



biodiversa+
European Biodiversity Partnership

Webinar “eDNA methods in environmental monitoring”

Task 2.3.1. Novel technologies and approaches

Organised by DTER (Catalonia) and Nadia Balduccio & Iiris Kallajoki (OT Biodiversa+)

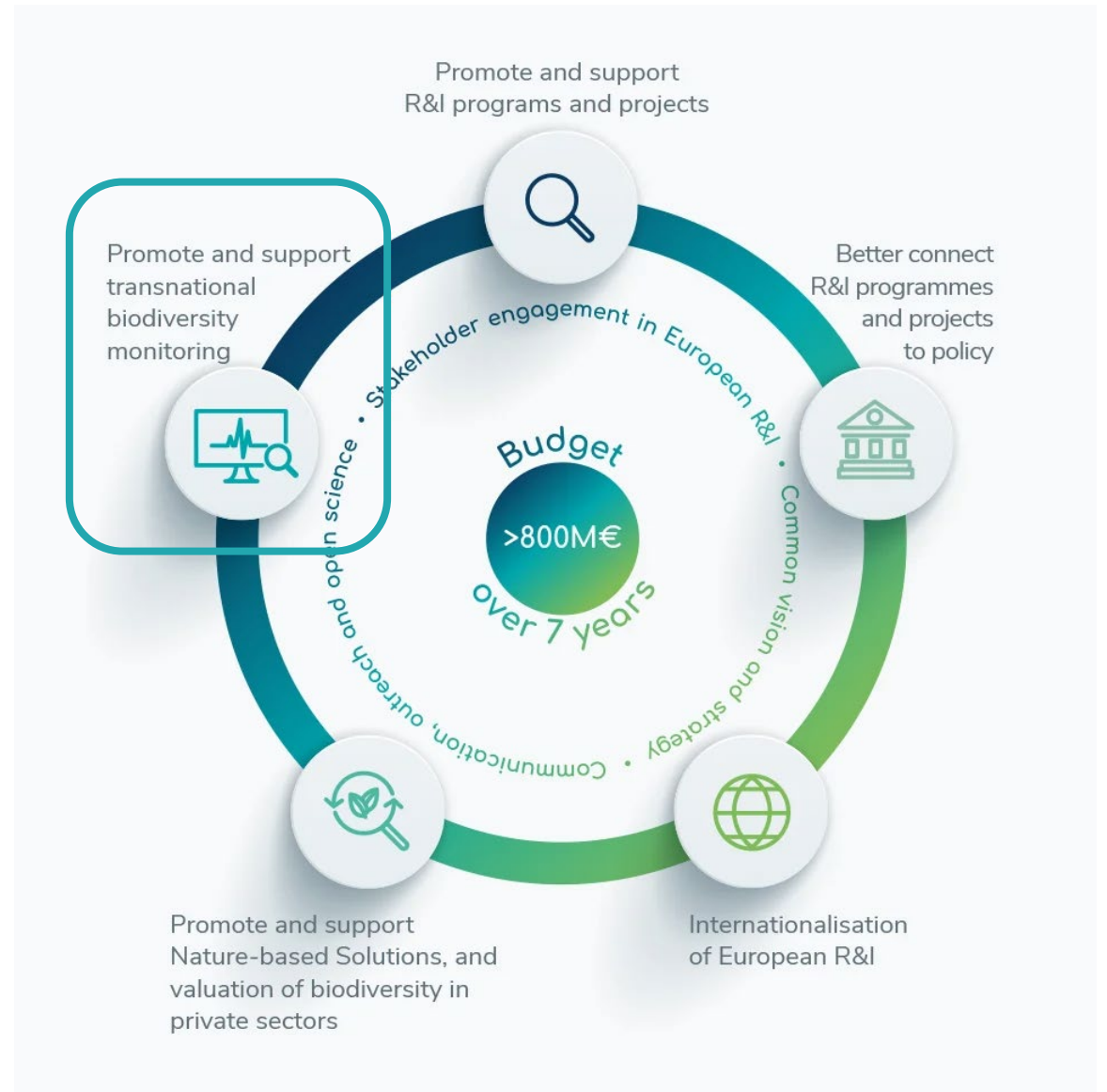
5 June 2026



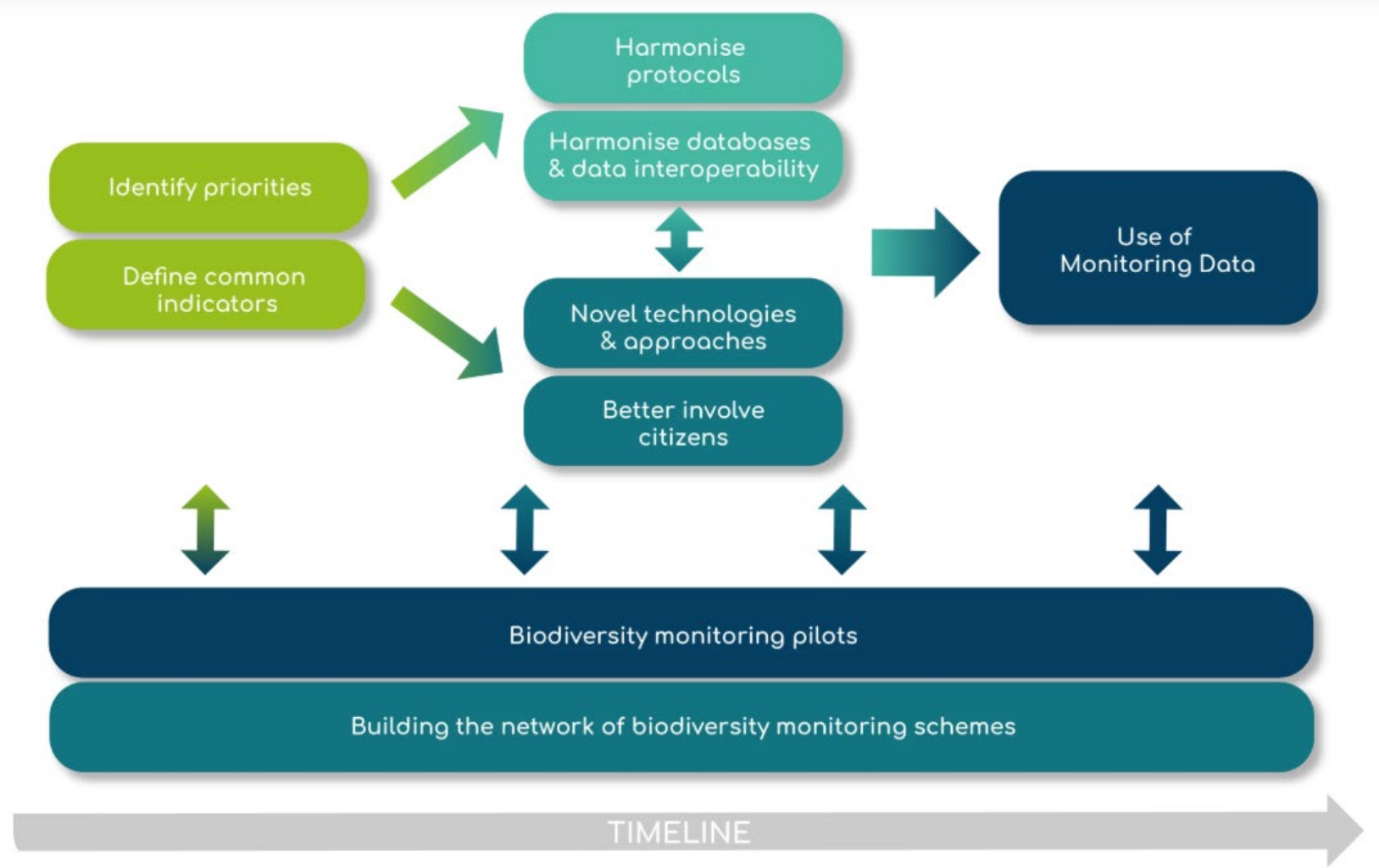
About Biodiversa+

Biodiversa+ is the European Biodiversity Partnership supporting excellent research on biodiversity with an impact on policy and society.

Workpackge 2: Set up a network of harmonised schemes to improve monitoring of biodiversity and ecosystem services across Europe



Biodiversa+ WP2 - Task 2.3.1. Novel technologies and approaches



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Series of webinars on novel technologies for biodiversity monitoring

- Image-based approaches
- Environmental DNA
- Bioacoustics
- Sensor networks
- Remote sensing

✓ More webinars to come, stay tuned!

