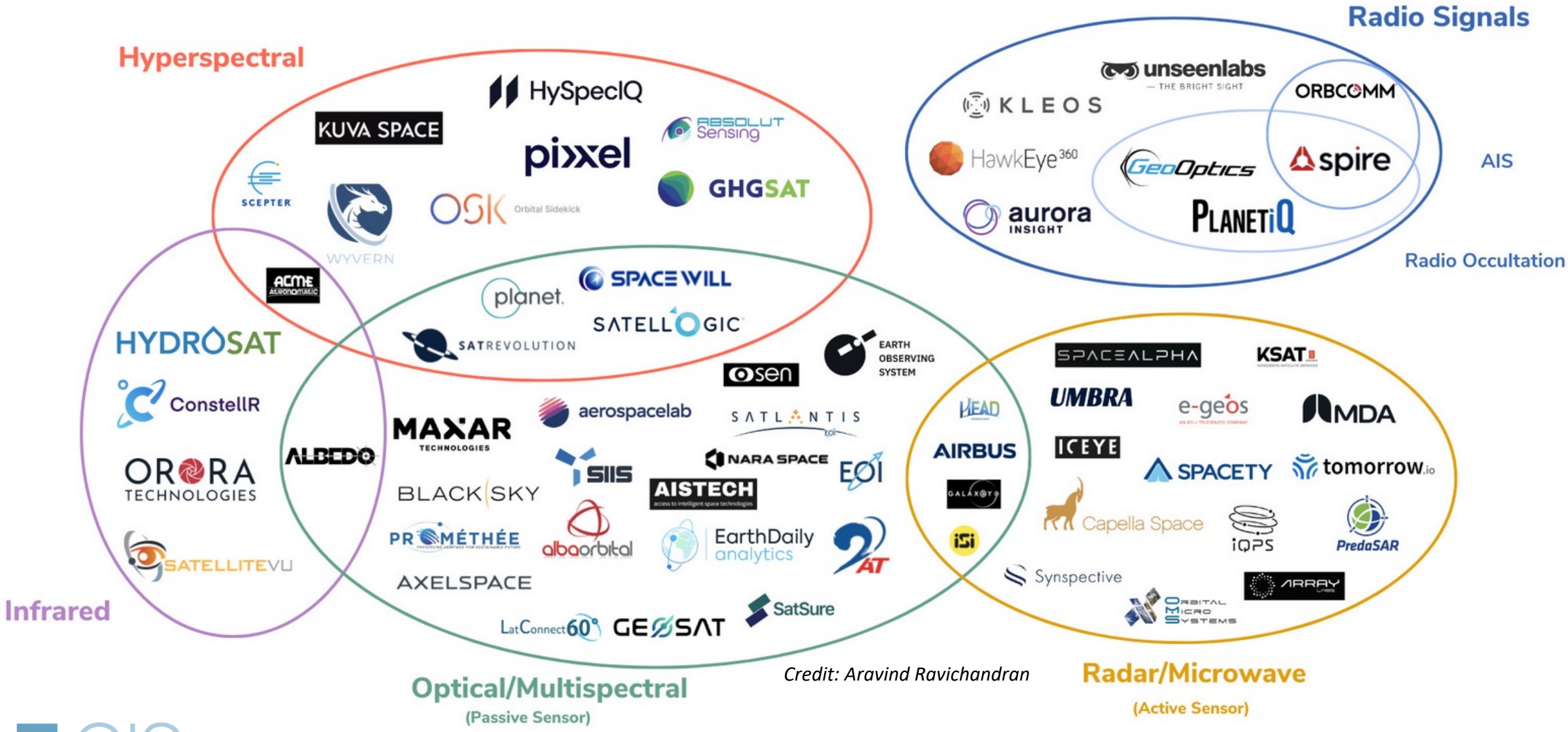
Blood clots in veins: Unmasking this silent threat on World...

Delhi: How gang duped targets in credit card, 5G

Delhi high court decided on Thursday to take stock of the capital's green cover, particularly from 2018, when it began monitoring the condition of the city's trees.

The high court also directed Delhi government to ascertain the present status of forest cover in the central and southern Ridge areas

The earth observation market is developing rapidly



Credit: Aravind Ravichandran

Industry claims that …..

