

Stronger together via *collaborative* environmental compliance assurance: supporting civil society and institutional actors to join forces in combatting environmental crimes

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The environment keeps degrading

International regimes, legislation, and respective local policies to manage environmental resources are (mostly) in place.

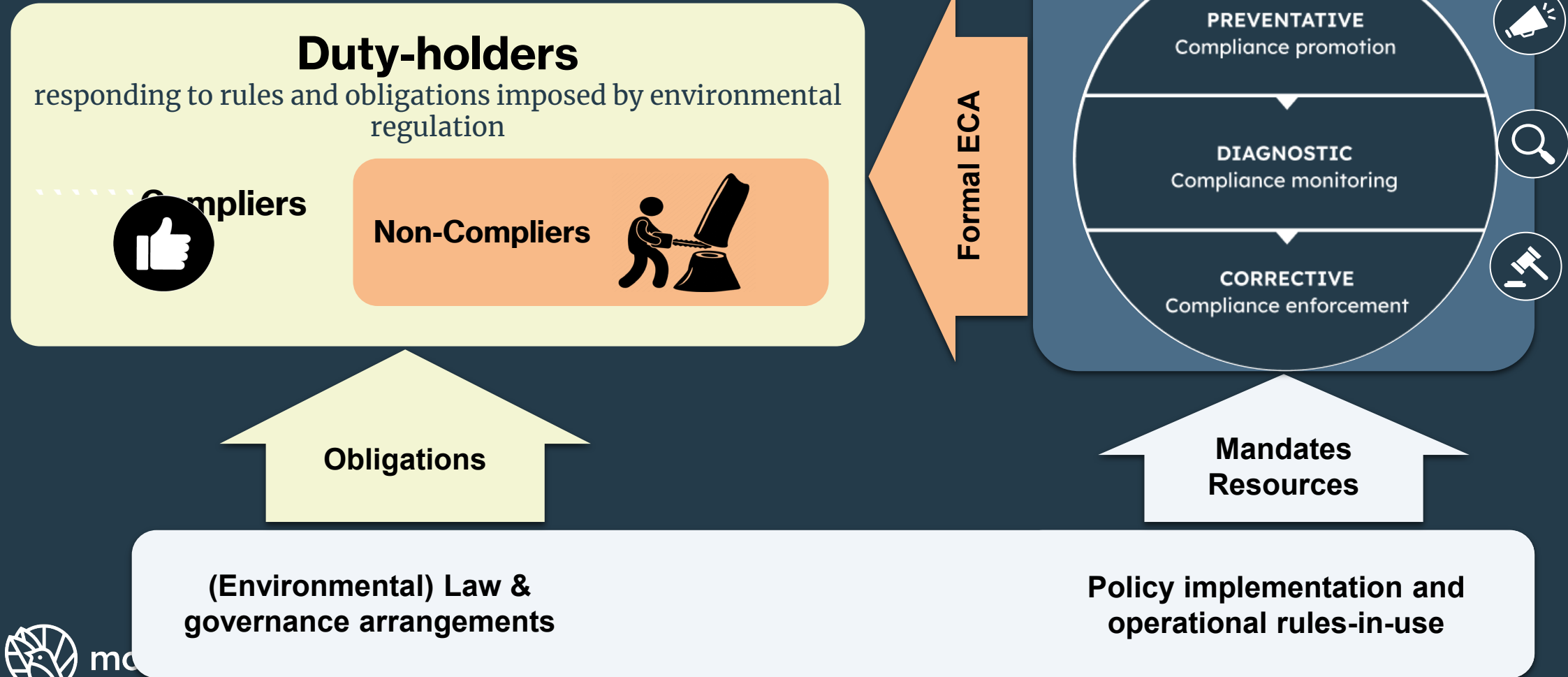
But water and air pollution, biodiversity loss and deforestation are continuing and worsening in most parts of Europe and globally.

