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Interreg
North Sea Region
GEANS

European Regional Development Fund



EUROPEAN UNION



Introducing GEANS: Genetic tools for Ecosystem health Assessment in the North Sea region

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Member of the

Leibniz
Leibniz Association

GEANS – General Information

- Funding: EU Interreg North Sea region (<https://northsearegion.eu>)
- Under Priority 3 (Sustainable North Sea Region: Protecting against climate change and preserving the environment)
- Duration: 1 March 2019 – 1 March 2022
- Budget: € 2.5 million
- Consortium: 9 partners

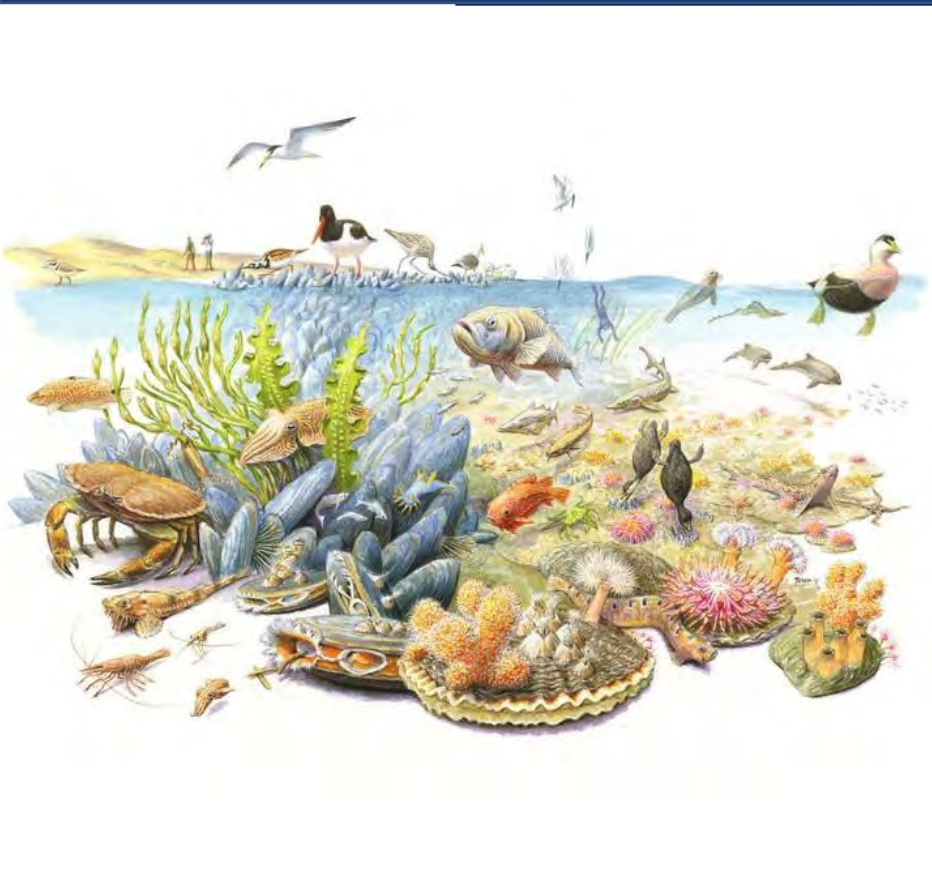


- Project coordinator: ILVO, Belgium

GEANS – Importance



From Mark Dickey-Collas



GEANS – Importance



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Marine Strategy Framework Directive (MSFD)



