BiodivRestore Project „Restolink“

Kick off and joint sampling workshop Aug 29th – Sept 4th 2022

Summary

From August 29th to September 4th, the Restolink team (see Appendix 1) met in Ilsenburg (Germany) for the kick off workshop (see Appendix 2). The aim of the workshop was to introduce the individual partners, jointly discuss the sampling strategy and methodological approaches, set up a common data management, introduce the joint publication strategy and finally, how to engage the stakeholders. Individual topics were introduced by the WP leader with short presentations (see Append 3) and jointly discussed. The second part of the workshop was devoted to practical work and was conducted as a joint sampling workshop at a local stream. Here, the Restolink team tested and discussed methods applied in WP 1-3 and jointly defined the replication to allow for a later appropriate statistical treatment of the data. Individual decisions on methods, work steps and data processing formed the methodological basis for the joint sampling protocols.

Figure 1. Kick off workshop

Figure 2. Introduction to WP 1

Figure 3. Introduction to WP 2

Figure 4. Joint sampling workshop

Day 1: Introduction and field course to quantify hydromorphological diversity in WP 1

- Christine and Andreas introduced overall sampling scheme that will be applied from all partners
- Scheme describes a spatially nested approach with samples taken from spots (dime) and patches (dim) that are nested in reaches (dim) and biomes
- Hydromorphological measurements are conducted at each scale
- Partners were introduced to high-frequency flow measurements with ADV at the spot scale, roughness laser scans at the patch scale and topographic surveys at the reach scale
- Lina suggested to complement reach scale measurements by pebble counts that provide an assessment of larger-scaled morphological diversity

Day 2: Kick off workshop

- Mario (WP6) introduced workshop's agenda and aims
- Morning session dealt with WP 1-3 presenting suggestions for a joint sampling strategy followed by discussion on using standard methods at all sites or are there local adjustments to specific conditions necessary (see appendix 3)
- Afternoon session was devoted for discussion the publication strategy with decisions on how to deal with cross-biome and within-biome publications
- In the evening session, stakeholder engagement was discussed and details for the stakeholder questionnaire clarified

Day 3: Introduction and field course to quantify biological diversity in WP 2

- Julia, Mario and Patrick explained the approach to sample biofilms and macroinvertebrate following the scheme from WP1
- Discussion about the applicability of the sampling methods to each partner
- Creating video clips that show how to sample macroinvertebrate from pre-defined patches and how to process samples

Day 4 and 5: Introduction and field course to quantify ecosystem functioning in WP 3

- Christine and Julia introduced stable isotope addition approach
- Demonstrated sampling of consumers and resource before and after the 15N-NO3 and 13C-DOC addition

Day 6: Field excursion to sampling sites for 2023

Day 7: Departure

Appendix 1. Participants

Country	Name	Institution	Attendance	WP
BRA	Björn Gücker	Federal University of São João del-Rei	Presence	3
BRA	Davi Gasparini Fernandes Cunha	University of São Paulo	Presence	5
ESP	Andrea Butturini	University of Barcelona	Online	3
ESP	Daniel von Schiller	University of Barcelona	Presence	3
ESP	Francesc Sabater	University of Barcelona	Online	5
ESP	Isabel Munoz	University of Barcelona	Online	2
GER	Alexander Schwab	Helmholtz Centre for Environmental Research – UFZ	Presence	1
GER	Andreas Lorke	University of Koblenz-Landau	Presence	1
GER	Christine Anlanger	University of Koblenz-Landau	Presence	1
GER	Clara Mendoza-Lera	University of Koblenz-Landau	Presence	1
GER	Julia Pasqualini	Helmholtz Centre for Environmental Research – UFZ	Presence	2, 3
GER	Juliane Thomas	Helmholtz Centre for Environmental Research – UFZ	Presence	1
GER	Mario Brauns	Helmholtz Centre for Environmental Research – UFZ	Presence	2, 3, 6
GER	Markus Weitere	Helmholtz Centre for Environmental Research – UFZ	Presence	4
GER	Patrick Fink	Helmholtz Centre for Environmental Research – UFZ	Presence	2
GER	Sven Bauth	Helmholtz Centre for Environmental Research – UFZ	Presence	1-3
SWE	Lina Polvi	Umeå University	Presence	1
SWE	Nicolas Finkler	Umeå University	Presence	2, 3
SWE	Ryan Sponseller	Umeå University	Online	4

