

From Sludge to Resource

Rethinking Sediment Filtration Together

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SAFE Final Workshop · 27.10.2026

This project has received funding from the European Union's
Horizon Europe programme under grant agreement no. 101084549

Where pond sediment comes from

What builds up on the pond bottom over the season

Uneaten feed

Feed the fish do not eat

Fish faeces

Waste from the fish stock

Algae and plankton

Organic matter that dies and sinks

Soil and silt

Washed in from fileds and inflow water

What happens at harvest

Builds up all season → **Draining and harvest stir it up** → **Leaves with the last water**







DISCHARGE CHANNEL

0.47 g/L

suspended solids at harvest

The other months 0.002 to 0.016 g/L

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Two questions, results at the end.

[QR code]

Draining a pond sends its sediment downstream

4.6×

more suspended solids in the river below the farm outlet than above it

- Draining and harvest bring the biggest pulse of sediment.
- The sediment carries nitrogen and phosphorus with it.
- What a farm may discharge is set by the Water Law.



Why straw bales?

1

Low tech

Straw bales and the channel the farm already has. No power needed.

2

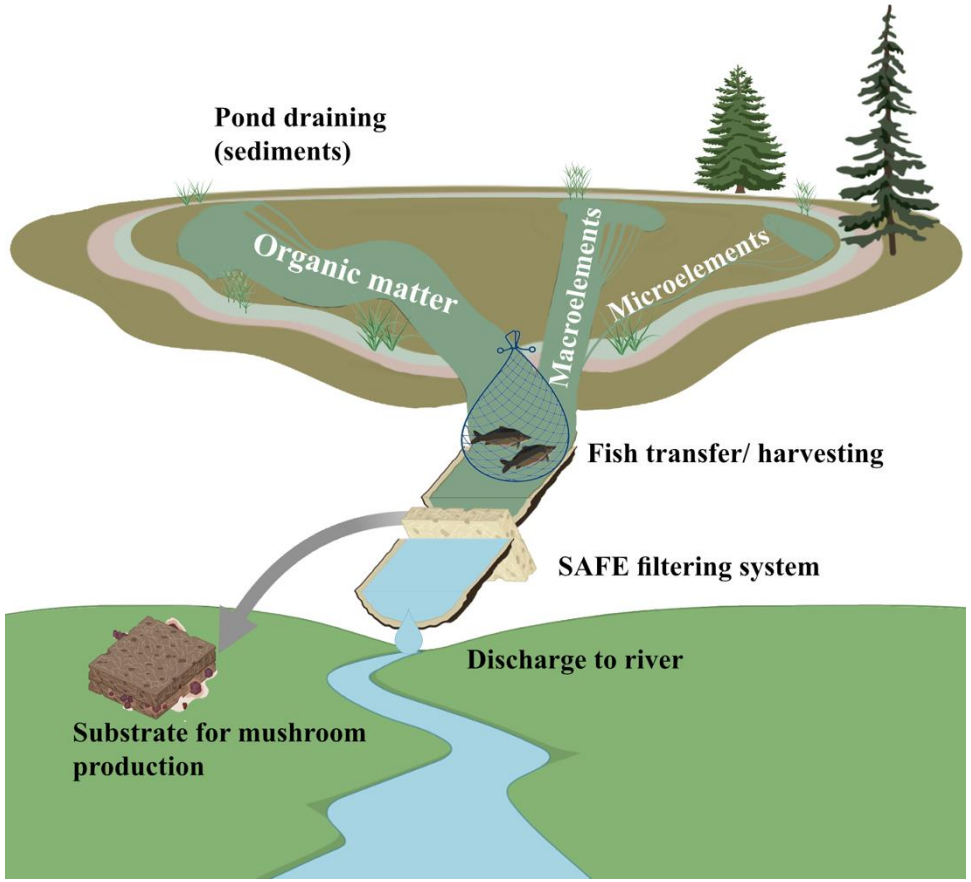
Low cost

Cheap, easy to get material. No large investment for the farm.

