Webinar

"How do sponge measures work? Monitoring with insights from the field"

Questions and Answers

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Speakers:

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1. UK case study: What about the impact on fish and other species (river connectivity), if you build dams in rivers and creeks?

Such 'leaky dams/barriers' are named as such because they are designed to be permeable, with gaps or an open bottom, to mimic natural structures like fallen trees. The aim of these features is to slow the flow of water rather than block it entirely. They also allow for sediment transport and consider fish passage and other migratory species. Overall, they enhance the biodiversity of the area. Some act like structures that mimic beavers, diverting part of the flow to temporary storage, which is then released again.

They are only activated during periods of high flow and reconnect floodplains that were previously connected. In the example shown in the presentation, these were agricultural landscapes where streams had been ditched because farmers needed to drain the water as quickly as possible. With leaky dams, we're actually reverting to a more natural flow regime.

While these features can reconnect floodplains and restore more natural flow regimes, it's important to understand the pre-existing hydrological conditions, i.e. what the flow regime was before human impact and how it has evolved. While it may not be possible to return to the original flow regime, we can at least stop further impacting it.

2. UK case study: How quickly do the field bunds fill up with sediment or debris, and do they require maintenance?

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This is, of course, highly dependent on geomorphology, geology, climate, land cover, land use and management. This applies to field corner bunds and any other kind of runoff attenuation feature that might fill up with sediment.

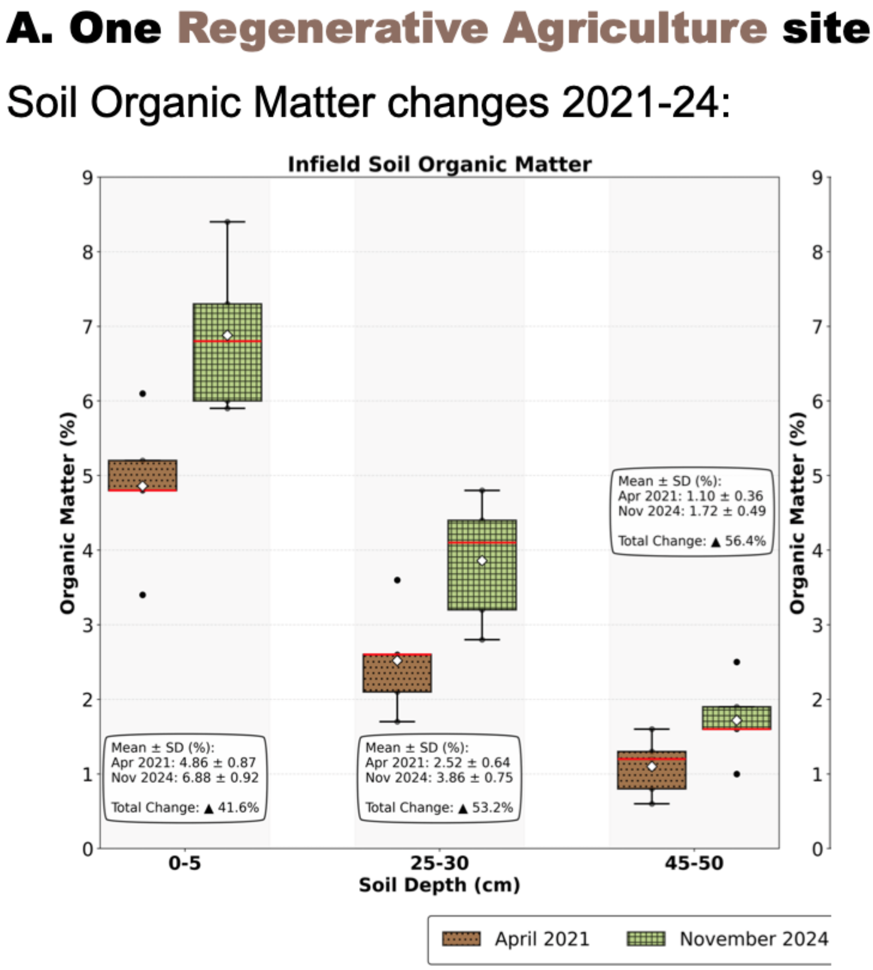
The idea is that farmers can build these structures using their own equipment because they are not large or technically complex. In some cases, bunds are not colonised by vegetation and can trap sediment that farmers can use on their fields as it tends to be high in nutrients. In other cases, however, a new ecosystem has been created, so dredging is not an option. In this case, it is possible that the bund will fill up, and we will need to assess whether the other bunds and the rest of the system are sufficient, or if a new bund needs to be created in a different corner of the field.

