LIFE OF A SEDIMENT DWELLER IN A MESOCOSM – STRATEGIES TO ASSESS SEDIMENT COMMUNITIES IN REGULATORY MESOCOSM STUDIES FOR PPP RISK ASSESSMENT

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BACKGROUND:

- Sediment-dwelling organisms are essential for aquatic ecosystem functioning.
- Included in risk assessment of plant protection products (PPPs).
- Standard tests rely on a single species (chironomids).
- Laboratory studies lack ecological realism and community-level responses.
- Mesocosms provide more realistic, system-level assessment.
- Sediment organism evaluation remains challenging in mesocosms.

AIMS:

To improve sampling strategies and analytical approaches for sediment-associated endpoints

- **Coring technique** - optimize sediment sampling methods
- **Sub-sampling refinement** - reduce processing variability
- **Recovery efficiency** - maximize organism detection
- **Spatial variability** - assess differences across replicates

METHODOLOGICAL CHALLENGES IN ASSESSING SEDIMENT ORGANISMS IN MESOCOSMS

- Heterogeneous sediment structure makes sampling difficult
- Low organism densities limit assessment
- Practical constraints risk disturbing system integrity

WHAT WE HAVE TRIED

What Doesn't Work

- ✗ **Freezing samples** – Causes degradation
- ✗ **70% Ethanol for Preservation** – Discolours the specimens
- ✗ **Using a DIWS as a Corer** – Is not reliable in producing a clean core each time
- ✗ **Grab sampling** – Cannot gather an accurate weight, plus grabs benthic organisms, not just sediment-dwelling

What Does Work

- ✓ **Glycerol for preservation** – Allowed them to keep shape and colour up to 3 months
- ✓ **Using a sediment Corer** – Effective in core extraction
- ✓ **200 µm sieve** – Was able to trap all macroinvertebrates without trapping too much sediment when washing out the sample

METHODS

Core sampling (undisturbed sediment layers)

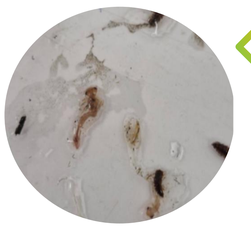
Grab sampling (surface sediment collection)

SAMPLE PROCESSING

PRESERVATION & ENUMERATION

Glycerol

70% ethanol



Freezing

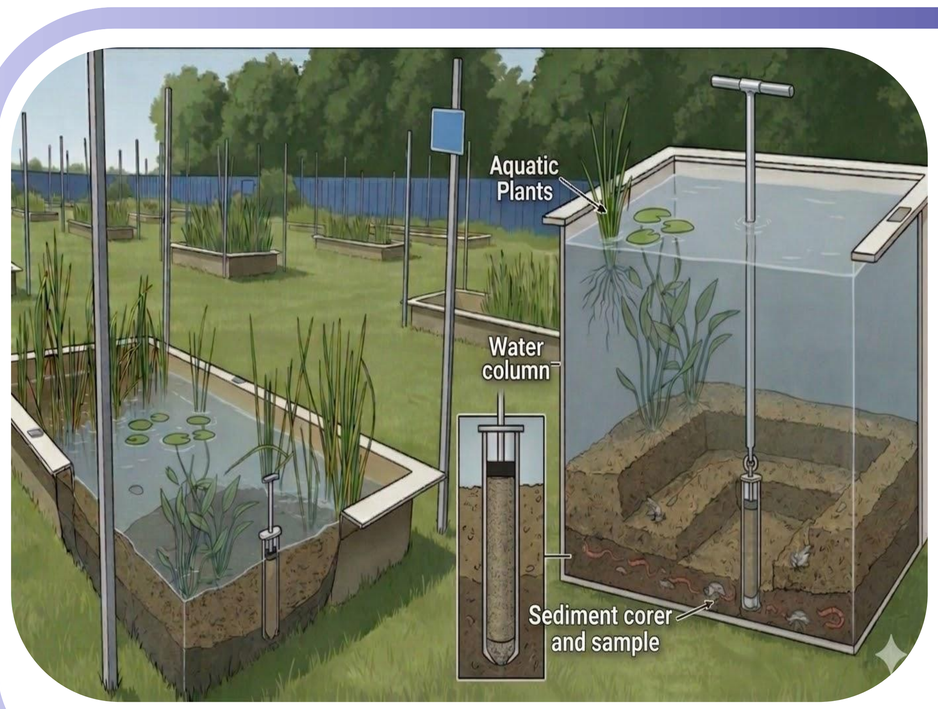


Figure 1: Visualising a core sampler usage within our ponds (4).

NEXT STEPS:

- Compare the integrated core method (3) with the core sampler method (4), examining sediment depletion and disturbance, as well as methods to prevent sediment resuspension into the water column.
- Investigate in-life counting compared to preserving the macroinvertebrates in an ethanol-based fixative.
- Determining the seasonal fluctuations in the abundances of the sediment-dwelling macroinvertebrates.

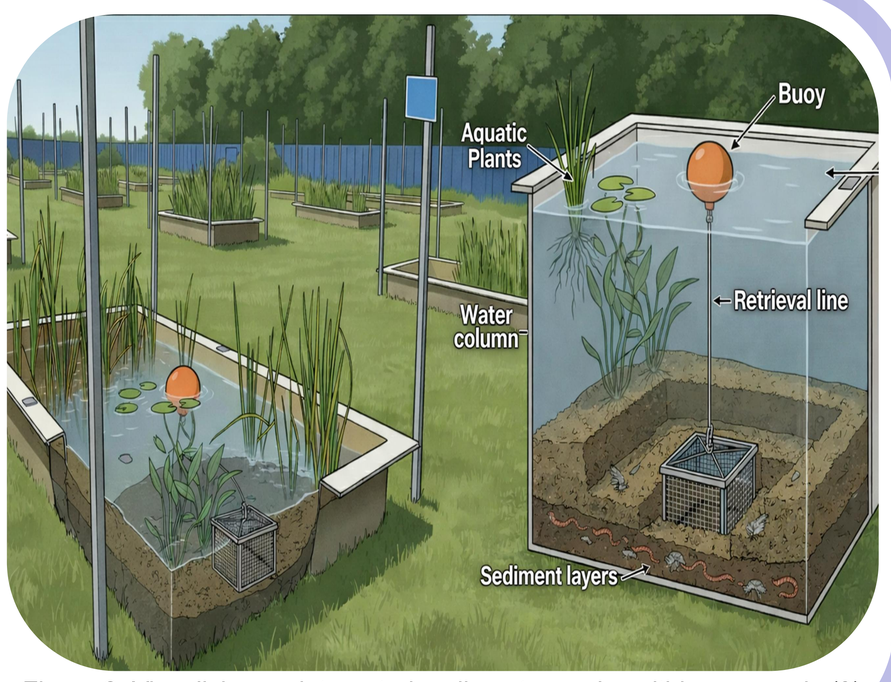


Figure 2: Visualising an integrated sediment sampler within our ponds (3).

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