



Implementation Roadmap

Agnès Bouchez

The INRAE logo is positioned at the bottom left of the slide. It consists of the letters "INRAE" in a bold, teal-colored, sans-serif font. The letter "E" is stylized with a circular element at its bottom right corner. The logo is partially overlaid by a large, abstract graphic on the left side of the slide, which is composed of several overlapping rounded hexagonal shapes in various shades of green and teal.

INRAE

The CARRTEL logo is located at the bottom right of the slide. It features the word "CARRTEL" in a bold, blue, sans-serif font. To the right of the text is a circular emblem containing a stylized mountain range and a blue sky with white clouds. Below the emblem, the text "CENTRE ALPIN DE RECHERCHE SUR LES RÉSEAUX TROPHIQUES ET ÉCOSYSTÈMES LIMNIQUES" is written in a smaller, blue, sans-serif font.

CARRTEL
CENTRE ALPIN DE RECHERCHE
SUR LES RÉSEAUX TROPHIQUES
ET ÉCOSYSTÈMES LIMNIQUES



A strategy for successful integration of DNA-based methods in aquatic monitoring

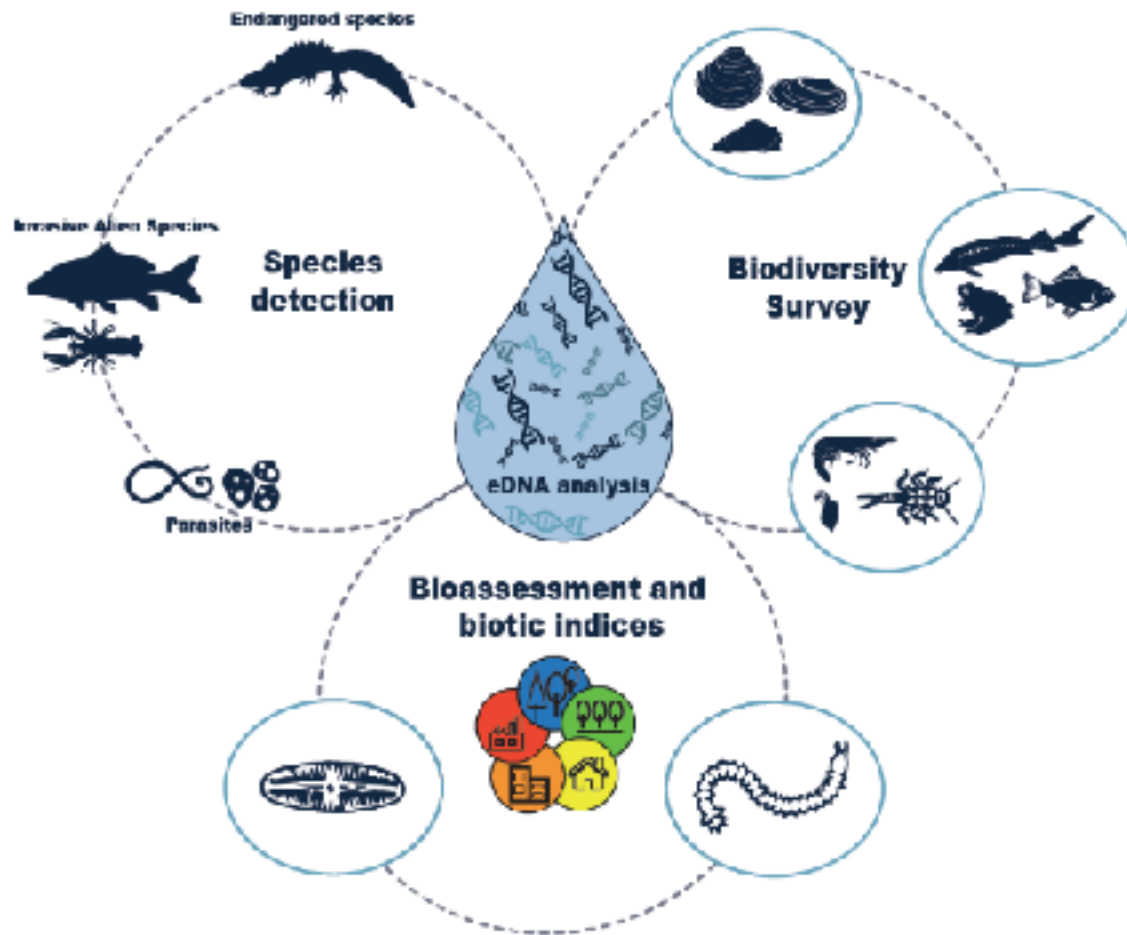
Agnès BOUCHEZ,
DNAqua-Net 2020 workshops participants,
Philippe BLANCHER, Estelle LEFRANCOIS ,
Valentin VASSELON, Frédéric RIMET