Survey of novel technologies monitoring across partners

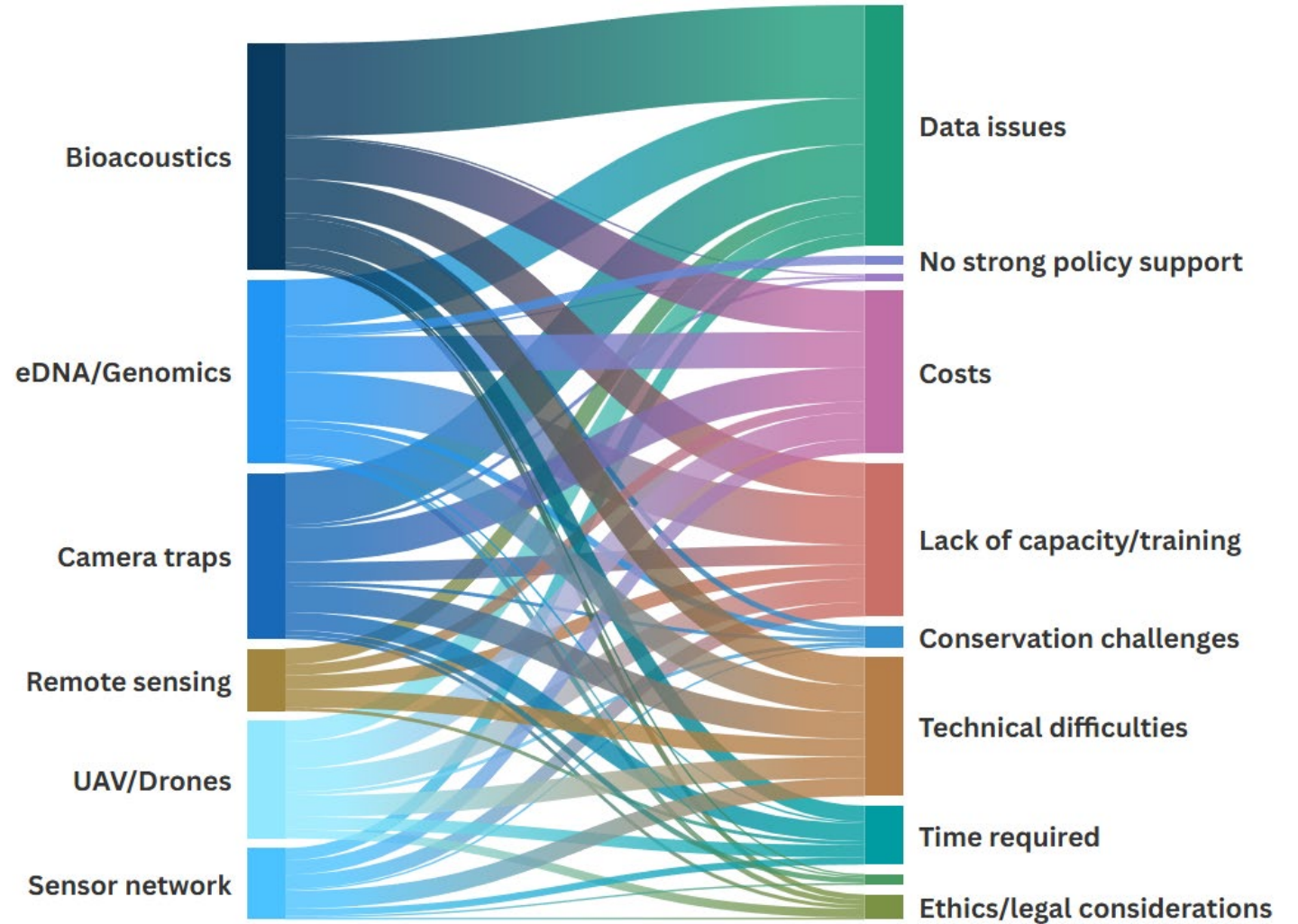
- Deployment state / interest
- Targeted taxa and EBVs
- Challenges and constrains



Biodiversa+ WP2 - Task 2.3.1. Novel technologies and approaches

eDNA constrains

- Lack of capacity or training by 27% of partners.
- Data issues by 25% of partners, specifically in difficulties in comparing results (lack of standardization) and lack of reference data.
- Costs & technical difficulties.



Webinar agenda



1. Introduction of the webinar and speakers
2. Presentation by Tiina Laamanen (Finnish Environment Institute, SYKE)
3. Presentation by Kristian Meissner (Finnish Environment Institute, SYKE)
4. Questions / debate (not recorded)



eDNA methods in environmental monitoring: where are we on the road for routine implementation?

Tiina Laamanen, Group Manager, Senior Researcher
Biodiversa eDNA webinar 5.6.2026



Suomen ympäristökeskus
Finlands miljöcentral
Finnish Environment Institute

eDNA

- eDNA is genetic material in environmental samples (e.g.soil, sediment and water)
- eDNA offers an integrative view of ecosystem composition
- eDNA metabarcoding can be used in assessment and monitoring of all species
- high detection capacity
- cost-effectiveness





Why do we need national and international coordination of molecular monitoring methods implementation?