3

Easy to copy

Simple enough to scale up and repeat on other farms.



How the straw bale reach works

69 sets of straw bales placed across the discharge channel

1 **Slow the flow**

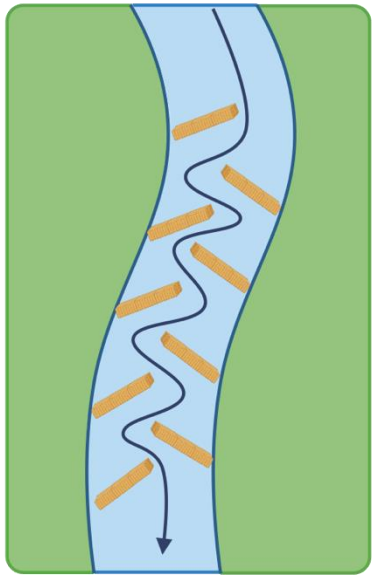
Bale sets across the channel slow the water down.

2 **Let it settle**

Particles drop out in the calm water behind each bale.

3 **Dig it out**

After draining, the bales and the deposit are removed.





How we measured it

134 m

length of the filter reach

69

bale sets, laid in a herringbone pattern

13

water sampling points, 2 of them reference points

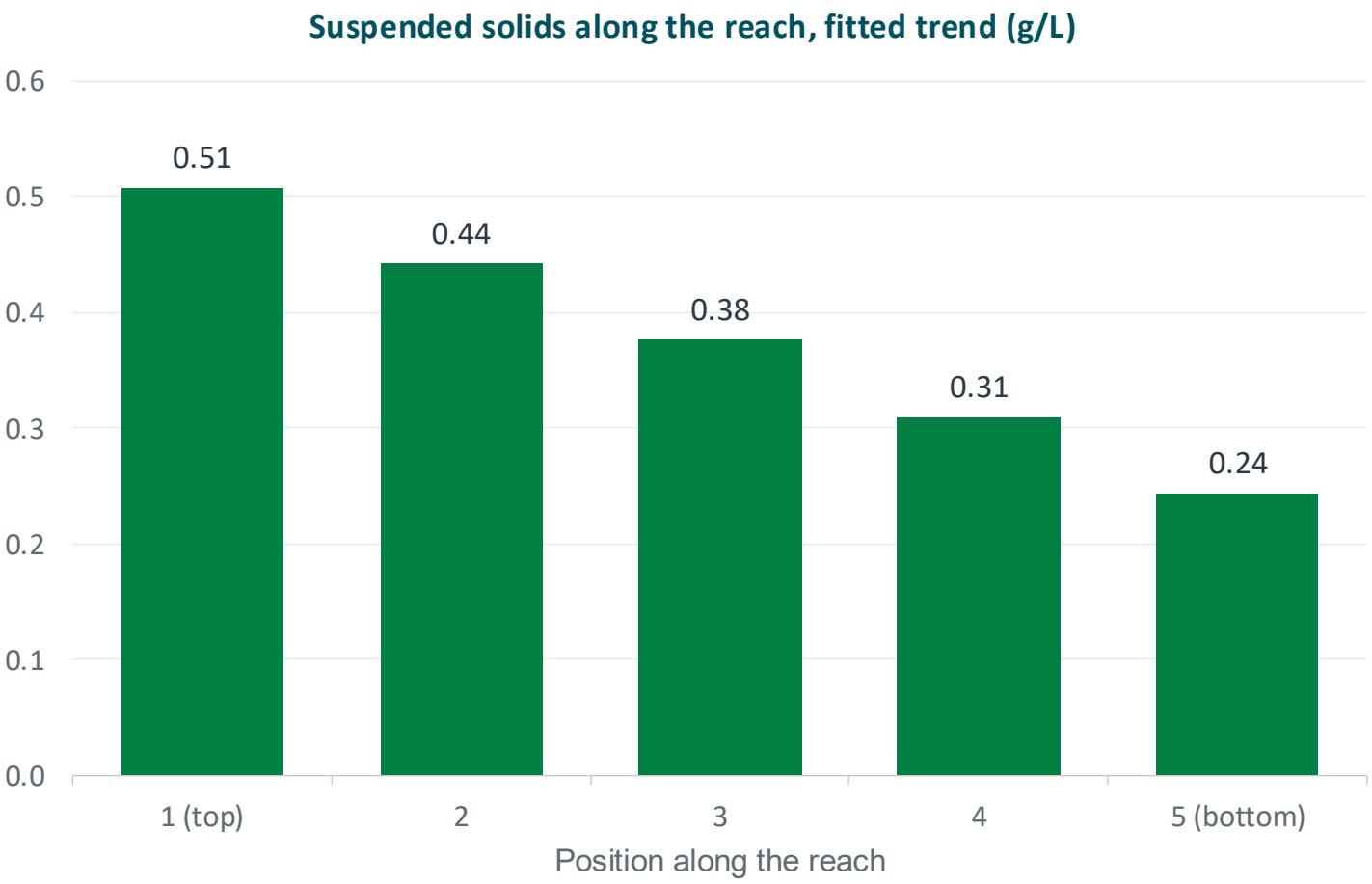
25

hydrochemical parameters measured

We also measured

the volume of water passing through, the sediment held in the bales, and the sediment that settled between the bale sets.

Suspended solids fall along the reach



About half

less suspended solids at the bottom of the reach than at the top





One season, almost 19 tonnes held back

18.8 t

suspended solids, dry matter

458 kg

nitrogen bound to the particles

26 kg

phosphorus bound to the particles

About 25 EUR

per hectare, a cost a farm can carry on its own

About 4.4 EUR

per kg of particle-bound nitrogen held back

What the bales do not do

1 Dissolved nutrients pass through

Dissolved N and P leave unchanged, and nitrate showed a small net export.

2 Clean water reverses it

Below a certain inflow concentration the reach releases more than it holds.

3 The deposit must come out

Left in the channel, it can release nutrients back into the water.

Nitrogen in one season



The bales catch nitrogen bound to particles. Dissolved nitrate passes through and even rises a little.

Which light would you give the straw bales?

Q1 · answer on menti.com

Green

It works, and it is allowed

Yellow

It works, but the law or other limits get in the way