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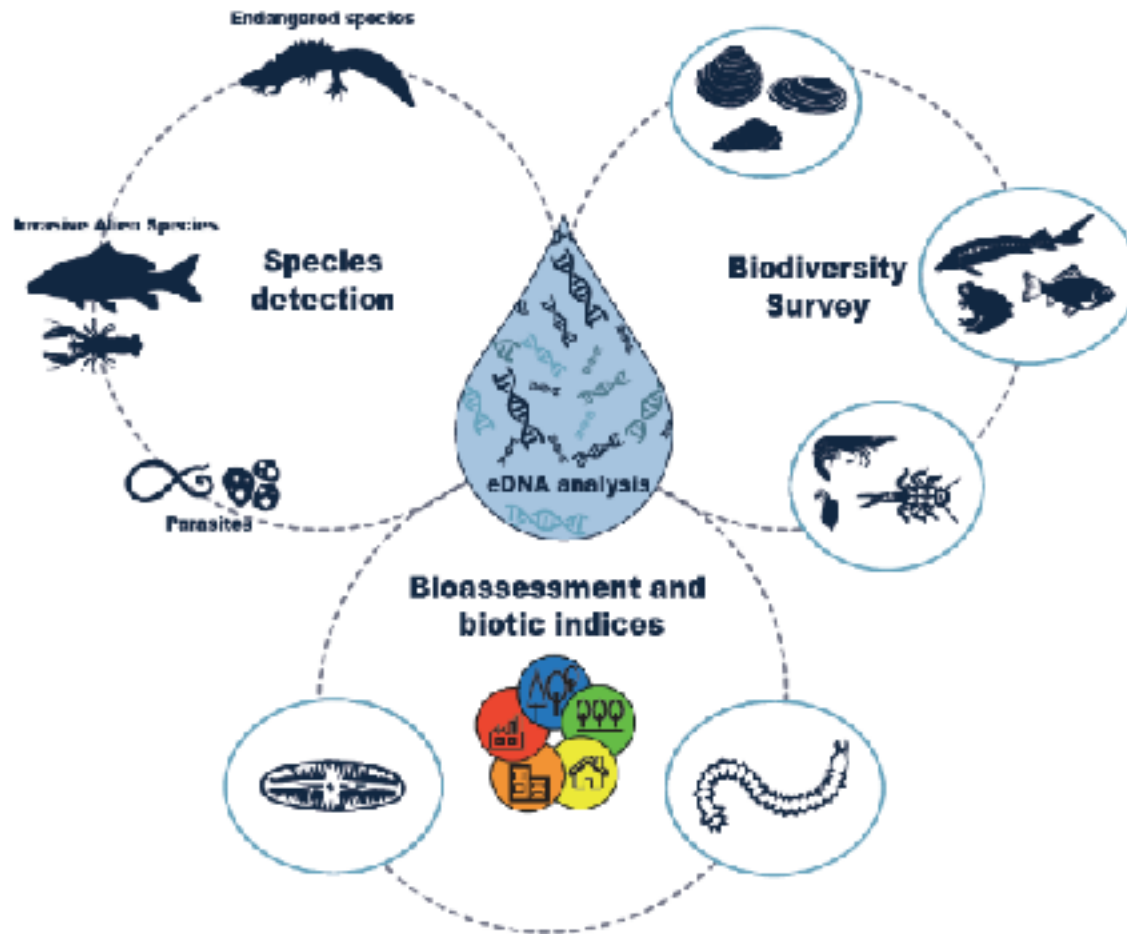
New DNA-based methods



Pawlowski, Apothéloz-Perret-Gentil, Mächler & Altermatt 2020
Swiss Federal Office for the Environment



New DNA-based methods



Inclusion in monitoring practices ?