Unsatisfactory outcomes typically attributed to **implementation gaps** and **insufficient compliance** by duty

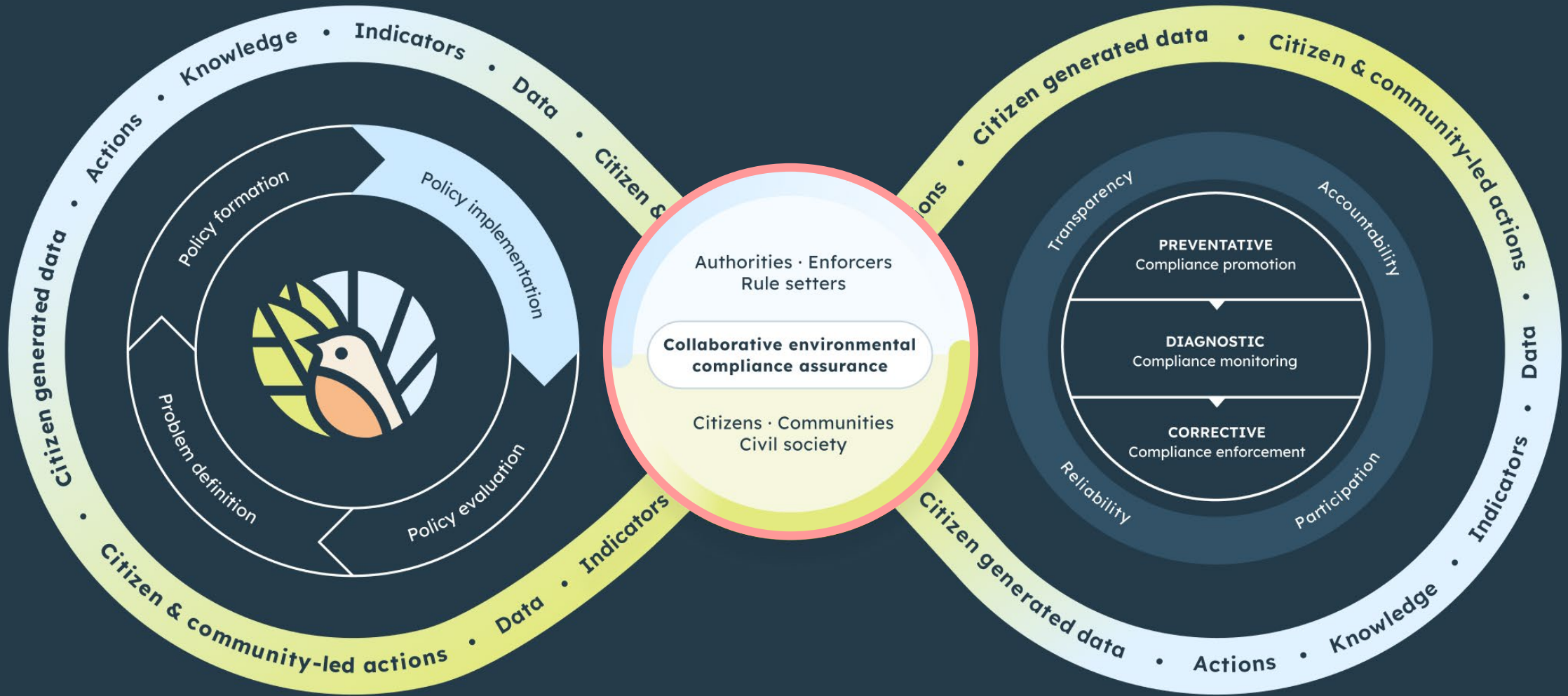


Environmental Compliance Assurance (ECA)