Several environmental directives require to report data on biodiversity

We need reliable tools to assess the effect of management actions

Molecular methods have reached critical maturity - their implementation has started worldwide

The field is fragmented, – risk of unnecessary duplication of efforts, method pluralism and resulting incompatibility of the end results

Some of the desired endpoints are ultimately international – European, or global biodiversity assessments, international legislation, identification of patterns and effective measures

Roadmap for implementing environmental DNA (eDNA) and other molecular monitoring methods in Finland

Vision and action plan for 2022–2025

Veera Norros, Tiina Laamanen, Kristian Meissner, Terhi Iso-Touru, Aapo Kahilainen, Sirpa Lehtinen, Katileena Lohtander-Buckbee, Henrik Nygård, Taina Pennanen, Marja Ruohonen-Lehto, Päivi Sirkkiä, Sanna Suikkanen, Mikko Tolkkinen, Eeva Vainio, Sannakajsa Velmala, Kristiina Vuorio and Petteri Vihervaara

+ Promote international coordination and collaboration

+ Promote cross-organizational interaction in practice

Aims of the eDNA roadmap project

Describe the national state-of-the-art in molecular monitoring methods

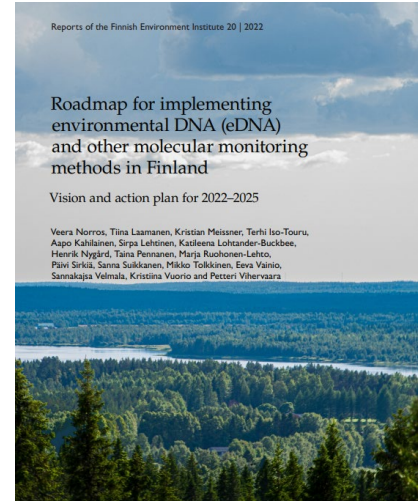
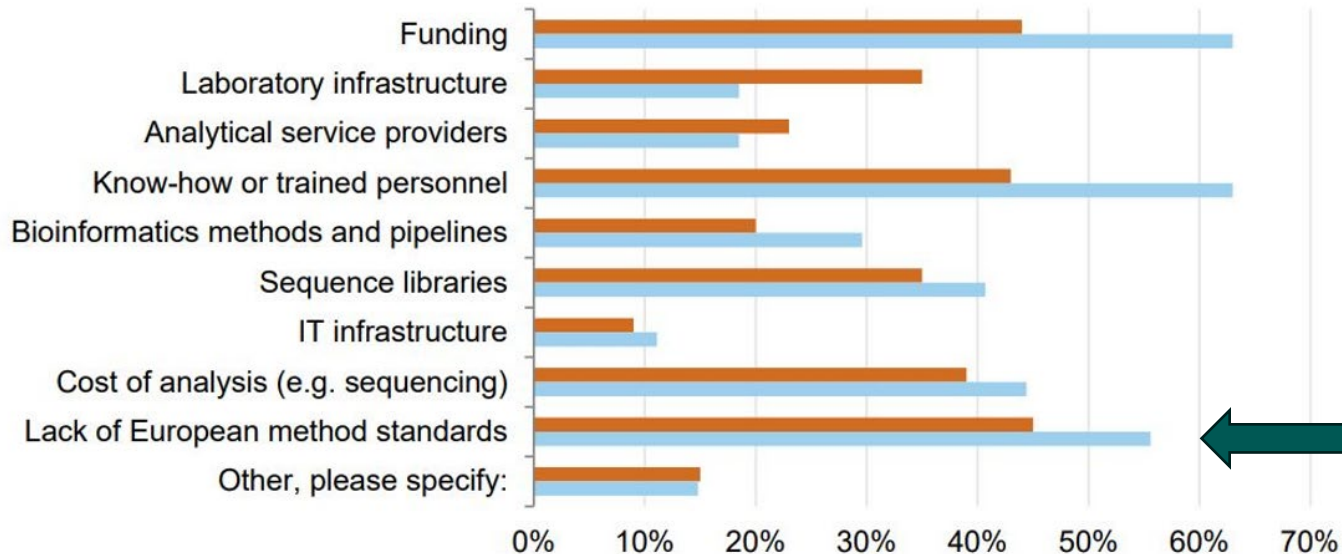
Identify the main possibilities and challenges and development needs