→ Not straightforward

Implementation of DNA-based methods

- Potential to improve aquatic bioassessment and monitoring;
E.g. high-throughput, non-invasive, higher richness is generally detected, better comparability among sites-campaigns, etc.
 - Does not provide similar information than classical approaches, which limits their direct implementation;
E.g. taxa lists will always differ, as DNA-based tools systematically measure differently to morpho-based ones
- Inclusion of DNA-based methods in monitoring practices requires harmonised actions at national and international levels.

Implementation of DNA-based methods

To foresee the necessary steps and stimulate implementation, prospective workshops were organised:

➤ **1st workshops: national level (FR, CH) / SYNAQUA**

→ various scenarios → **best scenario**



Implementation of DNA-based methods

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➤ **1st workshops: national level (FR, CH) / SYNAQUA**

→ various scenarios → **best scenario**



➤ **2nd workshops : European level / INRAE and COST Action DNAqua-Net**

→ a **roadmap** for an efficient implementation of the best scenario



DNAqua-Net Workshops



- 18 countries
- 51 participants: Scientists, Environmental authorities, Decision-makers
- 8 online workshops (March-April 2020)
- 2 facilitators/ws
- 5-8 participants/ws





Let's start our discussion

- Remember that we need your contributions first for your own country and then on a European scale
- We need your contribution on the integration of eDNA based methods in aquatic monitoring*

* Including free eDNA and bulk eDNA ** not on the resolution document

Participants: estel, Benot, lakvos, Marlen, Agnès, Marie-Sophie Ranevier, Daniel, Stefania Marcheggiani, Stefania Erba, Italy

Today's participants April 22th

- Benot
- Marie-Sophie Ranevier
- Stefania Erba
- Stefania Marcheggiani
- Daniel
- Rosa Trobajo

Participants: B034224, Gunilla Ejdung, Inmet, Steinar Sandoy, Sidsel L-W, Pawlowaki, estel, remy.marcel, B012774

Participants: Agnès, Benot, caver, estel, lakvos, Marie-Sophie Ranevier

Conversation

Public

Strategy for Successful Integration of eDNA-based Methods in Aquatic Monitoring

Prospective European workshop on the implementation of DNA-based methods

Participants: jarvnenmark, Inmet, Rosa Trobajo, Christine, estel

Develop a shared roadmap

→ 6 main objectives

Highlight the effectiveness and benefits of DNA-based methods

Develop an adaptive approach for successful implementation of new methods

Provide best practice guidelines and standards

Involve stakeholders and ensure good knowledge transfer

Support the environmental biomonitoring sector to achieve the required changes

Steer the process at European level



Develop a shared roadmap



Highlight the effectiveness and benefits of DNA-based methods

Understand **managers' needs** and respond to them

- When methods are satisfactory / required by regulation, implementation is not a priority

Develop a shared roadmap



Highlight the effectiveness and benefits of DNA-based methods

Understand **managers' needs** and respond to them

- When methods are satisfactory / required by regulation, implementation is not a priority
- Focus on topical management issues not yet addressed

E.g. monitoring impact of restoration, biodiversity, invasive or endangered species, multiple pressures, neglected waterbodies...

Develop a shared roadmap



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✓ **Numerous pilot studies / efficiency / good comparability**

→ **intercalibration**

✓ **Take full advantage of DNA-based methods**

→ **develop new indices adapted to new DNA data**

→ **develop approaches for over-looked issues**

✓ **An opportunity to reduce differences between EU regions and countries**



Develop a shared roadmap



Develop an adaptive approach for successful implementation of new methods

Most DNA-based methods are mature enough to be implemented into biomonitoring and meet end-users needs.

How to proceed?

- A. Wait until methods are fully tested, evaluated and calibrated ?

Optimisation of a method = an endless task. At what stage development is sufficient to move to the operational phase, even if questions remain?

- B. Adopt an adaptive approach ?

Harmonisation and comparability of the methods will be a challenge

Develop a shared roadmap



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Most DNA-based methods are mature enough to be implemented into biomonitoring and meet end-users needs.

How to proceed?