Appendix 2. Workshop agenda

Kick off and joint sampling workshop

RESTOLINK

	Time		**Where**
Sun 28th	15:00 – 15:15	Shuttle to sampling site	Hotels in Ilsenburg
	15:15 – 18:00	Setting of habitat patches, impacted site, setting stations for metabolism	Ecker River, impacted & restored site
	19:00 – 22:00	Ice breaker	Kneipchen Ilsenburg
Mon 29th	08:00 – 08:30	Grocery shopping, shuttle to sampling site	Shuttle starts from Lidl super market
	08:30 – 12:00	Introduction and habitat mapping restored site	Ecker River, restored site
	12:15 – 13:45	Lunch	Ecker River, impacted site
	13:45 – 17:30	Introduction and field course WP 1	Ecker River, impacted site
	17:45 – 18:00	Shuttle to hotels	
	18:30 – 22:00	Dinner	Restaurant Altstadthotel Ilsenburg
Tue 30th		Kick off workshop	Hotel Ilsenburger Hof & digital via Skype
	10:00 – 10:30	Introduction, deadlines, reports	MB
	10:30 – 12:15	Discussion on work packages (see below)	DvS & PF
	12:30 – 13:45	Lunch	Genusswerk Ilsenburg
	14:00 – 14:30	Discussion on work packages (see below)	DvS & PF

	14:30 – 15:30	Publication strategy and agreement	Ryan et. al
	15:30 – 16:30	Stakeholder involvement	Davi & Quico
	16:30 – 18:00	Miscellaneous & way forward	MB
	18:30 – 22:00	Dinner	Barbecue at Genusswerk Ilsenburg
Wed 31st	08:00 – 08:30	Grocery shopping, shuttle to sampling site	Shuttle starts from Lidl super market
	08:30 – 11:00	Excursion reference site & field course: Sampling of biofilm & macroinvertebrates (WP 2)	Ecker River, 2nd restored site
	11:45 – 12:00	Return to hotels	
	12:30 – 13:45	Lunch	Genusswerk Ilsenburg
	14:00 – 18:00	Hike to tentative sampling stations 2023	Ilse River
	18:30 – 22:00	Dinner	Restaurant Wilde Ilse
Thu 1st	08:00 – 08:30	Grocery shopping, shuttle to sampling site	Shuttle starts from Lidl super market
	09:00 – 17:00	Pre-addition sampling & mapping (WP2, 3)	Ecker River, impacted site
	17:15 – 17:30	Return to hotels	
	18: 00 – 22:00	Dinner	Shuttle to Waldschänke Drübeck
Fri 2nd	08:30 – 09:00	Grocery shopping, shuttle to sampling site	Shuttle starts from Lidl super market
	09:15 – 11:00	Introduction to sampling scheme	Ecker River, restored site
	11:00 – 16:00	Joint sampling isotope addition	
	16:30 – 17:00	Return to hotels	
	18:30 – 22:00	Dinner	Shuttle to Tonmühle Drübeck

Sat 3rd	08:00 – 18:00	Grocery shopping, shuttle to sampling site	Shuttle starts from Lidl super market
	09:00 – 12:00	Finalisation pre-addition sampling & mapping (WP2, 3)	Ecker River, impacted site
	14:00 – 17:00	Finalisation of sampling protocol for WP 2, 3	Optional
	18:30 – 22:00	Final dinner	Shuttle to Gemeindekrug Drübeck

Kick off:

10:30 – 14:30: Discussion on work packages

- Sampling strategy - consensus on methods, open questions, local adjustments to specific conditions, what parameters will be measured/analyzed where? Standard methods at all sites, specific methods centralized for all partners? (3 WPs, each 15 min)
- Lessons learned from the first sampling week (15 min for all WPs)
- Data processing, joint spreadsheets & data organization (20 min)
- Sampling dates, 10 min [one person from each country]: country-specific dates and changes to the original plans?
- Additional parameters and additional sites ("side projects" - where, when, what?), 20 min
- Wrap-up discussion, 10 min

14:30 – 15:30: Publication strategy

- Lead author for synthesis paper
- How to cope with local data used for local paper and synthesis
- Discuss publication agreement incl. authorship regulation

