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Kakovost vode - Navodilo za strateški pristop k obnovi rek

Water quality - Guidance standard on a strategic approach to river restoration

Wasserbeschaffenheit - Richtlinien für einen strategischen Ansatz für Renaturierung von Fließgewässern

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Water quality - Guidance standard on a strategic approach to river restoration

Wasserbeschaffenheit - Richtlinien für einen
strategischen Ansatz für Renaturierung von
Fließgewässern

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European foreword

This document (prEN 18025:2023) has been prepared by Technical Committee CEN/TC 230 “Water analysis”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

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Introduction

Most European rivers and their catchments no longer function naturally. This loss of natural functioning is the result of human modification undertaken over many centuries for (among other things) flood defence, hydroelectric power generation, the provision of water for agricultural, industrial, and domestic consumption, land use and land drainage. These activities have often resulted in disturbed river functioning and led to degraded physical habitats and, as a consequence, to reductions in biodiversity, reduced resilience to flooding and drought, and a decline in ecosystem services such as recreation. Climate change is now compounding the issues created by human modification, and the need to restore rivers will become increasingly pressing to ensure the conservation of their naturally occurring habitats and species and the sustainable provision of their ecosystem services. Accordingly, river restoration following a 'nature-based' approach is an imperative requirement to allow river ecosystems to recover, a concept advocated by the International Union for Conservation of Nature (IUCN) [1].

River restoration is the act of returning natural functioning and form to a river that has been directly or indirectly altered by human activity. Ideally it should result in uninterrupted lateral, longitudinal, and vertical connectivity of hydraulic, sedimentary, chemical and biological processes, allowing unhindered channel and floodplain evolution, and the associated mosaic of habitats that support a characteristic array of flora and fauna. In many locations, physical and other constraints will affect what restoration is practicable, but the ambition should be to achieve the greatest degree and spatial scale of re-naturalization possible.

Rivers are restored for many reasons including to: re-establish natural patterns of water and sediment movement and so remove the costs associated with managing modified channels; restore habitats and biodiversity; manage flood risk through natural flood management; enhance the aesthetics of an area; and create opportunities for recreation. Key policy and legal frameworks to drive river restoration within the European context include the Water Framework Directive (WFD), Habitats Directive and the Floods Directive. Furthermore, the EU Biodiversity Strategy 2030, and the UN Treaty on Climate Change, for example, provide additional impetus for increased restoration efforts. Although the motivation for restoring rivers and the extent to which rivers may be restored vary, a fundamental basis common to all restoration projects should be the re-establishment of natural physical processes, leading to the development of natural form and features, and the sustainable evolution of instream, riparian and floodplain habitats. Activities such as adding gravel to construct specific spawning areas may be part of a larger river restoration scheme, but are not by themselves considered to be river restoration unless they are measures for restoring natural river processes.

Specifying the desired outcome of restoration is an essential element of any plan, and the meaningful monitoring and appraisal of any project will depend upon the clarity in setting this goal.

1 Scope

This document concerns the restoration of rivers, including their channels, riparian zones, and floodplains. The word 'river' is used as a generic term to describe permanently flowing and intermittent watercourses of all sizes, with the exception of artificial water bodies such as canals. Some aspects of landscape restoration beyond the boundaries of what are often considered typical river processes are also considered. This document focuses on 'nature-based solutions', which are 'actions to protect, sustainably manage and restore natural or modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits' (<https://portals.iucn.org/library/sites/library/files/documents/2016-036.pdf>).

A clear framework of guiding principles to help inform the planning and implementation of river restoration work is provided. These principles are aimed both at individuals and organizations wishing to restore rivers, and stress the importance of monitoring and appraisal. This document makes reference to existing techniques and guidance, where these are appropriate and within the scope of this document.

This document provides guidance on:

- the core principles of restoration
- the aims and overall outcomes of river restoration
- the spectrum of typical approaches to river restoration (the 'restoration mode') with a focus on those that are nature-based and restore both physical and ecological aspects
- identifying opportunities for restoration and possible constraints, with a focus on physical and natural rather than socio-economic aspects
- the different scales of restoration and how restoration works across different catchments and landscapes
- the importance of monitoring and appraising restoration work across the range of approaches and scales.

2 Normative references

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There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp/>
- IEC Electropedia: available at <https://www.electropedia.org/>

prEN 18025:2023 (E)**3.1
bank**

side of a river channel or island which extends above the normal (e.g. mean) water level and is only completely submerged during periods of high river flow

Note 1 to entry: In the context of this document, the bank top is marked by the first major break in slope, above which cultivation or development is possible.

[SOURCE: EN 14614:2020, 3.7]

**3.2
bar**

in-channel, elevated sediment deposit exposed during periods of low flow, which could be a side bar, (including a point or counterpoint bar, located respectively along the convex or concave bank of a meander bends) or a mid-channel bar

[SOURCE: EN 14614:2020, 3.9]

**3.3
baseflow**

sustained component of streamflow, usually resulting from drainage of groundwater, but also from drainage of large lakes, swamps, soils, snow and ice packs

[SOURCE: EN 14614:2020, 3.10]

**3.4
Before-After-Control-Impact
BACI**

investigation of the effect of an Impact at a site by comparing the conditions Before the Impact with those After the Impact while accounting for natural/background change through the use of Control site

**3.5
berm**

natural or artificial, flat-topped shelf along the margin of a river channel that is exposed above water level during low flows, but is submerged during high flows

Note 1 to entry: Natural berms are vegetated features composed of sediments deposited by the river to the baseflow level.