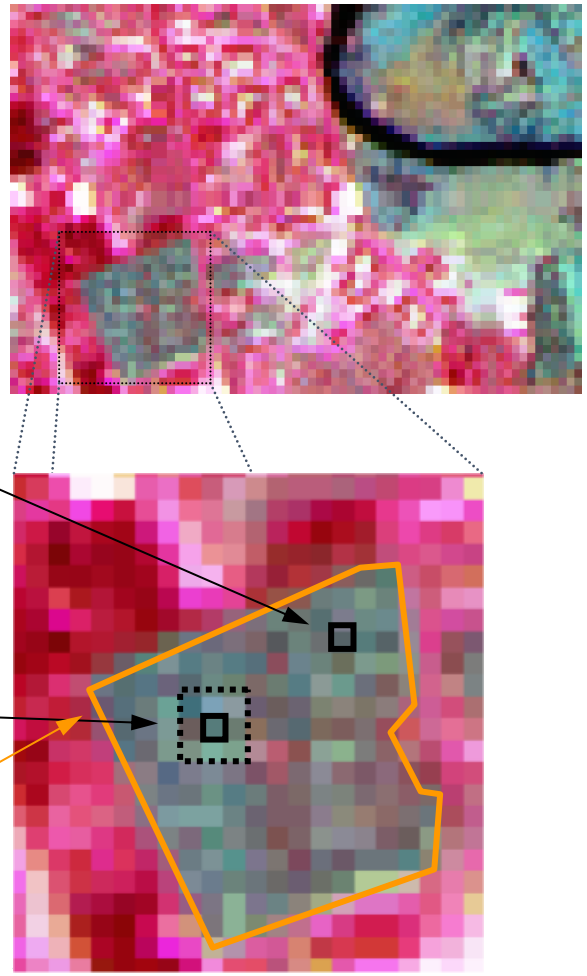
Reporting needs can be solved with ‚press the bottom' solutions

But there are methodological and legal aspects to be included

Cc-by SA http://alphastockimages.com/

But, initially, images are merely many pixels (… or measurements)

initially one only gets large arrays (rasters) of pixels – only our eyes/brain recognize objects such as lakes or rivers etc. !



classic approach:

- How to interpret and utilize different colours (spectral reflectance values in various bands of an image
- How to analyse and classify individual pixels, groups of pixels, or e.g., 3*3 - pixel neighbourhoods

Object Based Image Analysis

Machine learning & AI approaches

In most cases, information important for the understanding of an image is not represented in single pixels but in meaningful image objects and their mutual relations (Blaschke, 2003)