Good Environmental Status



GEANS – Importance

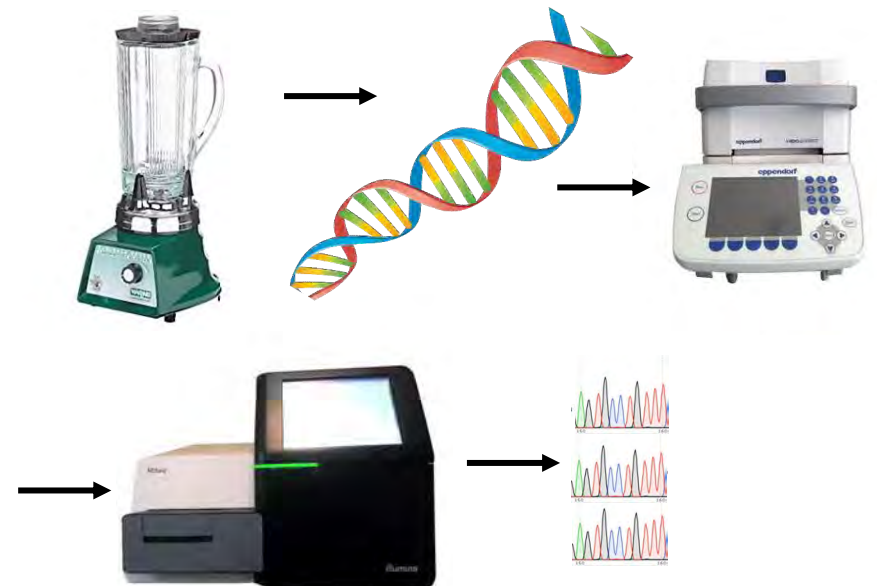


Morphology-based analysis



- Processing time ~ one sample about 5 days (sorting, identifying, counting)
- Requiring trained taxonomic experts
- Quality assurance not guaranteed across institutes

DNA-based analysis (metabarcoding)

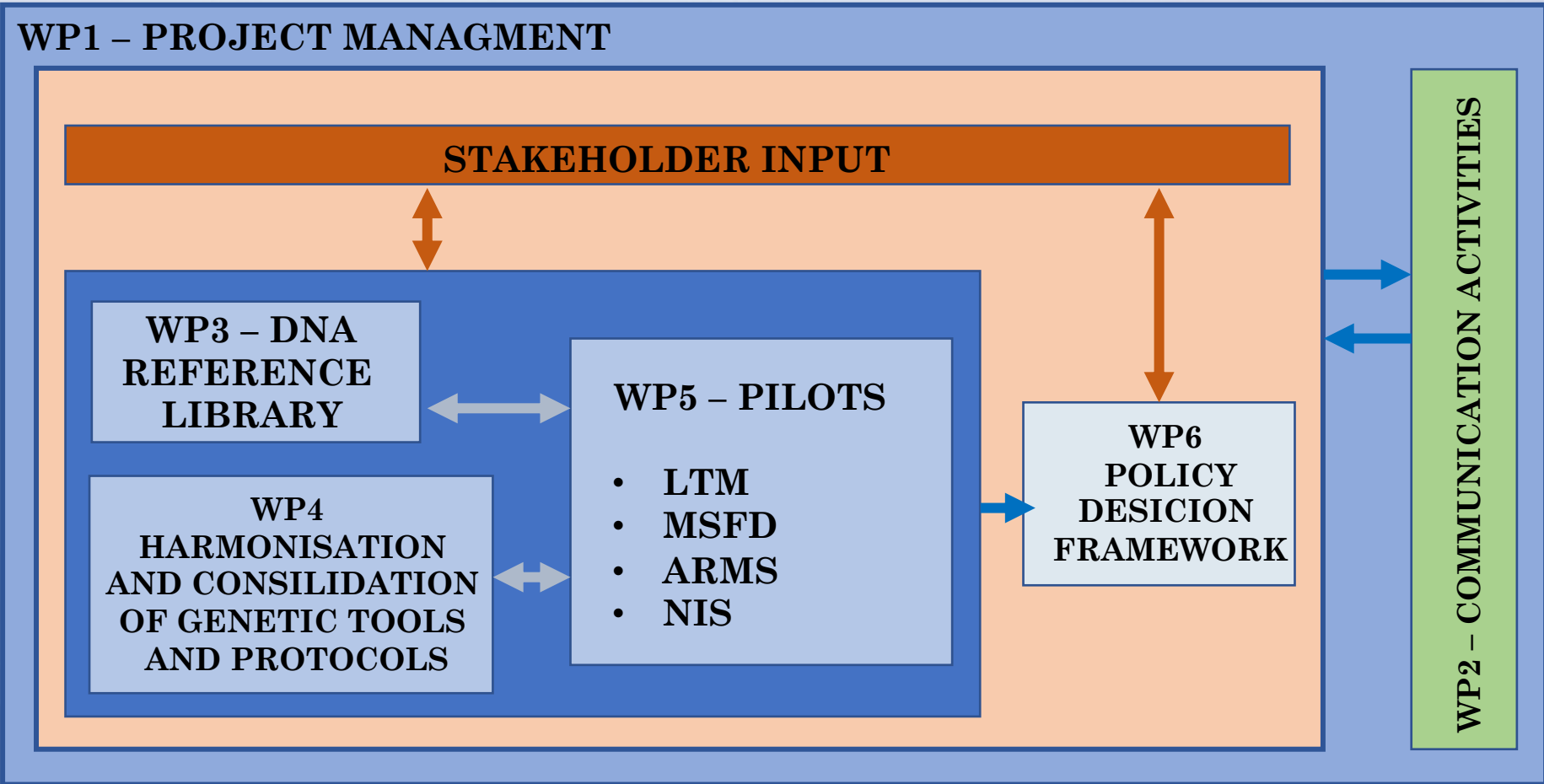


- Processing time ~ 96 samples about 10 days
- Standardisation across institutes through SOPs