Formulate medium- and short-term aims

Provide a concrete action plan for the next four years

The key limiting factors are lack of funding, expertise and method standards

We received a total of 171 responses to our international survey



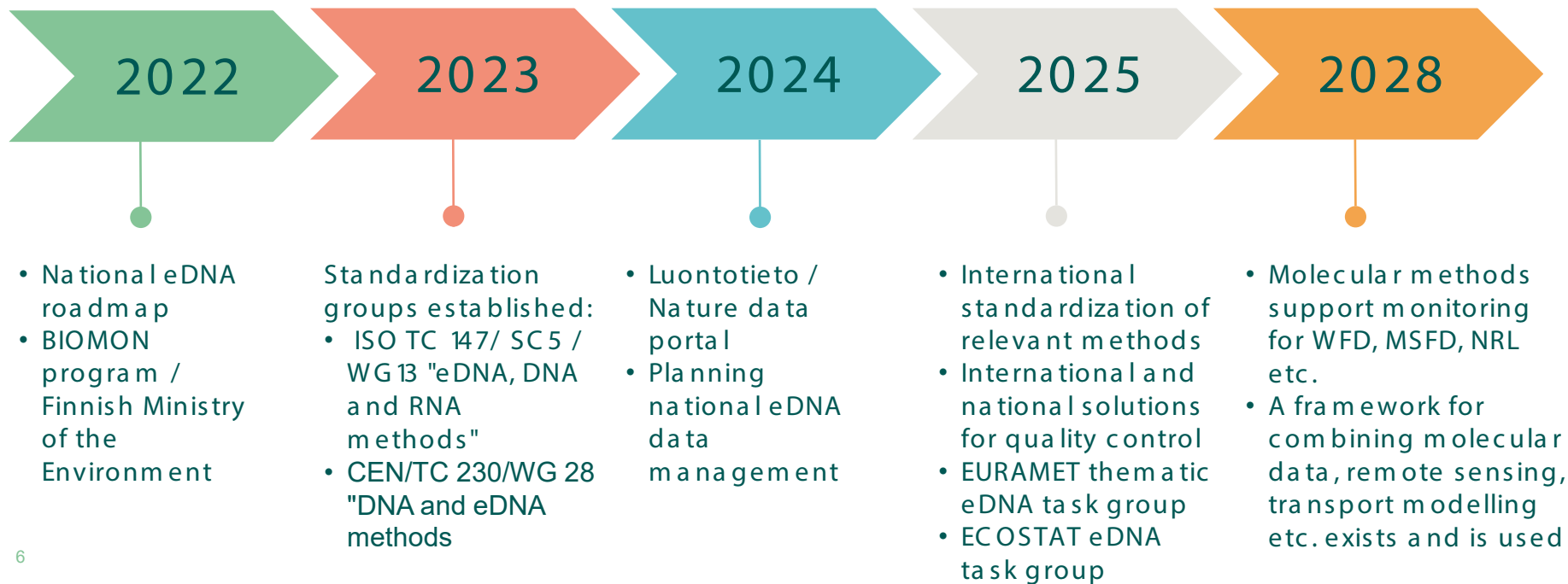
Norros et al. (2022)

Vision: internationally standardized molecular methods as a cornerstone of routine monitoring

National transition phase – method piloting and testing

Updated from [Norros et al. \(2022\)](#)

New age of biological monitoring



Technology Readiness Level (TRL) of biodiversity monitoring with molecular methods

Over 600 research papers screened
Division into Freshwater, Marine and Terrestrial applications for monitoring
Freshwater applications of molecular monitoring methods ranked highest on TRL



Metabarcoding and Metagenomics 9: 71–89 (2025)
DOI: 10.3897/mbmg.9.130834

Review Article

Technology Readiness Level of biodiversity monitoring with molecular methods – where are we on the road to routine implementation?

Tiina Laamanen^{1,2}, Veera Norros¹, Petteri Vihervaara¹, Jacqueline Jerney³, Pirkko Kortelainen¹, Katharina Kujala², Stefan Lambert², Janne Mäyrä¹, Lilja Nikula⁴, Ida Palmroos⁵, Mikko Tolkkinen⁶, Kristiina Vuorio¹, Kristian Meissner¹

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[Laamanen et al. 2025](#)

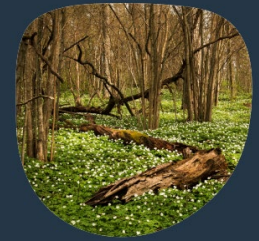
Ongoing activities

- Standardization efforts through the International eDNA Standardization Task Force iESTF (www.iestf.global) -> ISO & CEN
- International collaboration with GEOBON, iBOL, GBIF etc.
- Numerous national and international research and development projects are currently running
 - funded by e.g. Research council of Finland, EU LIFE programme, Horizon Europe Biodiversa+, ERC
- Molecular monitoring methods are part of
 - National environmental monitoring strategy working group “New methods”
 - National coordination group for nature information (Lukki) working group “New methods for producing and utilizing nature information”
 - European Metrology Network on pollution monitoring (EMN Polmo) task group eDNA