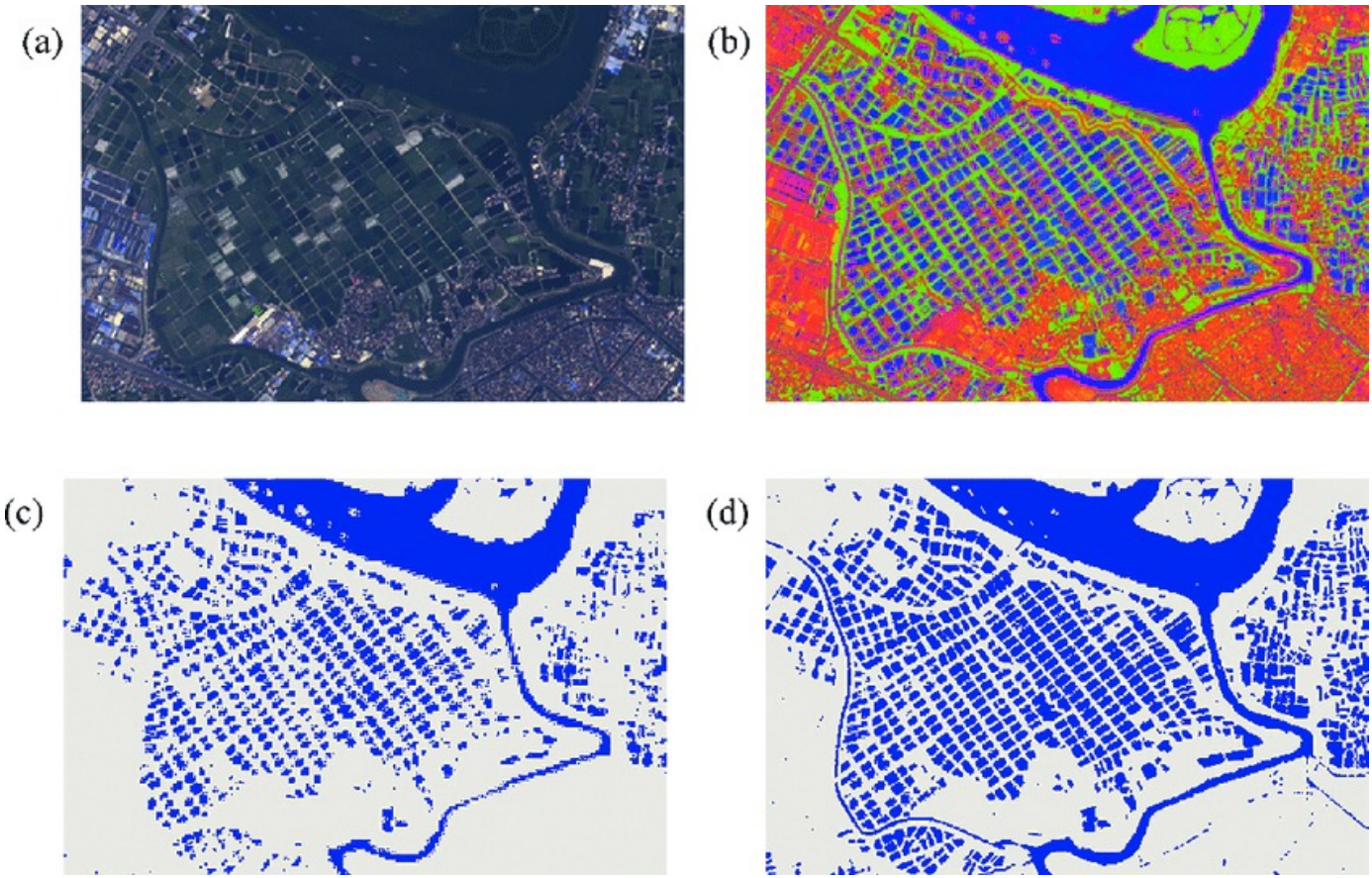
‘Big EO data’ requires changes in data to information workflows

“not only more data:
changing distribution model?

instantaneous transactions

paying for information rather than for data?

(pay per km2 water bodies or pay per building or tree extracted)



To be taken into account: (not exhaustive)

Governance Factors:

a. **Land Ownership and Land Rights**: Mapping land ownership and land rights can provide insights into potential conflicts and adherence to property rights, a key governance factor.

b. **Regulatory Compliance**: Monitoring land use against zoning and environmental regulations can assess a company's compliance with governance standards.

c. **Supply Chain Transparency**: Geospatial data can help trace the supply chain, identifying the sources of raw materials and potential risks associated with suppliers.

d. **Infrastructure Investment**: Assessing infrastructure development in regions where a company operates can indicate its commitment to long-term growth and governance.

a. **Community Impact**: Geospatial data can help evaluate the proximity of a company's operations to communities, potentially highlighting issues related to noise, pollution, or other disturbances.

