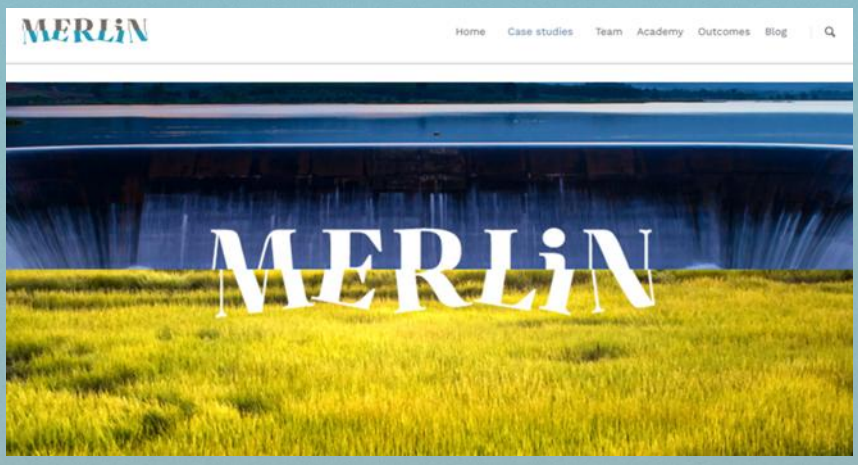
MERLIN



Deliverable D1.4

Digital reports on results of the monitoring of the MERLIN case studies

www.project-merlin.eu

MERLIN

Imprint

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MERLIN Key messages

1. Digital reports are published recording the key results of the MERILN Systemic analysis of restoration impacts across the 13 European Green Deal Policy areas for 18 MERLIN Restoration Case Studies.
2. Reports are published on the MERLIN Knowledge Hub allowing users to navigate through each criteria following a progressive disclosure approach which directs towards more detailed evidence in respective deliverables.
3. A description of the systemic and integrated analysis approach developed through the MERLIN Monitoring and Assessment Framework including estimates of confidence and direction of impact for each of the EGD assessment indicators.
4. The digital reports are designed to provide real-life examples from the MERLIN community, to inspire the wider restoration community and to demonstrate the potential to recognise multiple benefits of restoration as well as positive and negative trade-offs.

MERLIN Executive Summary

This deliverable summarises the development and publication of the MERLIN Digital Reports on Restoration Impact Monitoring across 18 MERLIN Restoration Case Studies. It marks the publication of these reports on the MERLIN Knowledge Hub following a progressive disclosure scientific communication approach. This web-based resource presents a synthesis and summary of the systemic assessment approach developed through the MERILN Monitoring and Assessment Framework which allows an integrated assessment across 13 European Green Deal Policy Area Indicators.

This resource represents one of the most comprehensive collation and synthesis of data on freshwater restoration projects available. It marks a major milestone in the MERLIN Systemic Assessment of Restoration Impact process and presents key highlights to the wider restoration community. It is our hope that this resource will inspire the wider community providing real-life evidence on realising multiple benefits of restoration programmes as well as recognising the potential for positive and negative trade-offs.

Content

The MERLIN project (https://project-merlin.eu) has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 101036337.

1 Introduction

The MERLIN Digital Reports on Restoration Impact Assessments bring together information on 18 best-practice case-studies on freshwater restoration. They provide evidence of restoration impacts across scales across the 13 European Green Deal Criteria and span a range of ecosystem types, innovative restoration measures, governance structures and financing frameworks.

The MERLIN Digital Reports on Restoration Impact Assessments are available through the project website here: https://project-merlin.eu/

This report documents the layout, content, and future use of the MERLIN Digital Reports on Restoration Impact Assessments as a resource with which the scientific community, stakeholder groups, and the public can view lessons learned and progress across the 18 MERLIN Case Studies during the lifetime of the project. We outline the process through which content was selected, the development of a dedicated web-based platform underpinned by the systemic MERLIN Monitoring and Assessment Framework, provide examples of European Green Deal Indicator 'Focus Pages', and offer an outlook with respect to the impact of this resource on MERLIN Case Study Teams and the wider restoration community.

2 Creation of Digital Reports

2.1 Collation and Selection of Evidence

The digital reports draw on evidence gathered across a number of MERILN Project deliverables and provide an accessible platform through which the global restoration community can view progress on some of Europe's most ambitious restoration programmes.