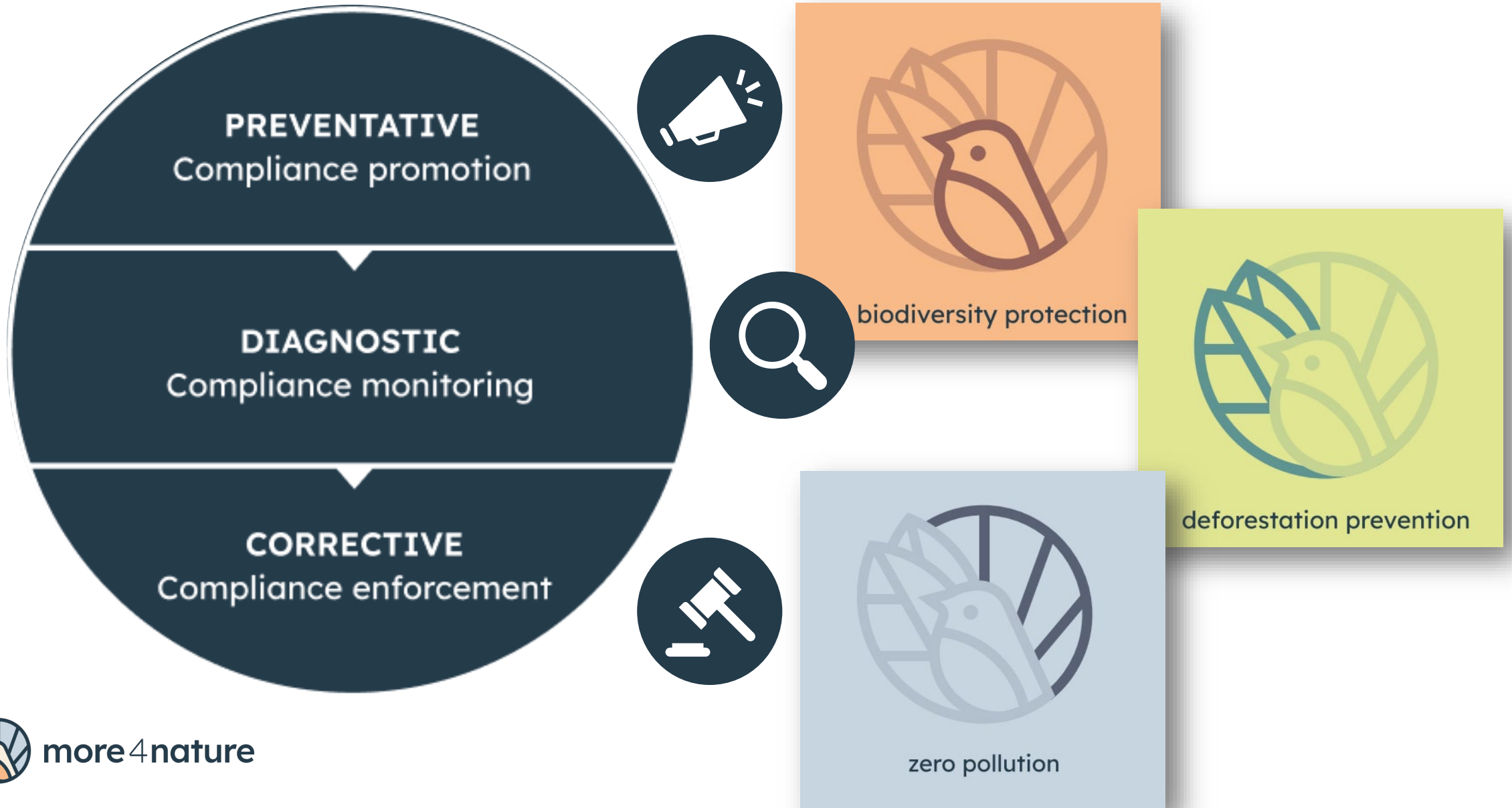
“all the ways in which public authorities promote, monitor and enforce compliance with the relevant rules”
(European Commission, 2017)