Red

It does not work, or it is not allowed

Keep your reason in mind. We discuss the votes together at the end.

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Q1 of 2. Answer now or any time before the end.

The open legal question

WASTE OR BY-PRODUCT?

Is the collected deposit waste, or a by-product the farm can use?

It decides the light

Green if the farm may use it. Yellow if the rules get in the way.

Safety comes first

Heavy metals and other pollutants must be tested before any reuse.

Co-funded by the European Union

A compact sediment trap, no power needed





79%

settleable solids

67%

total nitrogen

59%

suspended solids

58%

total phosphorus

Removal in the water that ran through the prototype, 48 hour test discharge at ICR. Dissolved N and P passed unchanged.

Prototype I treated about a third of the flow

Next winter. Larger, self-cleaning unit in the field

From mud to mushrooms

A reuse chain tested in SAFE

Pond sludge and straw → Oyster mushrooms → Mealworms → Carp feed



FULL-SCALE MUSHROOM TRIAL

2,200 kg

of straw bricks gave

1,800 kg

of oyster mushrooms

Take home

1

Simple and cheap

About 25 EUR per hectare, straw and an existing channel.

2

Holds back a lot of sediment

18.8 t of dry matter in one season.

3

Dissolved nutrients pass through

It is one step, not the whole answer.

Still open. What may a farm do with the deposit?

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Q2 is the last question.

Q2 · menti.com

What is the biggest barrier to systems like this?

- Cost
- Labour
- Permits and law
- Lack of evidence
- What to do with the deposit

Last question. Please finish your answers now.



Thank you for your attention

Now let's look at your answers on Mentimeter

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