15:30 – 16:30: Stakeholder involvement

- Engagement
- Stakeholder panel
- How to move on

16:30 – 18:00 Miscellaneous & way forward

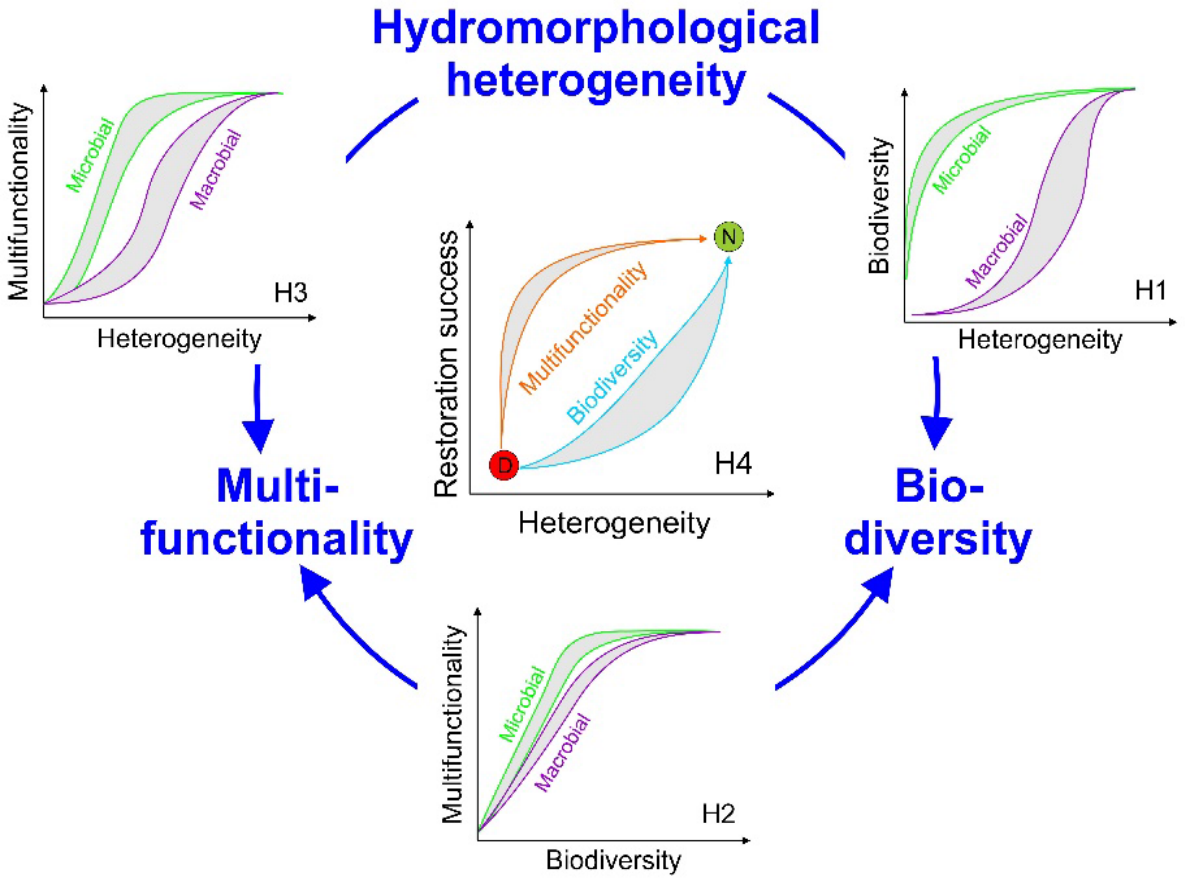
- Hydrological extremes and restoration new references needed?
- Hydromorphological restoration for sustainability against hydrological extremes
- Other suggestions from partners

Appendix 3. Slides of WP presentations

Restolink
WP 1

Christine Anlanger & Andreas Lorke

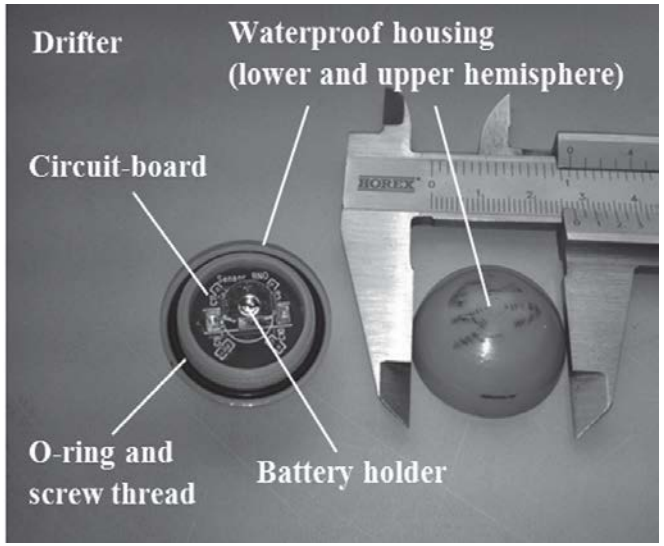
- H1 + H3: Biodiversity and ecosystem functioning are positively related to **hydromorphological heterogeneity** for micro- and macroorganisms … . We expect differences in the shape of both trajectories, given that the **body size and mobility** of a given species drive its niche requirements (→ **comment: varying spatial scales within reach**). Moreover, we predict that **biome-specific differences** in biodiversity should be larger for m acroorganisms … .