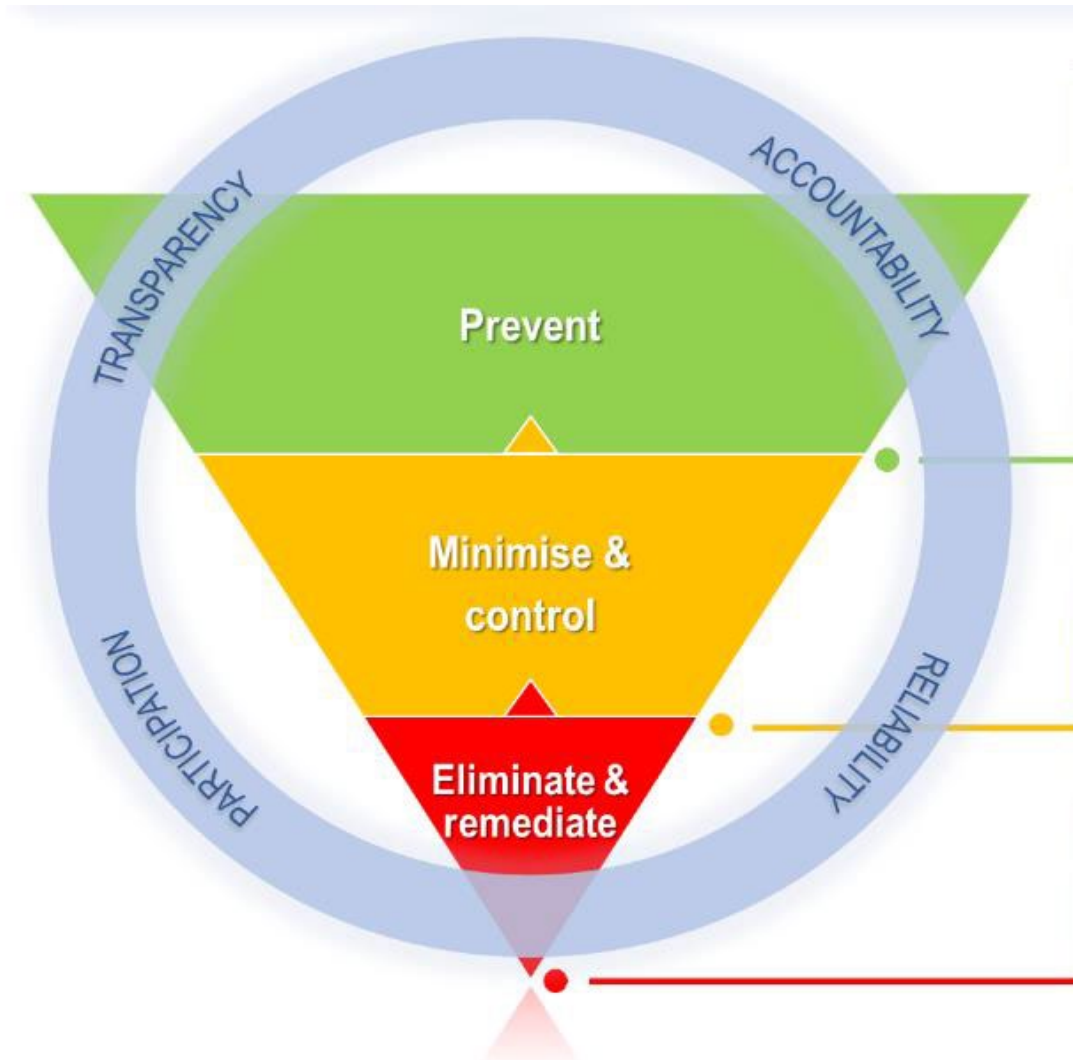
Stronger together: Make citizens & communities part of the solution!



Examples of citizen science contributions to ECA



Joining forces: more than data



Roles for citizen participation in ECA?

Duty holders

TYPES OF BEHAVIOUR AND RESPONSES



ECA
authorities



Source: European Commission (2017) *Towards an improved assessment of environmental compliance assurance.*

Roles for citizen participation in ECA

Duty holders



ECA authorities



Citizens & communities

Actions Provide *additional information, resources, or a stronger sense of urgency*

Target: duty holders or ECA actors who might change their behaviour based on additional knowledge, resources, pressure

