Data Management Plan

Quantifying restoration success across biomes by linking biodiversity, multifunctionality and hydromorphological heterogeneity (RESTOLINK)

Following the Horizon 2020 DMP Template v2.0

Contact person: *There is no contact person specified yet*

Based on: *Life Sciences DSW Knowledge Model, 2.4.0 (dsw:lifesciences:2.4.0)*

Project phase: *Before Submitting the DMP*

Created by: ***Mario Brauns*** *(mario.brauns@ufz.de)*
Helmholtz Centre for Environmental Research - UFZ

Generated on: *27 Jun 2022*

Projects

We will be working on the following projects and for those are the data and work described in this DMP.

Quantifying restoration success across biomes by linking biodiversity, multifunctionality and hydromorphological heterogeneity

Acronym: *Restolink*

Start date: *2022-04-01*

End date: *2025-03-31*

Funding: *BiodivERsA: grant number not yet given (granted)*

Restoration approaches to improve in-stream hydromorphology are increasing worldwide but often fail to recover good ecological status as well as biodiversity. Yet, the evidence for dominant effects of hydromorphology on biodiversity and ecosystem functioning suggests that the strong potential for hydromorphological restoration is not fully explored in stream rehabilitation. We argue that restoration often fails because it does not consider the spatial scales of stream hydromorphology that are most relevant to biodiversity and ecosystem functioning. Moreover, traditional indicators of restoration success based on the composition of biological communities may not show the same recovery trajectory as key ecosystem functions. We propose a novel framework for evaluating restoration success by mechanistically linking three central facets of stream ecosystems: hydromorphological heterogeneity at relevant scales, multi-group biodiversity (microbial and macrobial), and ecosystem multifunctionality. We will apply this framework to streams a broad latitudinal gradient from boreal to tropical biomes and will thus test how biome-specific factors such as climate, vegetation, and hydrology set the boundaries for local responses. With RESTOLINK, we i) identify scales of hydromorphology that need to be restored to induce recovery of microbial and macrobial biodiversity (call theme 3.1), ii) decipher the role of biodiversity for ecosystem functioning (theme 1.1 and 1.2), iii) establish ecosystem functions as novel targets for freshwater restoration (theme 2.2), iv) determine thresholds of biodiversity that must be restored to maximise ecosystem multifunctionality (theme 1.2), and v) evaluate the uncertainties of biodiversity and (multi)functional restoration targets across biomes (theme 3.3). RESTOLINK will advance our fundamental understanding of how physical complexity, biodiversity, and ecosystem functioning are interlinked. Through close collaboration with stakeholders, knowledge delivered by RESTOLINK will be available to water managers tasked with tailoring restoration measures that

improve the biodiversity, ecological status, and ecosystem functioning of streams. In doing so, RESTOLINK contributes significantly to the implementation of the biodiversity strategy of the European Union for 2030 as well as the European Water Framework Directive. Functional indicators delivered by RESTOLINK will allow for the implementation of the Aichi Biodiversity Targets, which consider biodiversity and ecosystem functioning as environmental commodities at risk.

1. Data Summary

Instrument datasets

The following instrument datasets will be acquired in the project:

- **Hydromorphology**

  This dataset will be collected by experts in the project, with our own equipment.

  The equipment is less well described or not completely standard, so we will need to take extra care documenting the process.

  Other researchers working in the same field of research could be interested in using this data.

- **Macroinvertebrate biodiversity**

  This dataset will be collected by experts in the project, with our own equipment.

  The equipment is very well described and known.

  Other researchers working in the same field of research could be interested in using this data.

- **Microbial biodiversity**

  This dataset will be collected by experts in the project, at a specialized infrastructure.

- **Stable isotope uptake**

  This dataset will be collected by experts in the project, with our own equipment.

  The equipment is very well described and known.

  Other researchers working in the same field of research could be interested in using this data.

- **Organic matter decomposition**

  This dataset will be collected by experts in the project, at a specialized infrastructure.

  The equipment is very well described and known.

Other researchers working in the same field of research could be interested in using this data.

- **Stable isotope food webs**

  This dataset will be collected by experts in the project, with our own equipment.

  The equipment is very well described and known.

  Other researchers working in the same field of research could be interested in using this data.

Data formats and types

We will be using the following data formats and types:

- **Comma-separated Values**

  It is a standardized format. This is a suitable format for long-term archiving. We will have only a small amount of data stored in this format.

2. FAIR Data

2.1. Making data findable, including provisions for metadata

There are the following 'Minimal Metadata About ...' (MIA...) standards for our experiments:

- Ecological Metadata Language
-

We will use lab notebooks to make sure that there is good provenance of the data analysis.

We made a SOP (Standard Operating Procedure) for file naming. Google drive for interim data storage and exchange, folder structure follows project's wp filenaming will be in the format: 3digitcountrycode_sitetype_sitename_content (e.g. ger_ref_ecker_doc.concentration) to allow for relating files to each other intented to create files with a predefined column structure to collate individual information for each data type (e.g. water chemistry) . We will be keeping the relationships between data clear in the file names. All the metadata in the file names also will be available in the proper metadata.

2.2. Making data openly accessible

We will be working with the philosophy *as open as possible* for our data.

All of our data can become completely open immediately.

Limited embargo will not be used as all data will be opened immediately.

Metadata will be openly available. Metadata will available in a form that can be harvested and indexed (managed by the used repository / repositories).

We have a consortium agreement that arranges Intellectual Property.

2.3. Making data interoperable

We will be using the following data formats and types:

- **Comma-separated Values**

  It is a standardized format.

We will be using the following standards (encodings, terminologies, vocabularies, ontologies):

-

2.4. Increase data re-use (through clarifying licenses)

As stated already in Section 2.2, all of our data can become completely open immediately.

We will be archiving data (using so-called *cold storage*) for long term preservation already during the project. The data are expected to be still understandable and reusable after a long time.

To validate the integrity of the results, the following will be done:

- We will use independently developed duplicate tools or workflows for critical steps to reduce or eliminate human errors.

3. Allocation of resources

FAIR is a central part of our data management; it is considered at every decision in our data management plan. We use the FAIR data process ourselves to make our use of the data as efficient as possible. Making our data FAIR is therefore not a cost

that can be separated from the rest of the project.

We will be archiving data (using so-called 'cold storage') for long term preservation already during the project.

None of the used repositories charge for their services.

Mario Brauns is responsible for implementing the DMP, and ensuring it is reviewed and revised.

Mario Brauns is responsible for maintaining the finished resource.

To execute the DMP, no additional specialist expertise is required.

We do not require any hardware or software in addition to what is usually available in the institute.

4. Data security

Project members will not store data or software on computers in the lab or external hard drives connected to those computers.They can carry data with them on password-protected laptops. All project web services are addressed via secure HTTP (https://...).

The possible impact to the project or organization if information is leaked is small. The possible impact to the project or organization if information is vandalised is small.

We are not using any personal information.

The archive will be stored in a remote location to protect the data against disasters. The archive need to be protected against loss or theft. It is clear who has physical access to the archives.

5. Ethical aspects

Data we collect

We will not collect any data connected to a person, i.e. "personal data".

6. Other issues

We use the Data Stewardship Wizard with its *Life Sciences DSW Knowledge Model* (ID: dsw:lifesciences:2.4.0) knowledge model to make our DMP. More specifically, we use the https://researchers.ds-wizard.org DSW instance where the project has direct URL: https://researchers.ds-wizard.org/projects/4c7e9f9a-74bc-4243-b3ff-73f2efa82c74.