**Yhteistyöllä
laadukkaampaa
luontotietoa**

LUKKI-RYHMÄN MAETRIKÖ JA SUOSTUS KANSALLISEN LUONTOTIEDON
KEHITTÄMISOHJELMAN KÄYNNISTÄMISEKSI 2024–2025



**Ympäristön tilan seurannan
strategia 2030**

Ympäristöministeriön julkaisu
2022:38



Some ongoing projects



DNAquaIMG

<https://dnaquaimg.eu/>

Implementation
for the WFD

eDNA & remote
sensing

 BSGSESSION

Observation of Ecosystem Changes for
Action

<https://obsgeSSION.eu/>

<https://www.metsa.fi/en/project/priodiversity-eng/>



PRIODIVERSITY LIFE

Method testing for species composition
& state of habitats

FAIR eDNA data



eDNAAqua-Plan Next generation of aquatic biodiversity monitoring

<https://ednaaquaplan.com/>

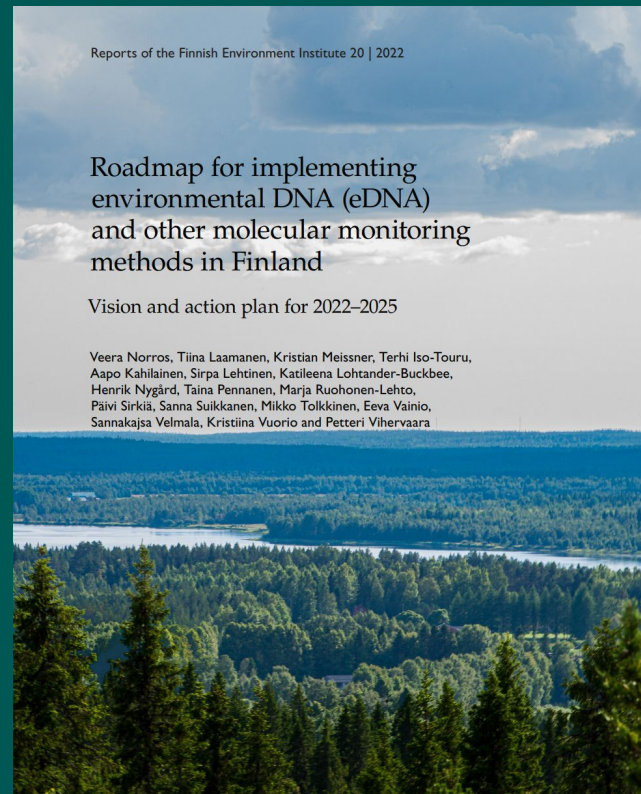


- + National 4 M € nature information R & D project will be running 2026-2027
- + National ECOSTAT pilot project running 2026
- + eDNA4Policy COST action 2026-2030



Where are we on the road to routine implementation of eDNA monitoring?

- Work is ongoing, standards are in development, numerous proof of concepts
- International cooperation is crucial for establishing common standards, ensuring reliable and comparable results, and implementing molecular methods into biomonitoring
- Further coordinated actions are needed for implementation and acceptance



Reports of the Finnish Environment Institute 20 | 2022

Roadmap for implementing environmental DNA (eDNA) and other molecular monitoring methods in Finland

Vision and action plan for 2022–2025

Veera Norros, Tiina Laamanen, Kristian Meissner, Terhi Iso-Touru, Aapo Kahilainen, Sirpa Lehtinen, Katleena Lohtander-Buckbee, Henrik Nygård, Taina Pennanen, Marja Ruohonen-Lehto, Päivi Sirkiä, Sanna Suikkanen, Mikko Tolkkinen, Eeva Vainio, Sannakajsa Velmala, Kristiina Vuorio and Petteri Vihervaara

Thank you!



Suomen ympäristökeskus
Finlands miljöcentral
Finnish Environment Institute

tiina.laamanen@syke.fi

Implementation and standardization of molecular monitoring methods

Kristian Meissner
Finnish Environment Institute
Biodiversity Genomics Europe, Brussels, 01.10.2025



Suomen ympäristökeskus
Finlands miljöcentral
Finnish Environment Institute



What is a standard?

De jure standards ≠ "Guidelines" or de facto "SOPs"

Standardization ≠ harmonization / intercalibration

Definition:

A document, established by consensus and approved by a recognized body that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context. Standards should be based on consolidated results of science, technology and experience, and aimed at the promotion of optimum community benefits.