Purpose: Improvements **within** the existing institutional system

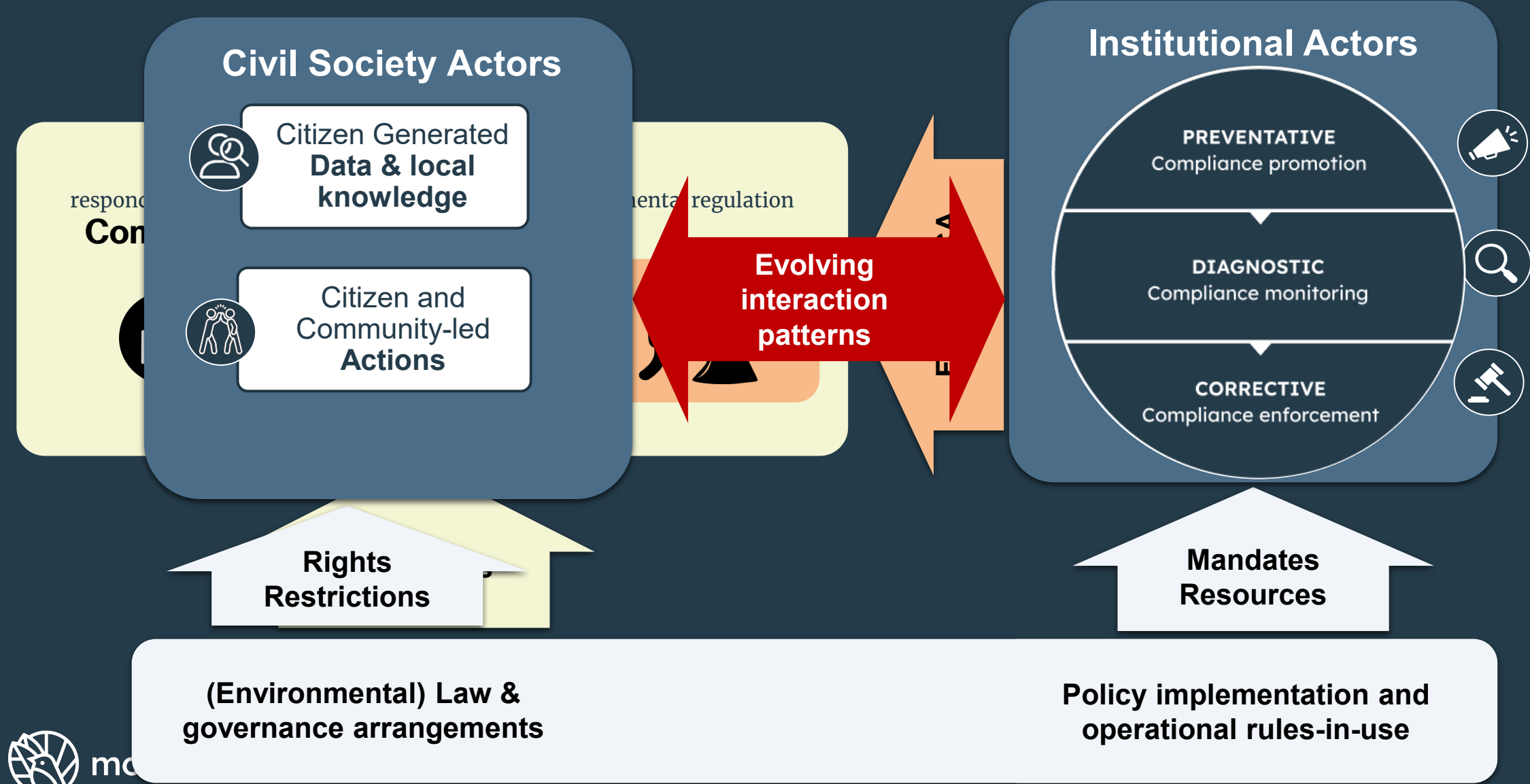
Actions Citizens as watch-guardians, surveillance of non-compliance, denounce ilegal practices, take legal actions, blockage of sites

Target: duty holders unwilling to change without deterrence, also pressure on inactive or corrupt institutions