- A. Wait until methods are fully tested, evaluated and calibrated ?

Optimisation of a method = an endless task. At what stage development is sufficient to move to the operational phase, even if questions remain?

- B. Adopt an adaptative approach & go forward ?**
Harmonisation and comparability of the methods will be a challenge

Develop a shared roadmap



Support the environmental biomonitoring sector to achieve the required changes

- Create conditions so that private companies invest and get involved
- Demonstrate that it is not only a cost-effective solution:
 - can **improve biomonitoring**
e.g. increase temporal/spatial coverage
 - can **provide more information**
e.g. finer taxonomic level, all life stages
 - useful for decision-makers
 - in line with citizens' concerns

Develop a shared roadmap



Involve stakeholders and ensure good knowledge transfer

Communication and training:

- to be exemplary and very effective
- going hand in hand with stakeholders
e.g. through pilot studies
- Joined training sessions between different stakeholders

e.g. hydrobiologists, molecular biologists, environmental managers

Develop a shared roadmap



Steer the process at European level

- Collaboration between EU bodies (e.g. ECOSTAT) and scientists to discuss/foster implementation
- **clear mandate**, e.g. knowledge sharing, produce recommendations...
 - **provide common framework**
 - **help obtain funding**

Develop a shared roadmap



Provide best practice guidelines and standards

A flexible approach:

1. **guidelines and guides** to good methods and practices for an **overall framing**



Open-access

Bruce et al. 2021 - 90p

<https://doi.org/10.3897/ab.e68634>



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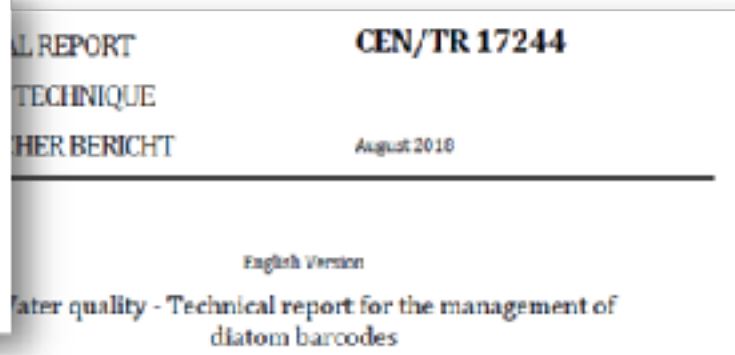
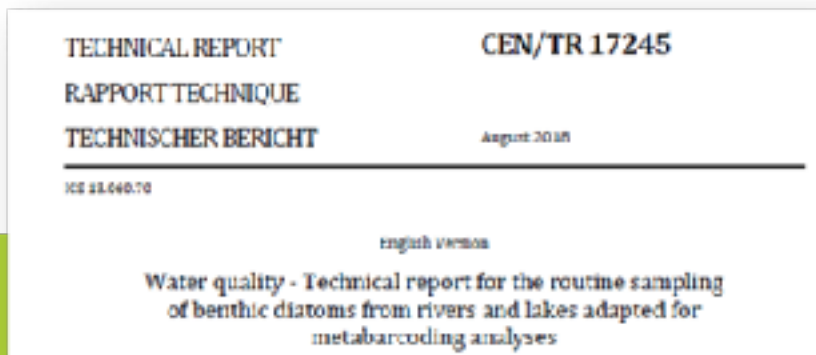
Develop a shared roadmap



Provide best practice guidelines and standards

A flexible approach:

1. **guidelines and guides** to good methods and practices for an **overall framing**
2. **imposed methods and standardisation for key stages** such as sampling.



Take-home messages

Crucial need for high-performance diagnostic and monitoring tools

- Take **full advantage** of DNA-based methods
- Based on **stakeholder needs** → discuss/collaborate
- Accompany **companies** on board
- **Communication & Training**
- **Shared protocols & Standards**
- **Harmonised** action at European level



To go further

<https://doi.org/10.3897/mbmg.6.85652>



Metabarcoding and Metagenomics 6: 215–226
DOI 10.3897/mbmg.6.85652

Forum Paper

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A strategy for successful integration of DNA-based methods in aquatic monitoring

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Full report:

<https://doi.org/10.15454/29LFIW>



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Questions ?



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