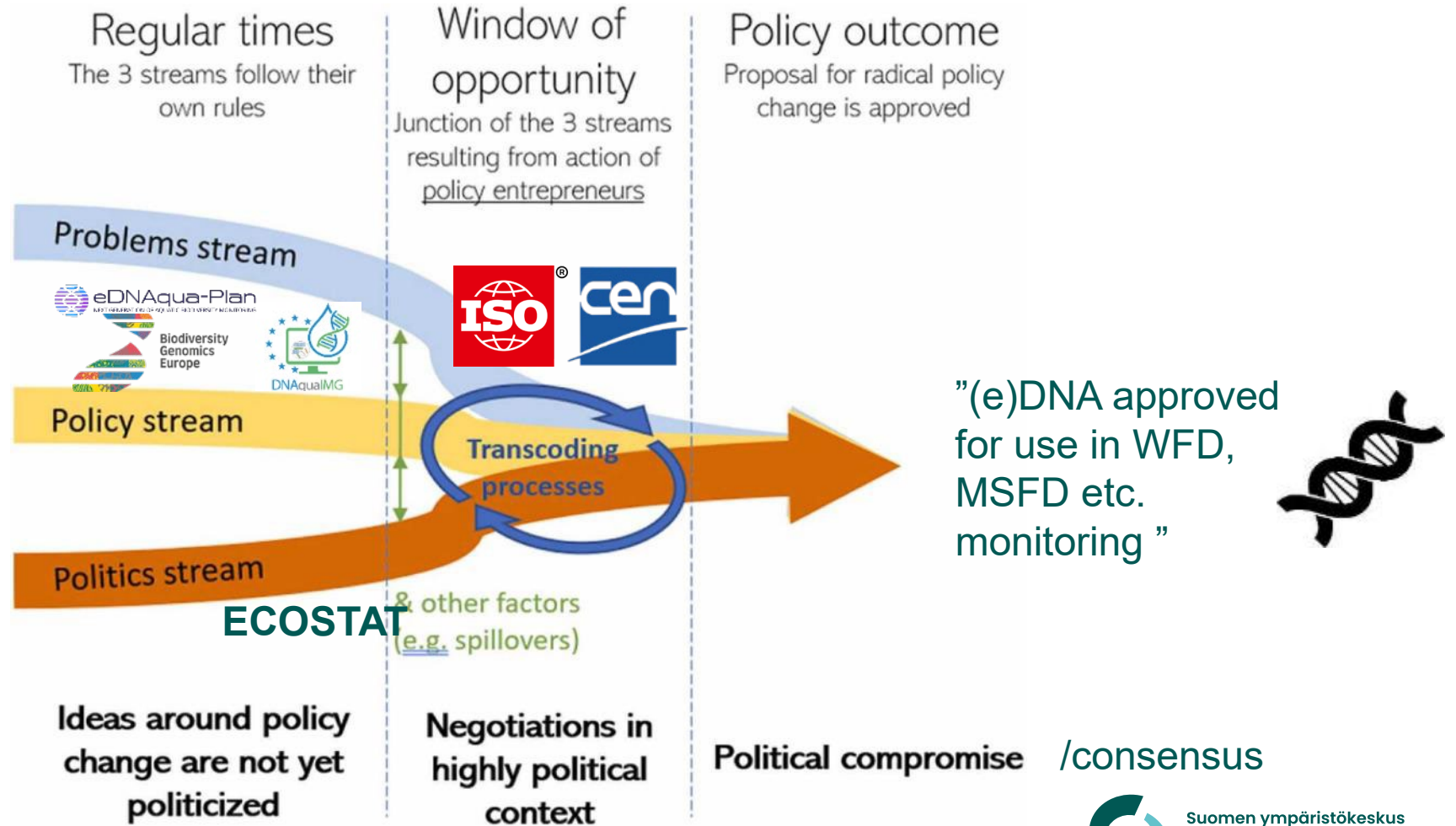
Note: The intention is to standardize minimum requirements for regulatory method use **not to** impose method use when doing research!



Ideally:



The reality :



Images: Valin& Huitema 2023, JNCC, EU, UNEP, UN, ISO, CEN

Ongoing (e)DNA method standardization for water: ISO TC147 WG13



1. ISO EN 17805:2023 Sampling, capture and preservation of environmental DNA from water M-T Werner (D)
2. ISO/NP 25806 Water quality - Guidance on field and laboratory procedures for aquatic macroinvertebrate sample preservation for DNA based analyses. F Leese, (D)
3. ISO/NP 25807 Water quality - Guidance on laboratory procedures mechanical homogenization and DNA extraction of aquatic macroinvertebrate samples. M-T Werner (D)
4. FprEN 13946:2025 Water quality — Guidance standard for the routine sampling and preparation of benthic diatoms from rivers and lakes M Kelly (UK)
5. ISO/PWI 25605 Water quality - General principles for quality assurance of molecular- biological examination for environmental DNA S Heeman (NL)
6. Extraction of aquatic environmental DNA (eDNA) from filters C Abbott (CAN)
7. Target species detection K Klymus (USA)
8. Metabarcoding to survey biological communities M Hajibabaei (CAN), Leese (D)
9. DNA extraction for diatoms metabarcoding B Paix, F Rimet (Fr)