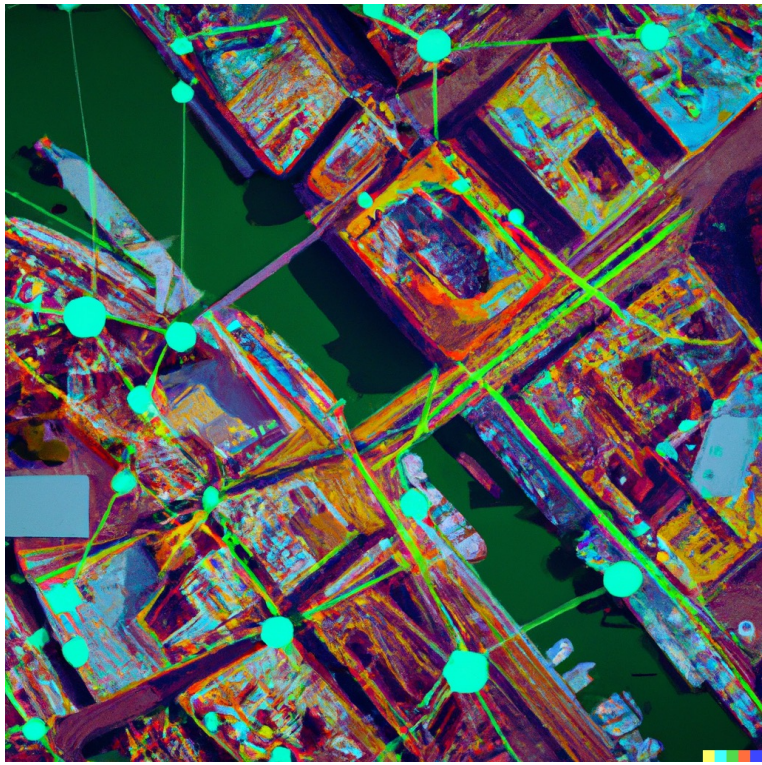
b. **Access to Services**: Assessing the accessibility of education, healthcare, and other essential services in the regions where a company operates can shed light on its social responsibility.

c. **Labor Force Analysis**: Mapping the distribution of labor force and their conditions (e.g., income, housing) around company facilities can indicate labor-related risks and opportunities.

d. **Cultural Heritage and Indigenous Rights**: Identifying culturally significant or indigenous areas near a company's operations can help assess its impact on cultural heritage and indigenous rights.

International regulations as a trigger to develop automated geospatial workflows

SDGs
ESG
CSRD & ESRS
CSDDD, GRI, SASB, ...



Earth observation in lucrative markets, i.e., business, finance, ESG, decarbonization

Corporate Social Responsibility Directive (EU)
European Sustainability Reporting Standards
Directive on corporate sustainability due diligence (EU)
Global Reporting Initiative
Sustainability Accounting Standards Board

EU: rises regulatory demand, increasingly complex

Official Journal
of the European Union

EN
L series

2023/2772

22.12.2023

COMMISSION DELEGATED REGULATION (EU) 2023/2772

of 31 July 2023

supplementing Directive 2013/34/EU of the European Parliament and of the Council as regards sustainability reporting standards

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to Directive 2013/34/EU of the European Parliament and of the Council of 26 June 2013 on the annual financial statements, consolidated financial statements and related reports of certain types of undertakings, amending Directive 2006/43/EC of the European Parliament and of the Council and repealing Council Directives 78/660/EEC

16.12.2022 EN Official Journal of the European Union L 322/15

DIRECTIVES

DIRECTIVE (EU) 2022/2464 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 14 December 2022

amending Regulation (EU) No 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU, as regards corporate sustainability reporting

(Text with EEA relevance)

L 150/206 EN Official Journal of the European Union 9.6.2

REGULATION (EU) 2023/1115 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 31 May 2023

on the making available on the Union market and the export from the Union of certain commodities and products associated with deforestation and forest degradation and repealing Regulation (EU) No 995/2010

(Text with EEA relevance)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 192(1) thereof,

Having regard to the proposal from the European Commission,

After transmission of the draft legislative act to the national parliaments,

Having regard to the opinion of the European Economic and Social Committee ([1]),

After consulting the Committee of the Regions,

Acting in accordance with the ordinary legislative procedure ([2]),

Whereas:

(1) Forests provide a broad variety of environmental, economic and social benefits, including timber and non-wood forest products and environmental services essential for humankind, as they harbour most of the Earth's terrestrial biodiversity. They maintain ecosystem functions, help protect the climate system, provide clean air and play a vital role for the purification of waters and soils as well as for water retention and recharge. Large forest areas act as a moisture source and help prevent desertification of continental regions. In addition, forests provide subsistence and income to approximately one third of the world's population and the destruction of forests has serious consequences for the livelihoods of the most vulnerable people, including indigenous peoples and local communities who depend heavily on forest ecosystems. Furthermore, deforestation and forest degradation reduce essential carbon sinks. Deforestation and forest degradation also increase the likelihood of contact between wild animals, farmed animals and humans, thereby increasing the risk of spreading new diseases and the risks of new epidemics and pandemics.