3. UK case study: Do you have any idea on how these maintenance costs are balanced against avoided damages? Similarly, are you gathering data on costs (initial investment + maintenance) and economic and financial benefits (including avoided losses and increased agricultural productivity, for example)?

An estimate was done, based on the initial modelling of the Littlestock Natural Flood Management (NFM) project. The Evenlode NFM project as a whole cost around £200,000, but the return on flood risk reduction wasn't significant; the estimate was around £100,000, approximately half the cost. However, other benefits, for example biodiversity, amenities, well-being and water quality are much greater, amounting to hundreds of thousands. This is a key aspect to keep in mind: sometimes these features are installed for water retention, but the co-benefits are actually much larger.

4. UK case study: Do you examine the state of the plant both above and below the soil? What about the size and value of the harvest before and after the measures were taken? Do the farmers tell you what has changed in terms of quality?

Due to limited resources, not everything can be measured. We try to monitor root depth and we're also trying to estimate the impact of macroporosity. However, we ask the farmers, and we have recently conducted interviews, with more planned before the end of the project. There are some co-benefit estimates for the Evenlode NFM project. (See the graph below)



5. Greek case study: What impact did the recent floods in Paros island (Greece, March 2025) have on the stone check dams?

Once the flood event was over, on-site inspections showed that the traditional stone check dams remained intact. This confirms their resilience and value as a sponge measure. These traditional stone check dams have been used on Mediterranean islands for hundreds of years and they can be valuable tools adapted to current climatic conditions and used effectively against water-related events such as floods and droughts.

6. Greek case study: Do you monitor the impact on groundwater, given that groundwater bodies are the main water source in the Cyclades islands (Greece)?

There are no nearby wells, so we can't monitor the groundwater. And our monitoring plan is set in place years after the stone check dams were constructed, so it would be impossible to compare the situation now with what it was before. But by focusing on surface water we can indirectly get results for groundwater. We have visited the site with geologists who have confirmed that the stream has geological features (schistocities) that demonstrate that surface water stored by the check dams is indeed led to groundwater.

7. Greek case study: What type of Earth observation products are you using to obtain the *Normalized Difference Vegetation Index (*NDVI)? What is the spatial resolution?

For more technical information, we used PlanetScope satellite images with a resolution of 3 metres. We calculated the NDVI by creating a 3-metre buffer zone around the stations, taking points within this zone and calculating the average. This is how we estimated the NDVI per station.

8. Slovenian case study: For reference, what is the size of the urban park site in Ljubljana?

The tree planting area shown was around 600 m^2. The whole area with sensors installed is slightly larger.

9. How do you monitor sites far from the research base, for example in another country ? Have you found a good method?

In the UK, we selected nearby sites so that we could reach them in the event of a flood, for example. However, we also use telemetered low-cost sensors that we can monitor via a data platform.

In Slovenia, the urban park research plot is near to our building, which is very lucky. That is why we have set up a kind of a test area here, where we can play with many measurements, and we can go and fix or clean everything, almost in the moment. However, this is usually very rare, and we also have other research plots which are harder to reach. So in this case it is really important to have people who are there just to maintain all these things. Usually this might be some Phd students or some researchers who work just on the monitoring. It's really helpful to have all the data connected to the cloud, so you can see the situation of the batteries, and you can plan your field trips to these places accordingly. However, it's really up to the funding and up to your plan how to do everything. And in this case it's not necessary to monitor everything. It's really important to plan this smartly, and maybe to look for some help from the people who have experience, and who can give you an insight on what is really important to measure, and which sensors are more robust, that this measurement campaigns will be successful, because at the end this is all that we are looking for.

10. Could citizen science or motivated individuals help monitor distant sites?

With the development of smart phones and smart equipment, this is becoming an increasingly realistic option, which is already being used in some places. However, sustained participation often depends on incentives or personal interest to keep people motivated in the long term. However, the combination of both, citizen science and responsible researcher keeping an eye on everything (but maybe less intense) can be very effective in such situations.

11. When assessing the effectiveness of sponge measures, how can we assess the connectivity beyond hydrology—e.g. between people, infrastructure, and institutions?

This broader, systemic view of connectivity—beyond ecological or hydrological systems—is crucial. SpongeWorks, a sister project, is exploring how to assess and enhance this type of systemic coordination.

As regards hydrological connectivity, there is the Free Flowing River (FFR) approach by the European Commission.