GEANS – Objectives

1. Transnational co-operation will create synergies and assure comparability
2. Creation of a reliable and open DNA reference library
3. Implement standardised genetic tools and SOPs in routine biological assessments across North Sea countries
4. Real time pilot studies, in close cooperation with managers, policy makers and stakeholders, for validation of genetic methods in environmental health assessment
5. Develop joint time- and cost-reducing genetic monitoring tools that feed into existing indicators to assess North Sea ecosystem health
6. Develop a policy decision framework including fit for purpose choice of genetic tools and protocols

GEANS – Overview



Workflow


1.

The mitochondrial genome


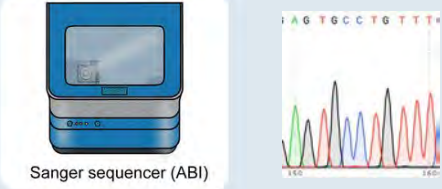


658 bp

2.

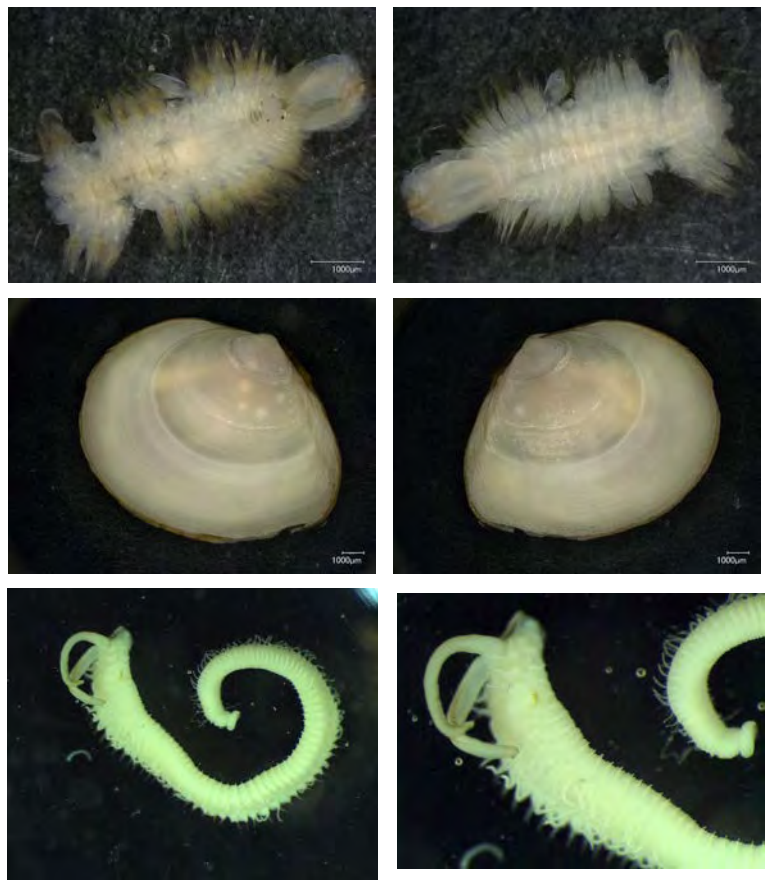





3.