- **Microbially-driven functions** may benefit from **mass transfer processes**, which are related to temporal variances of flow and can be high already at **small spatial scales**.

→ H4: restoration of **hydromorphological heterogeneity**

Hydromorphology – reach scale



Conservative/salt tracer additions

→ Mean flow velocity and discharge

→ Retention times, etc.

→ Surface vs. subsurface flow

Drifter

→ water surface roughness and flow type

→ hydraulic heterogeneity

Noss et al. 2019,
DOI:10.1080/00221686.20
19.1623930

Hydromorphology – spot and reach scale

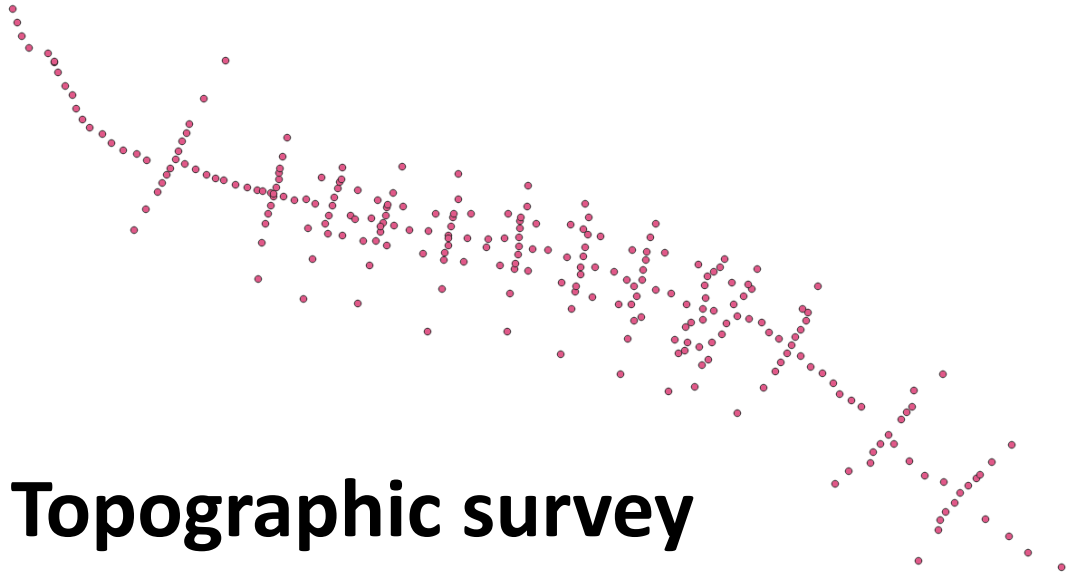