Automated workflow example

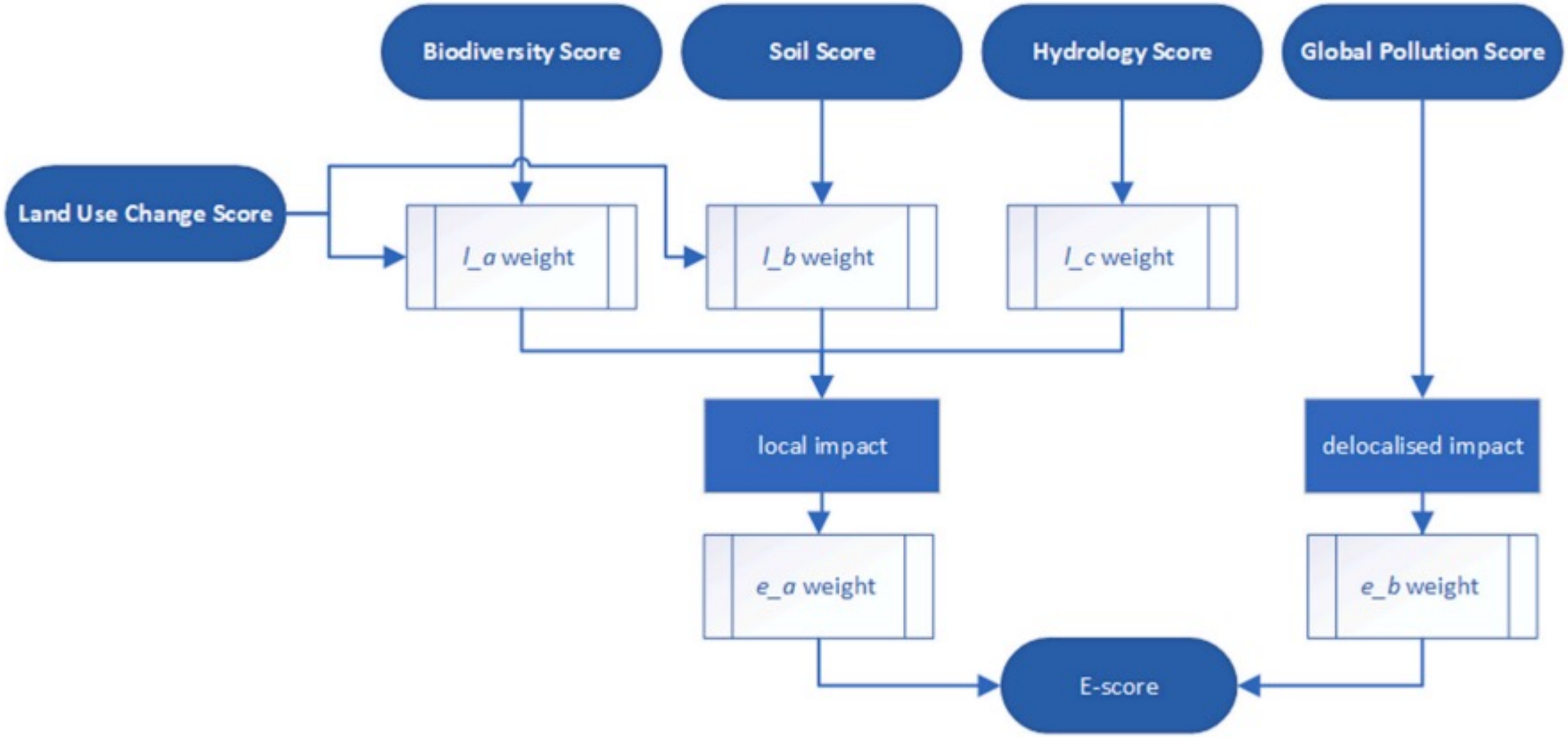


Figure source: Rossi et al. 2024

New deforestation regulations: EUDR

- Investigate changes to forested areas overtime: has deforestation or forest degradation occurred since Dec 2020?
- NDVI, multi or hyperspectral imagery, AI recognition, a combination?