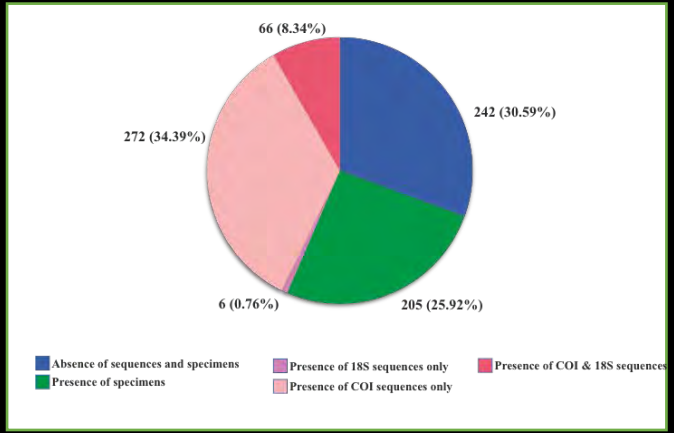
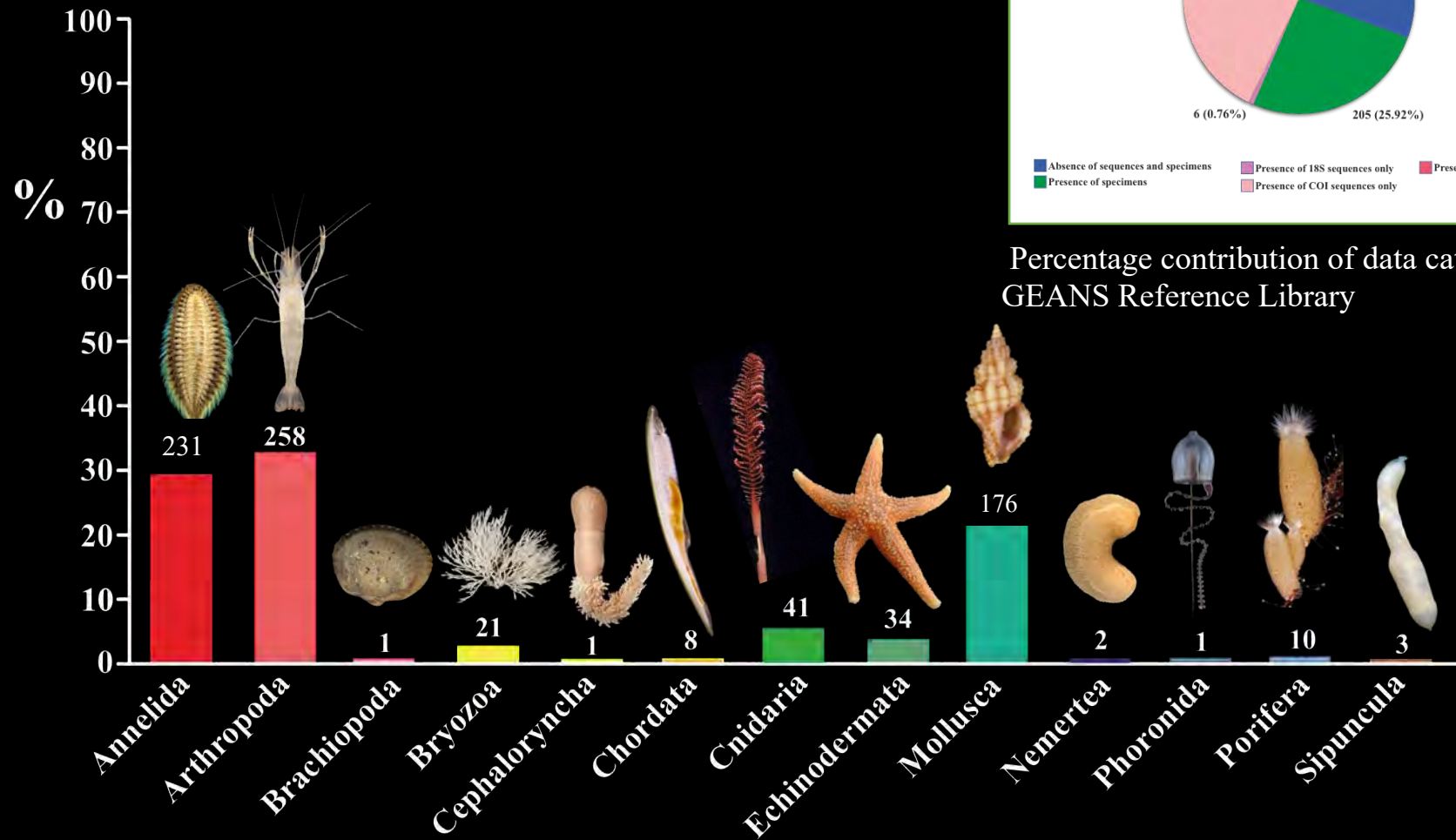
Sanger sequencer (ABI)

4.



GEANS: WP3 – DNA Sequence Reference Library

803 species
13 Phyla



Percentage contribution of data categories in GEANS Reference Library

Percentage contribution of species in GEANS Reference Library grouped by phylum

DNA-based techniques (eDNA, metabarcoding) will be applied in addition to traditional techniques in existing monitoring programs, providing proof of concept on the added value of genetic approaches in environmental health assessment.