High-frequency flow measurements

→ mean flow velocity and turbulence

→ mass transfer velocity

→ hydraulic heterogeneity

Hydro**morphology** – reach scale



Topographic survey

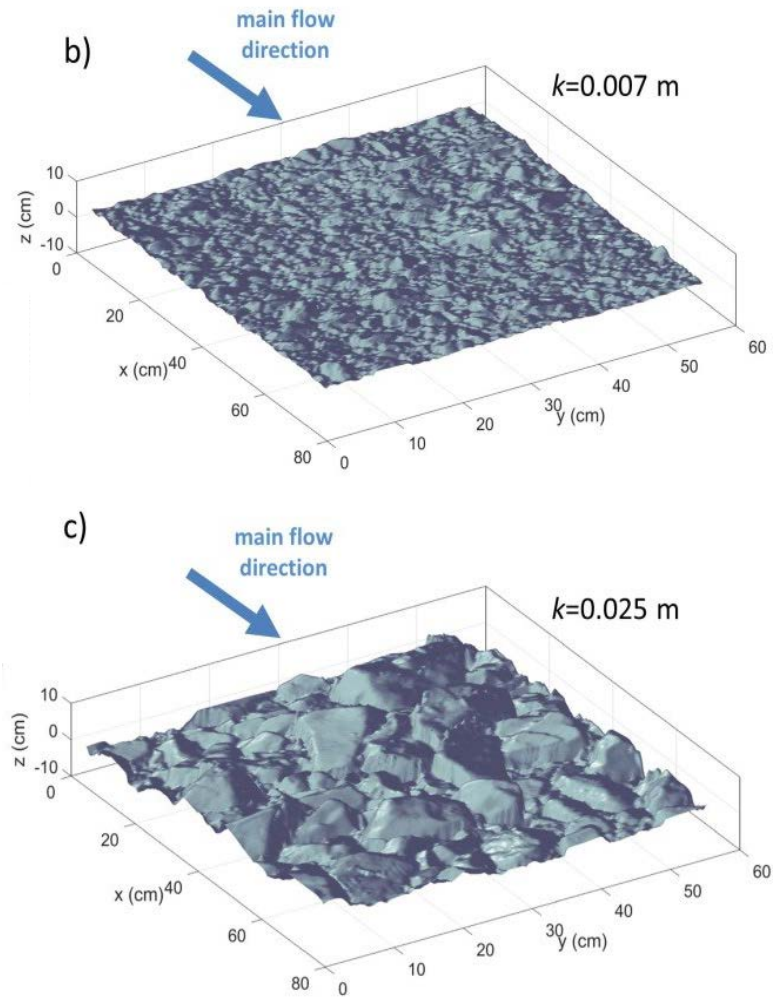
→ Bed and water level slope

→ Wetted width and water depths

→ Transversal profiles

→ Large-scale heterogeneity

Hydro**morphology** – patch and reach scale



Roughness laser scan

→ Water depths

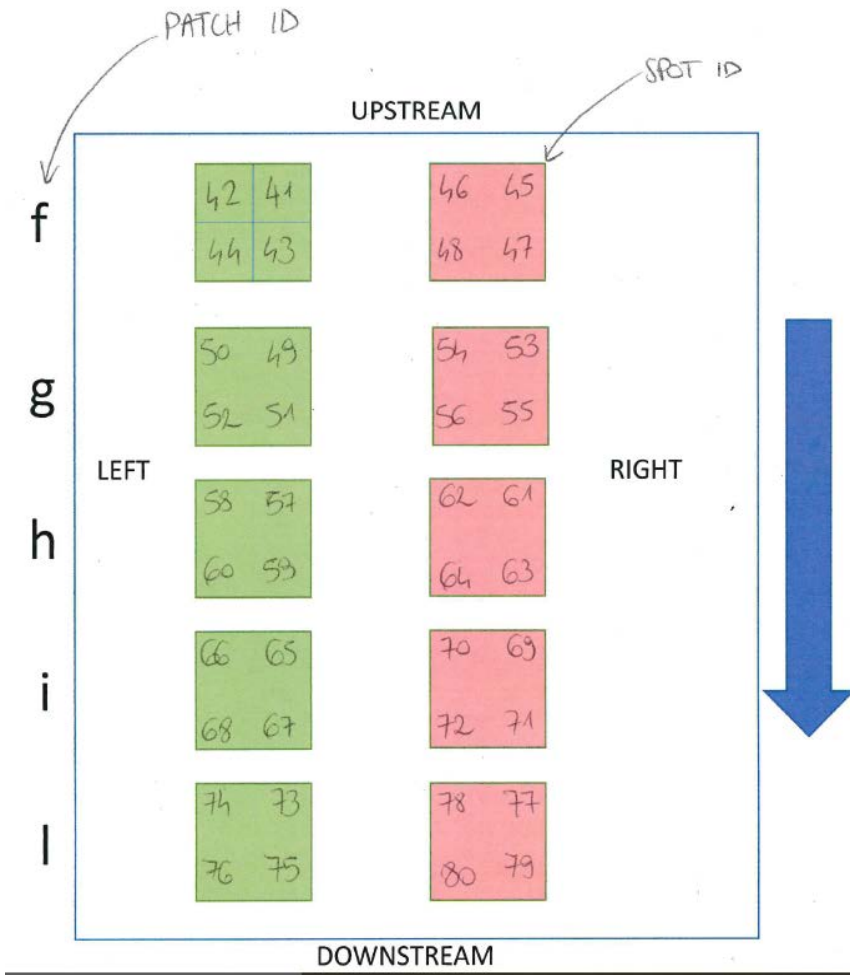
→ Streambed roughness

→ Morphological heterogeneity

Lessons learned WP2

30.08.2022/Ilsenburg

WP2



- Each spot in the green patch:

1. Biofilm for Chlorophyll-a
2. Biofilm for Bacteria (DAPI) counting

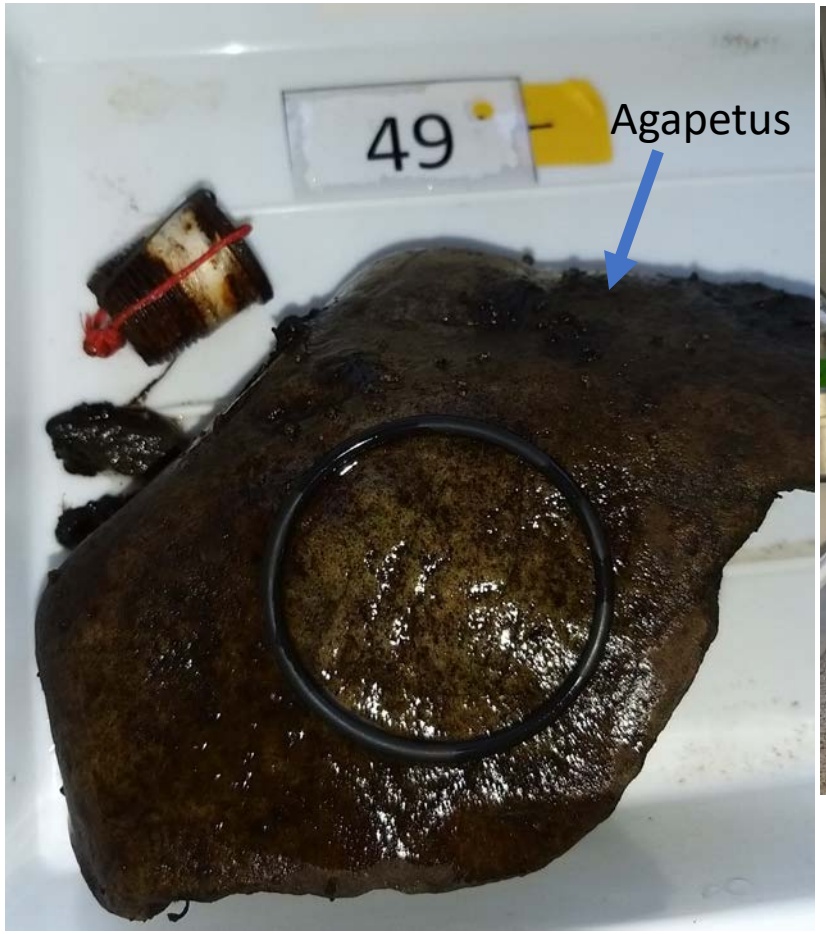
- Each spot in the red:

1. Biofilm for 13C15N enrichment
2. Biofilm for Genetics

- Each green path: macroinvertebrate for diversity and trophic niche
- Each red patch: macroinvertebrate for diversity

How did we choose the spots?

- Feasibility of hydraulic measurements (min. depth)
- Hard substrate
- Representativeness of the “habitat” in terms of spatial coverage (%area) or in terms of impact (e.g. boulders are a consequence of the impact)



O-ring placed around the spot that was measured for the hydraulics

Scraped biofilm in iso osmotic solution.

Filtered solution for chlorophyll-a determination

Oring and alufolie for area determination, important when surface is not flat

Protocol: https://drive.google.com/open?id=1cDm2So_Mb9Gg2xPxRv9R6tjKhvRGY5Ku-ht7GfQ42e8

Lessons learned from 1st week

- Area that is scraped is a compromise between hydromorphological measurement and the amount of biomass collected → always note down the area.
- Loose FPOM, must be collected before the stone is lifted with a syringe. Open question: how to avoid enriched water on the day of the addition?
- Boulders/unliftable stones can be sampled with biofilm sampler filled with isosmotic solution.
- Biofilm and macroinvertebrate sampling should be coupled:

1. Macroinvertebrate net shall be placed downstream of the stone before it is lifted to avoid drift of macro
2. Macroinvertebrate removed from the lifted stone are collected in the correponding “diversity” sample

- Wet transport/dry transport of stones
- Consider floods for biofilm
- Boulders are 0 for macro

Thanks, Gracias, Obrigada, Grazie, Danke, Tack!