The content of the digital reports was selected by experts form the MERLIN Project who were responsible for developing the MERLIN Monitoring and Assessment Framework, for collating and quality checking raw data submitted by the Case Study Leads over the duration of the project, and for designing and implementing the synthetic analysis of these impact assessments across all case studies and EGD Indicators.

A series of on-line meetings were held to discuss the highlight results and lessons learned from each EGD Criteria Expert. These meetings were led by a dedicated Web Designer. Content proposals were submitted by the Indicator Leads to the Web Designer in turn and the content was selected and uploaded to the web page.

The Web Designer then populated content across the EGD Criteria and designed a landing page as outline below.

2.2 Web Design and Structure

The Digital Reports are compiled and published on the MERLIN Knowledge Hub and following a progressive disclosure approach for science communication. Reports are structured behind a landing page which presents a synthesis of impact assessments across all case studies and EGD Indicators, for which data were submitted by the case study leads.

The landing page utilises the novel 'MERLIN Smiley Faces' approach using emojis to communicate levels of confidence in the assessment and the direction of the impact. A rating for each is calculated according to raw data and provided for all case studies and criteria allowing comparison between them.

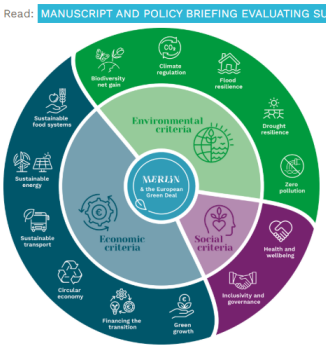
The user may navigate through links on the landing page to 'Focus Pages' where further information on exemplar EGD Indicators can be viewed. The content of these pages was selected by EGD Indicator Leads, responsible for conducting the synthetic analysis, providing selected information on highlight results and lessons learned. Links are provided on these focus pages to specific sections of MERLIN Deliverable reports where more detailed information and evidence is available.

2.3 Examples of Digital Report contents

We present below screenshots of the Digital Report Landing Page (Fig 1), the page outlining the methodology of the synthetic analysis (Fig 2), an example of the Focus Pages for 'Climate Regulation' (Fig 3), and the page outlining an analysis of interactions resulting from restoration activities in the Tisza Floodplain (Hungary) Case Study (Fig 4). The Landing Page (Fig 1) operates as a Dashboard which navigates the user through various components of the synthetic analysis. It includes a summary figure of all the EGD Criterion and their classifications (i.e. Environmental, Social, Economic) as well as summary statistics for these categories indicating the proportion of reported positive, negative, or null effects and the corresponding confidence levels. The landing page also includes a summary of the synthetic analysis indicating the assessed impact direction and confidence ratings (as faces) grouped by case study type. The methodology behind each 'face' is identified by comment boxes that appear when hovering the cursor over them. The methodology behind the synthetic assessment is available through a link above the table. The raw data underpinning each Criterion impact assessment is available under the criterion table headings through the 'data' icon which links to the CSV file in Zenodo. Further information is available on each criterion by following the 'Info' icon under the respective table headings which takes the user to a Criterion Focus Page (e.g. for Climate Regulation, Fig 3). We include here the Focus Page on the Tisza Floodplain Case Study Impact Interactions Analysis which is accessible through a dedicated link above the table on the Landing Page.

MERLIN restoration case studies assessment

Read: MANUSCRIPT AND POLICY BRIEFING EVALUATING SUCCESS OF LARGE LANDSCAPE-SCALE RESTORATION



Overview of the Green Deal Criteria as adopted in the MERLIN project framework. The diagram shows the categorization of the 13 sustainability-related criteria derived from the European Green Deal into three overarching domains. Each domain is color-coded: green for environmental, purple for social, and blue for economic dimensions.

Aggregated assessment of impact monitoring results

Aggregated assessment of impact monitoring results reported by the 18 case studies for the 13 EU Green Deal criteria. The background colour of the cells corresponds to the Theory of Change categories:

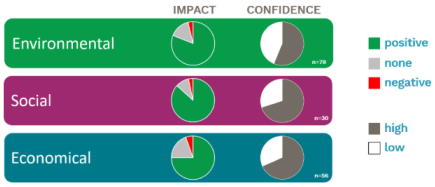
- dark blue indicates a primary restoration goal
- medium blue a secondary goal
- light blue a restoration cobenefit
- white denotes not relevant

Case Study 18 did not provide any information on the Theory of Change.