Purpose: challenge and improve the **system itself**



Collaborative Environmental Compliance Assurance

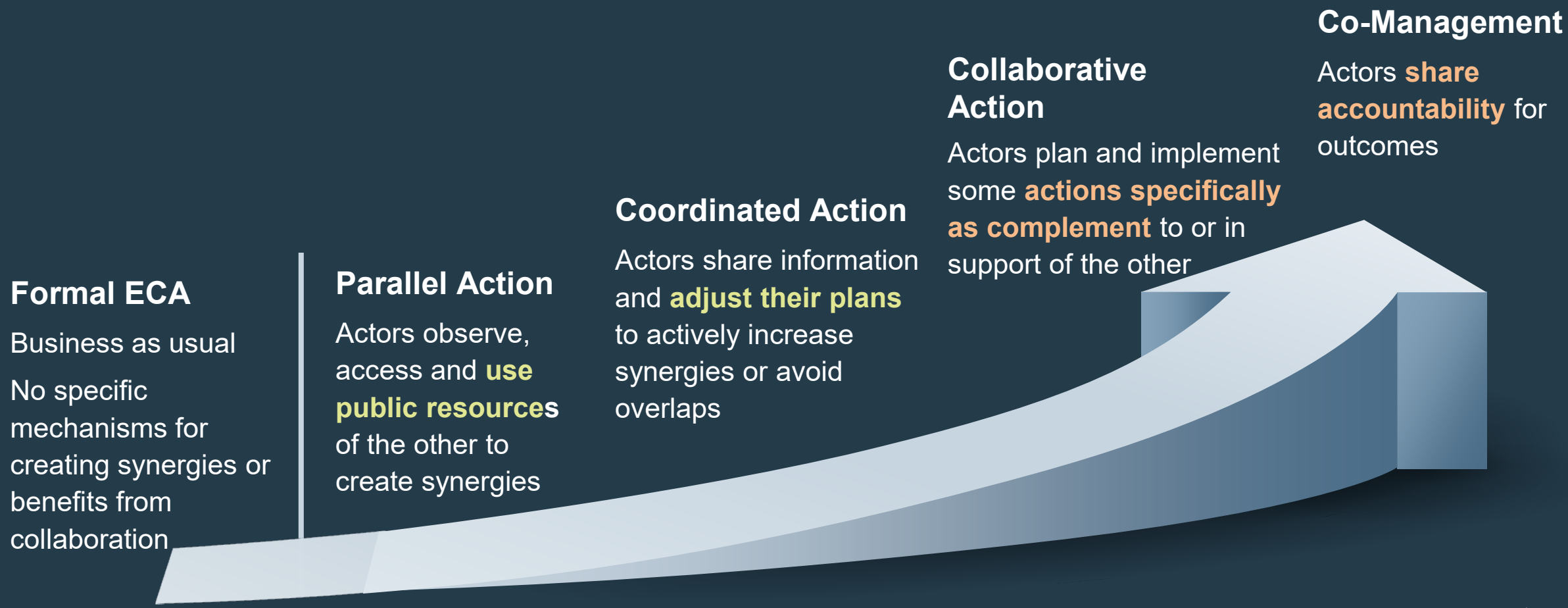


Source: based on Wehn & Pfeiffer (2024) more4nature Deliverable D3.1

Joining forces

Collaborative Environmental Compliance Assurance

Institutionalising informed citizen contributions to ECA



Who we are working with

40

Cases worldwide

98

Authorities and national agencies

160

Citizen Science Initiatives

40 cases
20 countries
1 methodology
 to support actors to join forces



EXPERIENCE

STAGE 5: CO-EVALUATE & SUSTAIN

co-evaluate results & strengthen capacity to sustain changes

STAGE 4: CONSOLIDATE

changes (social, institutional, technical)

STAGE 3: EXPLORE

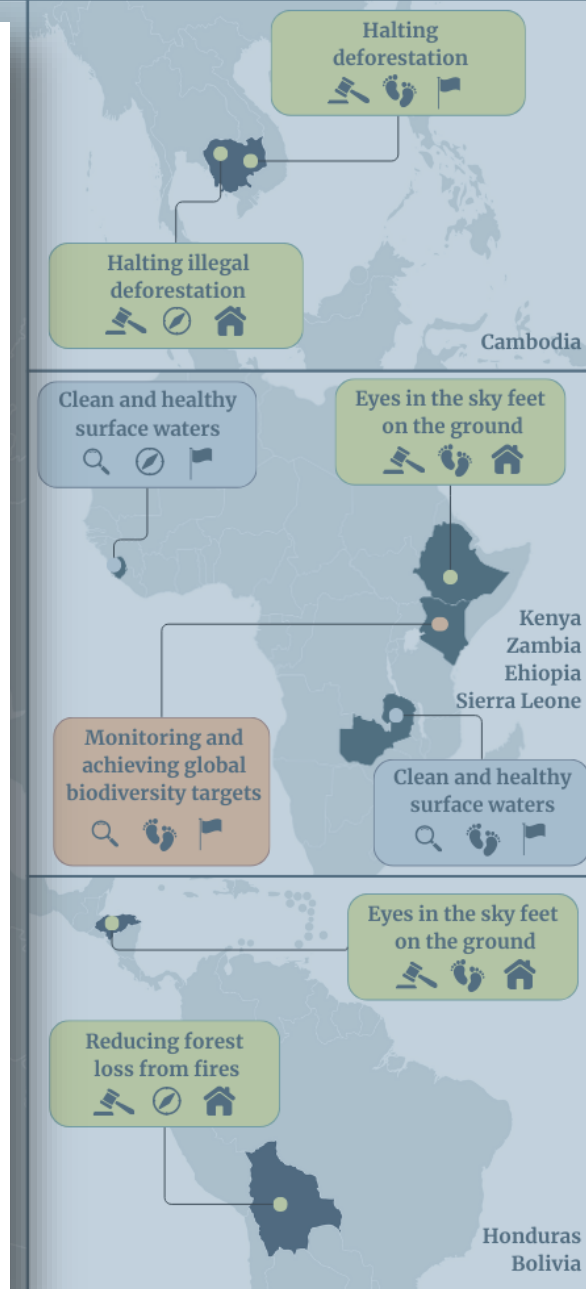
roles of CDG and CCLA in collaborative ECA