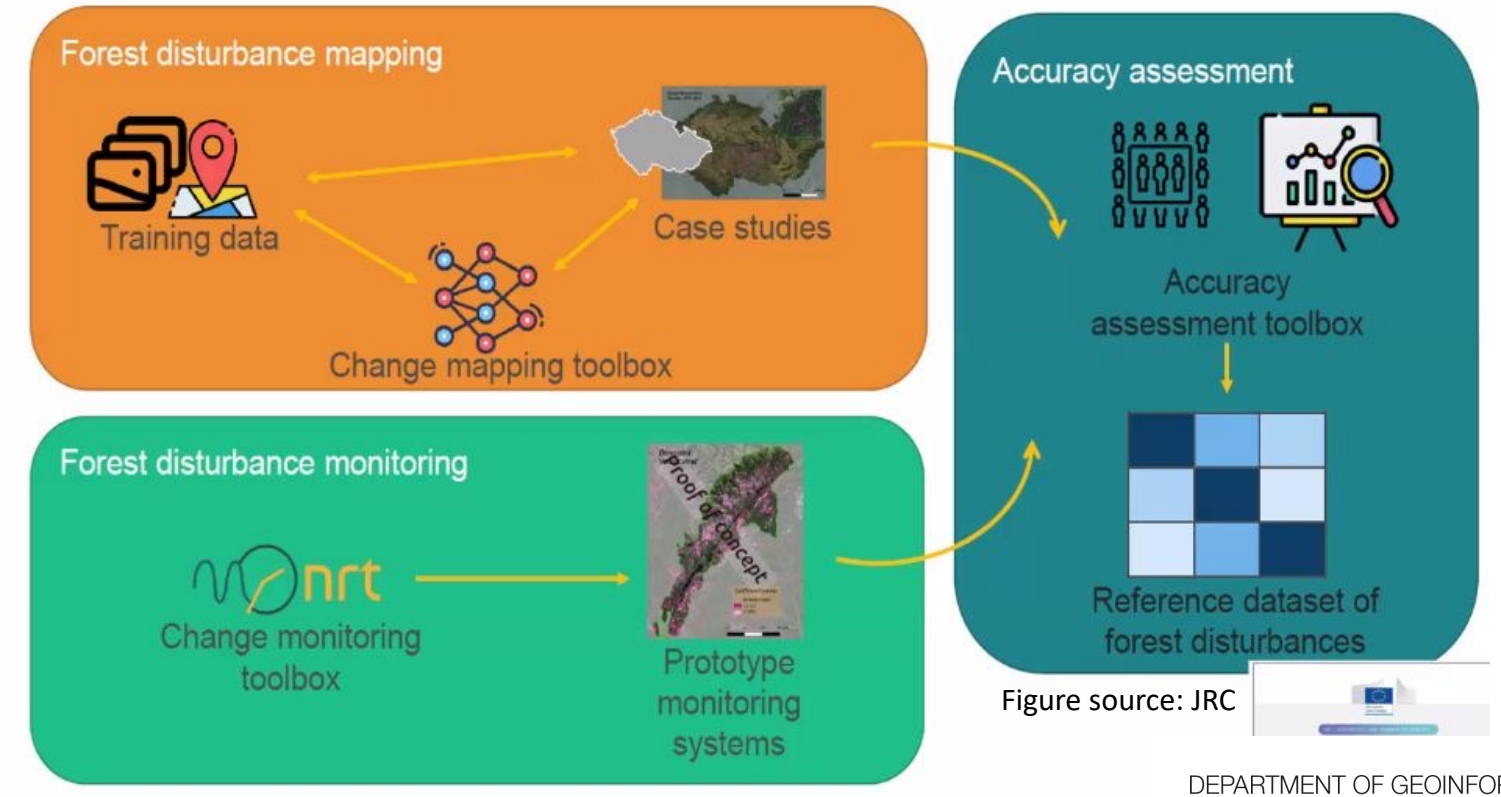


Figure source: JRC

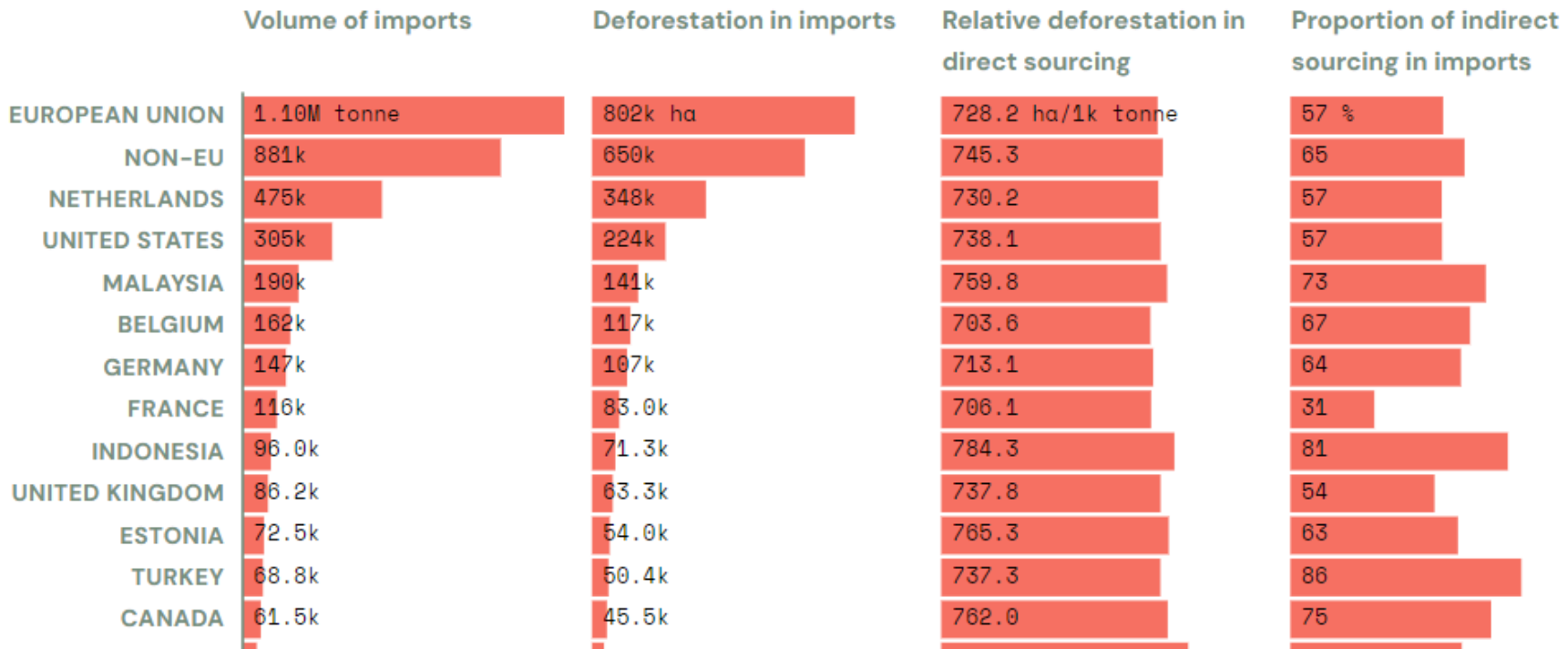
Special attention: smallholders

- coffee, cocoa and soya makeup 19.5% of Africa‘s GDP.
- 75% of deforestation in Africa is related to agriculture expansion, and these 3 commodities are a main contributor.
- 80% of the commodities are sourced from smallholder farmers
- Majority of smallholders across the continent (and world) are unaware of the EUDR and what it entails.
- Smallholders make up 60% of farmers on the continent and don’t have the ability to trace deforestation.