Note: More information regarding the study sites is provided in Annex 1. For case studies reporting data for a given criterion for more than one implementation site, the respective sites are denoted by lower case letters:

a. Emscher basin-scale DE (CS11)
b. Emscher Lake Phoenix DE (CS11)
c. Emscher flood-basins DE (CS11)
d. Emscher mouth DE (CS11)
e. Riparian buffer strips BE (CS16)
f. Zwalm restoration BE (CS16)

- Read more about the scoring of the monitoring results
- Interactions across EU Green Deal Criteria: the Tisza floodplain rewetting demonstration case study



Results of MERLIN's systemic monitoring, summarising restoration impacts (positive, negative, or none) per Green Deal criteria category across all 18 case studies, together with confidence levels of the underlying data.

Case study	Biodiversity net gain	Climate regulation	Flood resilience	Drought resilience	Health & well-being	Zero pollution	Farm to fork	Sustainable energy	Sustainable transport	Inclusive participation	Circular economy	Financing the transition	Green growth
Peatlands and wetlands													
CS01 — Kvorning wetland rewetting DK	☺	NA	☺	☺	☺	NA	NA	NA	NA	☺	NA	☺	☺
CS03 — Beaver river engineering SE	☺	😶	☺	😐	☺	☹	NA	NA	NA	☺	😐	☺	😐
CS05 — Kampinos wetland rewetting PL	☺	☺	☺	☺	😐	☺	NA	NA	NA	☺	NA	☺	☺
CS06 - Hutovo Blato peatland rewetting BiH	☺	NA	NA	NA	☺	NA	NA	😐	☺	☺	😐	☺	☺
CS12 — Lima floodplain forest restoration PT	☺	☺	☺	☺	😐	☹	☹	☺	NA	☺	☺	☺	☺
CS14 — Komppasuo peatland rewetting FI	☺	☺	☺	☺	☺	☹	NA	NA	NA	☺	NA	☺	😐
Small streams and basins													
CS02 — Deba barrier removal ES	☺	☺	☺	😐	☺	☺	NA	☺	NA	NA	NA	NA	NA
CS11 — Emscher basin restoration DE	☺ a	☺	☺	☺	☺	☺	NA	☺	NA	😐 a	NA	☺ b ☺ c	☺

Fig 1 - Screenshot of the Digital Reports Landing Page showing interactive links to Smiley Faces and a high-level synthesis of confidence and direction of impact form the synthetic analysis conducted by the EGD Indicator Leads. The Icons under the criterion titles in the table are Interactive and take the user to either the raw data file In Zenodo, or to further Information on the Criterion analysis through the 'Info' Icon.

MERLIN restoration case studies assessment

Scoring of the monitoring results

Scoring of the monitoring results was carried out in two steps: firstly, the results of the individual indicators were scored, and next these scores were transformed to an aggregated score for the 13 EGD policy criteria.

Regarding the indicators a score for the response observed in the reported data (i.e., positive, negative, or no change) and a score for the strength of evidence supporting the assessment (Box 1). These scores provided consistency across assessments. The indicator scores were then compiled and summarized. This initial scoring underwent expert peer review by the Case Study Leads, who provided revisions along with supporting rationale.

Box 1: "Traffic light system" for assessing the impact of restoration measures

Negative impact:

– Clear evidence of deterioration, supported by consistent numerical data or well-defined negative narratives.

– Indications of deterioration, but data are somewhat ambiguous (e.g. negative trend with fluctuations) or narratives are vaguely negative.

No impact/irrelevant impact:

– No detectable change, with stable numerical data and explicit narratives confirming the absence of change.

– No significant change, but this is conveyed through less precise or more cautious narrative wording (e.g. "no significant impact").

Positive impact:

– Clear evidence of improvement, supported by consistent numerical data or well-defined positive narratives.

– Indications of improvement, but data are somewhat ambiguous (e.g. positive trend with fluctuations) or narratives are vaguely positive.

– Effects cannot be assessed yet, either due to lack of data or because confirmation is currently not possible.

– Effects remain uncertain, with narratives that are vague or inconclusive.

No data: NA – Indicator is not relevant to that CS or data was not reported for other reasons.

Fig 2 - Screenshot of the Digital Reports Assessment Methodology Description page. This page provides information on the novel assessment methodology designed and conducted by Criterion Experts which utilizes the raw data across the criteria provided by the Case Study Leads to produce a systemic and synthetic assessment providing estimates of confidence in reported impact and the direction of the impact.