STAGE 2: ENGAGE

case stakeholders for the learning journey

STAGE 1: PREPARE

case activities



Key messages

Citizen science can help improve effectiveness of the ECA system – joining forces OR holding authorities accountable in combatting environmental crimes

Reimagining and deepening role of citizens and communities in collaborative ECA: *transformative change* that will not occur by coincidence

more4nature methodology: create space for visioning and socio-technical experimenting with new roles and interactions to create possibilities for collaboration previously unimagined

More from more4nature...at the poster session

Ireland – CS initiating & ground truthing EO monitoring of unauthorized aquacultures



Context

Intertidal and shallow sublittoral bivalve aquaculture can exert pressures on coastal ecosystems.

Traditional monitoring is challenging because farms are often extensive and remote, while inspections depend on low-tide windows and suitable water transparency; highlighting the need for robust, independent and scalable monitoring approaches.

Study area

This study focuses on the Lough Foyle Special Protection Area (SPA 004087) designated in 2014 under the EU Birds Directive (2009/147/EC) to protect wetlands and other key habitats.

The SPA covers the Donegal coast of Lough Foyle, a transboundary estuary between Ireland and Northern Ireland, where unauthorized Pacific oyster farming began around 2010 and subsequently became the dominant shoreline use.

Scope

The objective was to assess wetland changes associated with oyster aquaculture, focusing on the spatial and temporal evolution of oyster trestles and related sediment disturbances within the intertidal and shallow sublittoral zone.

A multi-temporal Earth Observation framework based on very high-resolution (VHR) optical imagery was applied from 2012–2026. The imagery was provided via the European Space Agency (ESA) Third Party Missions (TPM) programme, enabling access to archives from Pleiades and WorldView sensors.

Methodology and results

The methodology combines automated object-based image classification with expert photointerpretation to map oyster trestles and identify potential aquaculture-related disturbances, including vehicle tracks. Coastwatch citizen science observations were used as ground truthing to support interpretation and validation.



Sediment disturbances 2012-2026

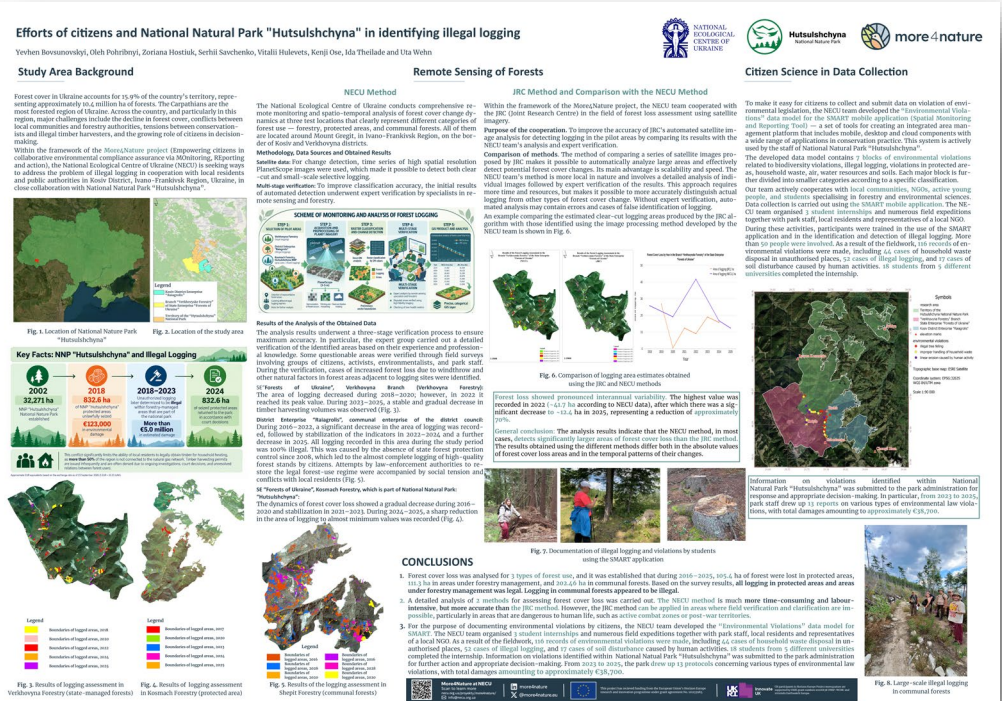
This activity maps individual vehicle tracks and areas with dense traffic-related disturbance in intertidal zones. Tracks, typically visible as parallel linear features created by tractors or other wheeled vehicles, may occur as isolated paths or extensive disturbed areas. Using photo-interpretation of co-registered cloud-free VHR optical images acquired at low tide in 2012, 2016, 2017, 2021, and 2026, identifiable tracks are mapped as lines, while heavily disturbed areas where individual tracks cannot be distinguished are wrapped as polygons.