Phtot credit: Shawn Harquail

Case study - Côte d'Ivoire:

every year 110,000 hectares of tropical moist forest cut down for cocoa plantations the EU is most exposed to deforestation



	Volume of imports	Deforestation in imports	Relative deforestation in direct sourcing	Proportion of indirect sourcing in imports
EUROPEAN UNION	1.10M tonne	802k ha	728.2 ha/1k tonne	57 %
NON-EU	881k	650k	745.3	65
NETHERLANDS	475k	348k	730.2	57
UNITED STATES	305k	224k	738.1	57
MALAYSIA	190k	141k	759.8	73
BELGIUM	162k	117k	703.6	67
GERMANY	147k	107k	713.1	64
FRANCE	116k	83.0k	706.1	31
INDONESIA	96.0k	71.3k	784.3	81
UNITED KINGDOM	86.2k	63.3k	737.8	54
ESTONIA	72.5k	54.0k	765.3	63
TURKEY	68.8k	50.4k	737.3	86
CANADA	61.5k	45.5k	762.0	75

SMART & EASY LAND MAPPING

UNIQUE PLOT ID
→ CROP TYPE ?
→ EXPANSION ?
→ LOGGING ?

BEETLE FORTECH

Rapport sommaire

sur la parcelle appartenant à [redacted]

Propriétaire du champ	[redacted]
Culture	Anacardier (Cashew)
Point central de la parcelle	Latitude: [redacted] Longitude: [redacted]
Taille du polygone	2,71 hectares
Périmètre du polygone	939,77 mètres
Date d'enregistrement GNSS	24 février 2024

GEOLOCATION PRODUCTION REPORT (ESSENTIAL FOR EUDR COMPLIANCE)

KEY COMMODITIES: COCOA, COFFEE, TIMBER

ROBUST & RELIABLE TIMBER TRACKING

UNIQUE TREE ID
→ ORIGIN ?
→ LEGAL STATUS ?
→ PROCESSING ?

BEETLE FORTECH

Huge markets, new players: automated reporting through geospatial workflows

- ESRS and CSRD
- Earth Observation combined with geospatial data
- Report on required metrics
- New market opportunities

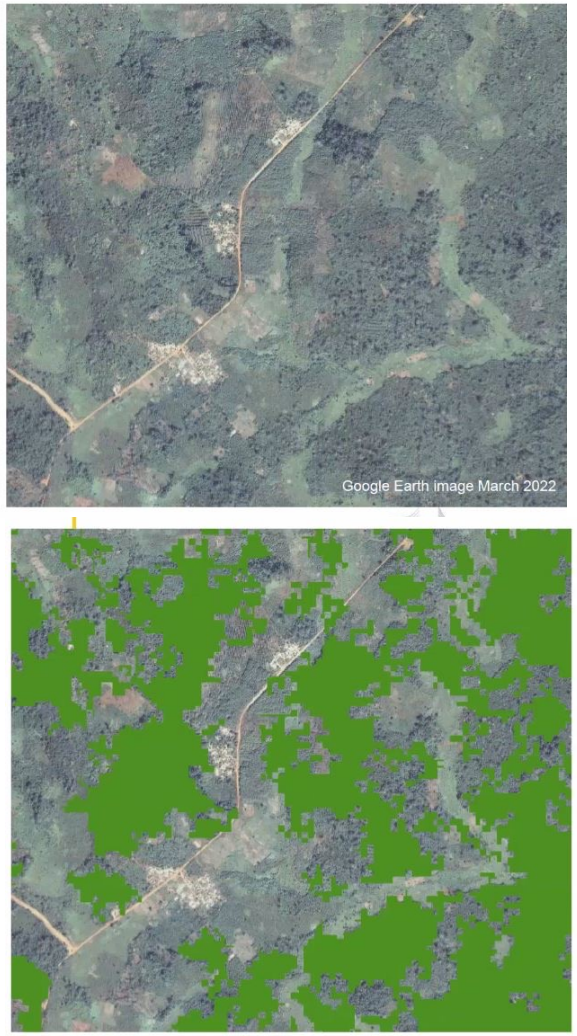


Figure source: JRC

refinq

BEETLE FORTECH

ESG CHAIN

VEO
Verify | Evaluate | Orientate

conclusions

Emerging commercial applications demonstrate that EO data are indispensable for developing scientifically sound and evidence-based practices and workflows to generate legally relevant solutions.

I illustrated some initiatives that contribute science-based information to legislations and initiatives that particularly aim to reducing biodiversity loss and global deforestation and exemplify this with geospatial strategies and workflows for due diligence processes within the EUDR.

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https://scholar.google.com/citations?user=kMroJzUAAAAJ

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