ECOSTAT and GEDS

ECOSTAT eDNA Task force → Key stakeholder workshop
November 21st 2025

UNEP: The Global Environmental Data Strategy

- → UNEA 7, Dec 1st-5th 2025
- **Standards and ISO TC 147 WG13 are mentioned!**



UNITED NATIONS



United Nations
Environment
Programme

UNEP/CPR/ASC/12/2/Add.1

Distr.: General
5 August 2025
English only

Annual subcommittee meeting of
the Committee of Permanent Representatives
to the United Nations Environment Programme
Twelfth meeting
Nairobi, 1 – 5 September 2025
10:00 – 13:00 and 15:00 – 18:00
Conference Room 2 (in person) and
Microsoft Teams (online)
Item 3 of the provisional agenda

Programme Performance Report of the
United Nations Environment Programme for 2024

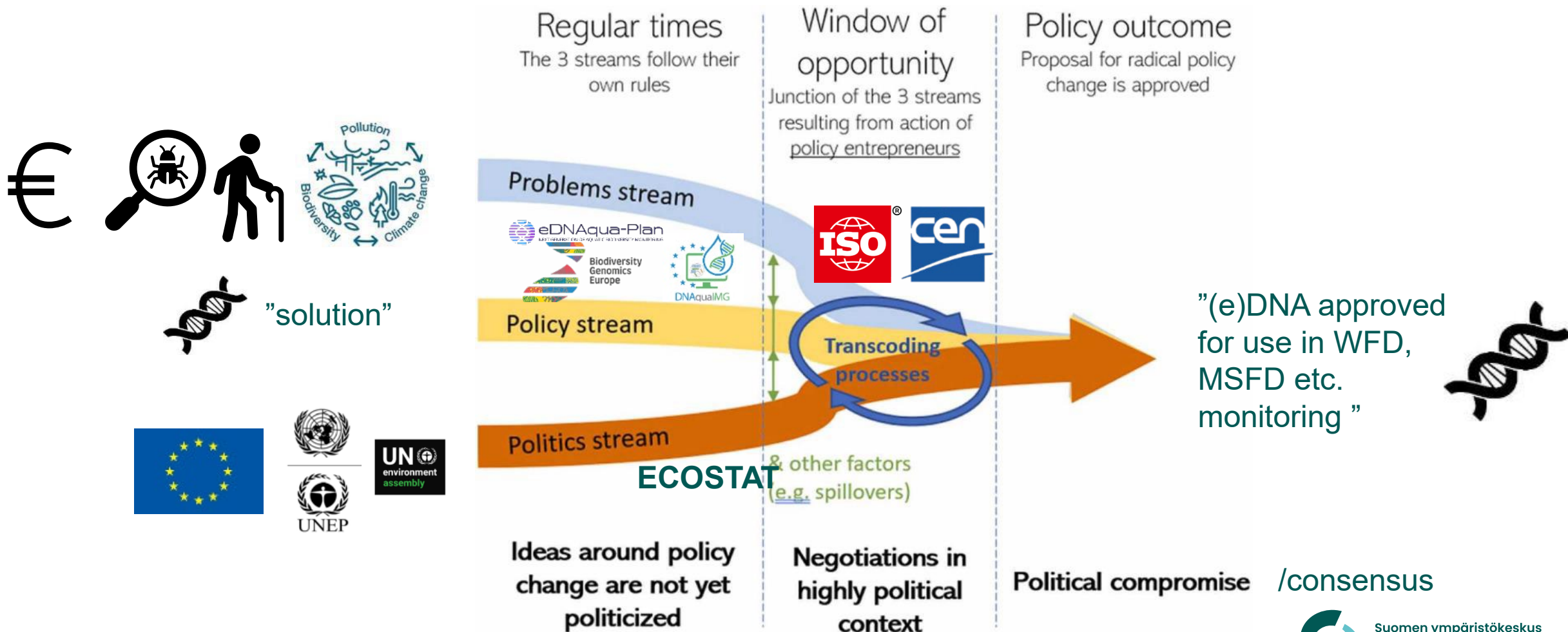
The second draft of UNEP's Global Environmental Data Strategy (GEDS) has been developed by the Secretariat based on feedback received on the first draft.

The revised draft reflects inputs from consultations held between October 2024 and July 2025 and outlines a more action-oriented framework, focused on nine targeted intervention points and associated implementation and funding mechanisms.

It also serves as a complement to the overview of the GEDS as set out in document UNEP/CPR/ASC/12/2.

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In closing: we must focus on joint transcoding!



Images: Valin& Huitema 2023, JNCC, EU, UNEP, UN, ISO, CEN