**Soft-Bottom
Substrate**



**Hard-Bottom
Substrate**



**Non-Indigenous
Species**



Morphology

VS



Metabarcoding

GEANS: WP5 – Pilots

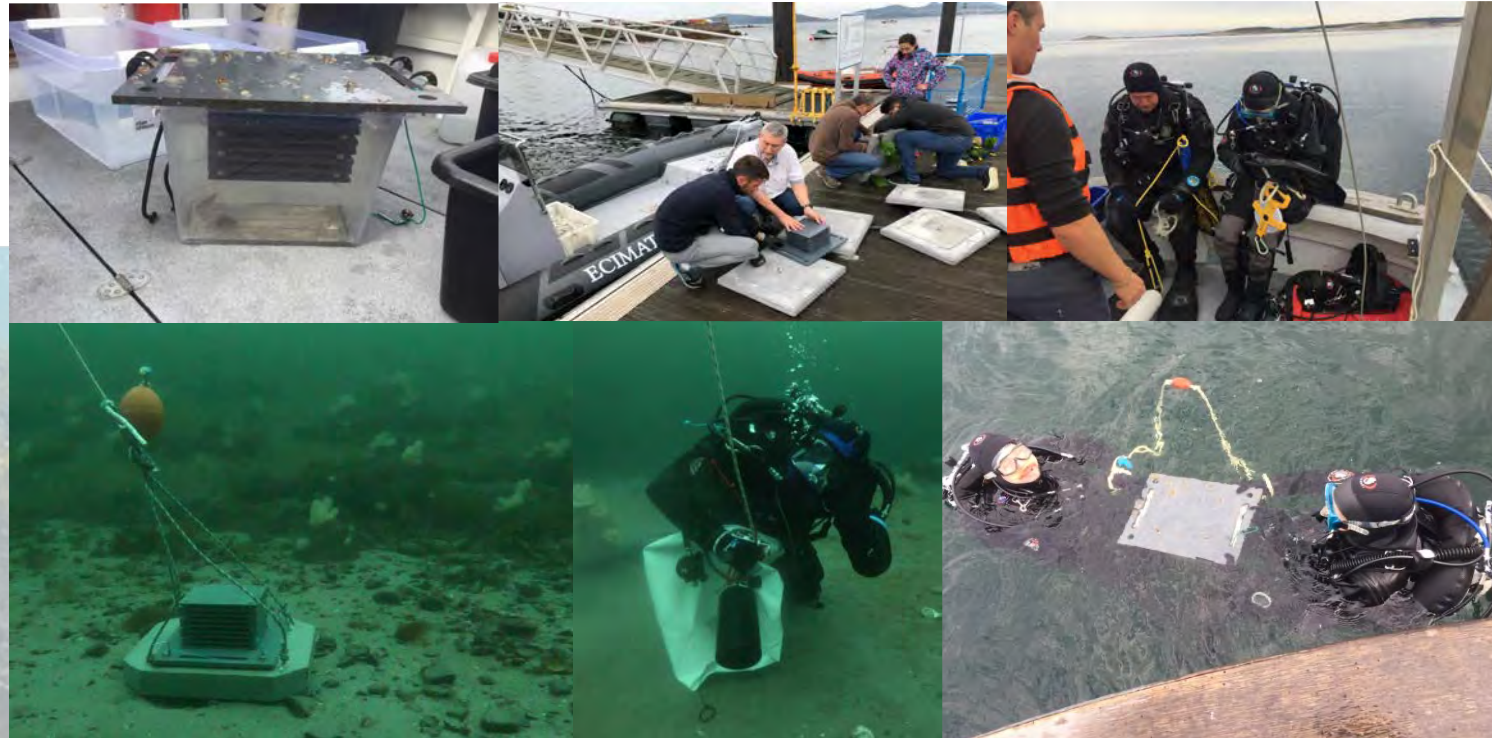
1. Soft bottom pilot

- Impact of marine aggregate extraction on the soft sediment ecosystem
- MSFD Monitoring in the North Sea
- Long-term soft-bottom monitoring station



2. Hard bottom pilot

ARMS (Autonomous Reef Monitoring Structures), a standardized sampling technique, combined with molecular methods will enable the monitoring of marine communities in the North Sea



3. Detection of non-indigenous species (NIS) in harbours

HELCOM/OSPAR protocol will be used as a baseline, while it will be investigated to which extent morphological examination can be complemented or replaced by meta-barcoding or eDNA.



GEANS – Expected Results

- **Improved transitional environmental health assessment**
- **Increased time-efficiency (60%)**
- **Cost reduction (40%)**



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Thank you!

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