Climate regulation

Further details on the systemic and synthesis for this European Green Deal Criterion are available in the MERLIN Deliverable Report page 47.

Peatlands

For peatlands the primary climate regulation impact considered is the change in carbon dioxide and methane emissions following restoration. These were modelled from the measured water levels in the peat before and after restoration.

In CS5 restoration raised the water table from 50 cm below the surface to 23 cm below the surface and reduced greenhouse gas emissions from nearly 4000 tonnes CO_2-eq per year to less than 600 tonnes CO_2-eq per year.

In CS14 3 different restoration locations and one control location were monitored. The control location remained dry and with high emissions per ha (despite low total emissions because of the small area). The restoration sites all showed reduced greenhouse gas emissions, and one restoration location was even modelled to sequester carbon dioxide.

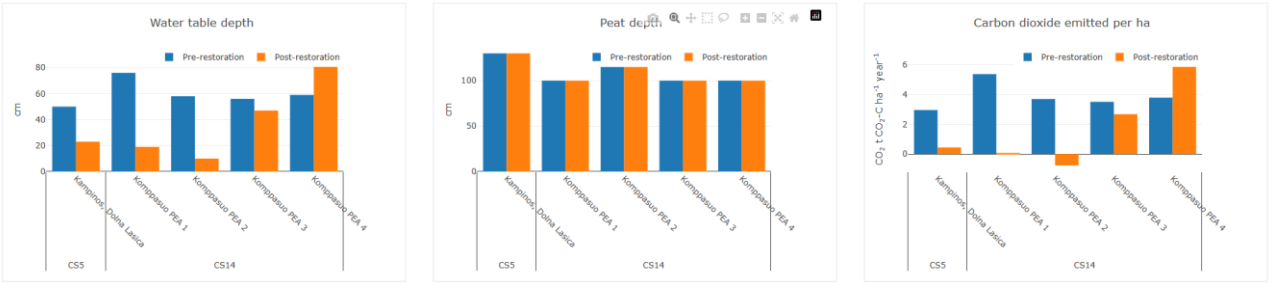


Fig 3. Screenshot of the EGD Indicator 'Climate Regulation' Focus Page showing general descriptive text on the lessons learned and an Interactive figure Including results for Sub-Indicators of this Criterion across the case studies.

Interactions across EU Green Deal Criteria: the Tisza floodplain rewetting demonstration case study

Further detailed narrative reports on these interactions and their implications for future restoration planning are provided in MERLIN Deliverable 1.6, pages 19–23.

The Tisza Floodplain Restoration case study is a MERLIN Demonstration Site located near the village of Nagykörű on the Central part of the Tisza River, Hungary; the largest sub-basin of the Danube River Basin. The restoration activities for this Demonstration Case formed part of the LIFE00-NAT-A-7051 Project implemented between 2001–2005. The beneficiary was WWF Austria, the project partner was WWF Hungary. The main aim of this project was to restore and conserve floodplain-related habitats (e.g. Figure 1), targeting 5 sites, which are situated along the middle section of the Tisza River in Hungary, within the "Middle Tisza Landscape Protected Area".

The results of the aggregated Assessment are provided (Figure 2) alongside an analysis of interactions between impacts of the restoration actions provided by the Case Study Reporting Team. The measures were assessed as having positive effects on Biodiversity Net Gain, Climate Regulation (with low confidence), Flood and Drought Resilience, Health and Wellbeing, Circular Economies and Financing the Transition. Negative effects were assessed to have resulted from the implementation of measures only for the Farm to Fork Criterion. A range of interactions were identified between criteria and the contexts underpinning these are introduced in the narratives below for relevant EGD Criteria.

Fig 4. Screenshot of the Focus Page on Interactions across EGD Criterion resulting from restoration In the Tisza Floodplain case study. This page distills the results of the synthetic analysis alongside a Narrative Report provided by the Case Study Leads to Identify synergies and trade-offs between the EGD Criteria.

3 Outlook

These Digital Reports provide an entry point to the wider community for one of the most comprehensive data resources and integrated systemic analyses on freshwater restoration projects available. It marks a major milestone in the MERLIN Systemic Assessment of Restoration Impact process and presents key highlights to the wider restoration community. It is our hope that this resource will inspire the wider community providing real-life evidence on realising multiple benefits of restoration programmes as well as recognising the potential for positive and negative trade-offs. In addition, we hope that the Case Study Leads will utilise these reports to showcase how their project contributed to the advancement of knowledge and experience sharing through the MERLIN Project.