The findings reveal an escalation of pressure on sensitive wetland habitats and birds for which the site is designated.

The value of Earth Observation for environmental monitoring and the use of long-term VHR satellite archives to detect human pressures in protected coastal ecosystems is highlighted.

Ukraine – CS ground truthing EO monitoring of illegal logging & forest loss analysis with JRC



Technical maturity levels of data mgt processes for citizen-generated data



The more4nature project aims to trigger transformative change in conservation efforts regarding zero pollution, biodiversity protection and deforestation prevention by strengthening the role of citizens and communities in environmental compliance assurance.

more4nature analysed the citizen-generated data (CGD) from citizen science (CS) initiatives involved in 21 more4nature cases from a technical

- Assess each stage of their CGD lifecycle management practices; namely: collection, storage, processing, usage and preservation, and determine set of criteria for the "Technical Maturity Level" (TML) of the data management process.
- Prepare the CGD in a way that allow its integration to the European Green Deal Data Space (GDOS) in an interoperable manner.
- Harmonize and implement indicators derived from CGD, enabling a more consistent evaluation and uptake of evidence for collaborative environmental compliance assurance.

In more4nature, the TML is defined by conglomerating criteria from various well-established data management principles such as FAIR, CARE, the Open Science Recommendation by UNESCO, or the Open Data Charter.

Set of criteria in the data lifecycle

[illegible]

Results

Stage of data life cycle	Zero Pollution
Data Collection	84%
Data Storage	46%
Data Processing	37%
Data Usage	55%
Data preservation and archival	44%

Zero Pollution initiatives, particularly those focused on air quality monitoring, demonstrate high maturity due to the use of low-cost sensor networks, standard APIs, and documented calibration procedures.

In contrast, water and waste pollution initiatives, often rely on project-specific data structures, have limited or no API access, and do not have standardised approaches to data quality control. This highlights the existence of remaining challenges to overcome.

Stage of data lifecycle	Biodiversity protection
Data Collection	94%
Data Storage	73%
Data Processing	58%
Data Usage	54%
Data preservation and archival	95%

Biodiversity Protection initiatives have the highest TMI scores among the case. This is because of the use of established platforms such as GBIF, Naturalist and eBMS, which provide a common standards, quality mechanisms and interoperable infrastructure.

Their high score in data storage and preservation demonstrates the benefits of integrating CGO in common platforms, offering a valuable practice for other CI initiatives.

Stage of data life cycle	Deforestation prevention
Data Collection	44%
Data Storage	14%
Data Processing	37%
Data Usage	33%
Data preservation and archival	0%

Deforestation Prevention Initiatives present lower technical maturity levels. This is because data is often managed through project-specific platforms and access is frequently restricted due to specific governance and sensitivity considerations.

Despite these limitations, most initiatives already collect valuable CGO and have the potential to improve interoperability and future integration to the GDOs.

Thank you!

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in more4nature



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