[SOURCE: EN 14614:2020, 3.13]

**3.6
channel**

main landform within river systems, conveying water

**3.7
characterization**

selection of properties or special features of a spatial unit that are uniquely relevant to identifying its hydromorphological processes, forms and pressures

[SOURCE: EN 14614:2020, 3.19]

3.8**coarse sediment**

sediment of grain size at or larger than 'very fine gravel' (diameter ≥ 2 mm, ≤ -1 phi)

EXAMPLE gravels, cobbles, boulders

Note 1 to entry: The phi scale defines sediment grain size as the negative logarithm to the base 2 of the grain diameter in millimetres.

[SOURCE: EN 14614:2020, 3.20]

3.9**confirmatory appraisal**

process of confirming the expectations following a restoration intervention through simple observation (cf. investigative appraisal)

3.10**connectivity**

See 'lateral continuity' and 'longitudinal continuity'

3.11**control site**

site representing (ideally identical) conditions to that of the Impact site except for the restoration intervention

3.12**culvert**

arched, enclosed or piped structure constructed to carry water under roads, railways and buildings

[SOURCE: EN 14614:2020, 3.25]

3.13**ecosystem services**

the benefits people derive from ecosystems

3.14**embankment****artificial levée**

artificial bank built to raise the natural bank level thereby reducing the frequency of flooding of adjacent land

[SOURCE: EN 14614:2020, 3.27]

3.15**equilibrium form**

morphological condition of a river that represents physical balance (stable but not necessarily static)

prEN 18025:2023 (E)**3.16****fine sediment**

sediment of grain sizes equal to or smaller than 'very coarse sand' (≤ 2 mm diameter, ≥ 2 mm -1 phi), i.e. sands, silt, clay

Note 1 to entry: The phi scale defines sediment grain size scale as the negative logarithm to the base 2 of the grain diameter in millimetres.

[SOURCE: EN 14614:2020, 3.28]

3.17**floodplain**

valley floor adjacent to a river that is (or was historically) inundated periodically by flood waters and is formed of sediments deposited by the river

[SOURCE: EN 14614:2020, 3.29]

3.18**fluvial audit**

method for assessing the condition of a river and its associated human pressures, using information from field survey, remote sensing, historical and recent maps, scientific literature and other sources

[SOURCE: EN 16859:2017, 3.18]

3.19**fluvial geomorphology**

scientific study of the physical processes, form and functioning of rivers and streams and their physical interactions with the surrounding landscape

[SOURCE: EN 14614:2020, 3.31]

3.20**hydrodynamic modelling**

numerical tool or methodology used to predict hydraulic patterns in rivers

3.21**hydrology**

study of the distribution and movement of water both on and below the Earth's surface

3.22**hydromorphology**

morphological and hydrological characteristics of rivers including the underlying processes from which they result

[SOURCE: EN 14614:2020, 3.36]

3.23**hyporheic zone**

spatio-temporally dynamic ecotone between the surficial benthic substrate and the underlying aquifer

[EN 16772:2016, 2.13]

3.24**impact site**

site at which restoration intervention effects are measured

3.25**investigative appraisal**

process of investigating the outcomes of a restoration intervention through an experimental approach (cf. confirmatory appraisal)

3.26**large wood**

piece of wood that is more than 1 m long and 10 cm in diameter

[SOURCE: EN 14614:2020, 3.37]

Note 1 to entry: 'wood' refers to natural wood (e.g. tree branches)

3.27**lateral connectivity****lateral continuity**

freedom for water, sediments and biota to move between the channel and the floodplain/hillslopes

[SOURCE: EN 14614:2020, 3.39]

3.28**longitudinal connectivity****longitudinal continuity**

freedom for water, sediments and biota to move along the river channel

[SOURCE: EN 14614:2020, 3.41]

3.29**meander**

one of a series of regular, sinuous curves along the course of a stream

[SOURCE: EN 14614:2020, 3.42]

3.30**morphology**

physical form and structure of a river

3.31**natural flood management**

working with nature to reduce and control the impacts of flooding

3.32**oxbow lake**

small lake located in an abandoned meander loop of a river channel

3.33**palaeochannel**

remnant floodplain feature indicating location of a previously active channel

prEN 18025:2023 (E)**3.34****planform**

geometric form of a river channel viewed from above

EXAMPLE sinuous, straight

[SOURCE: EN 14614:2020, 3.43]

3.35**pool**

distinctly deeper part of a river bed that is usually no longer than one to three times the channel's bankfull width, and where the hollowed river bed profile is sustained by scouring

[SOURCE: EN 14614:2020, 3.44]

3.36**quantitative sampling**

process of collecting measured information (e.g. flow measured in m s^{-1})

3.37**qualitative sampling**

process of collecting information that is subjectively assessed (e.g. flow measured according to a category, such as 'riffle', 'run', 'glide', etc.)

3.38**reach**

section of river along which boundary conditions are sufficiently uniform that the river maintains a near consistent internal set of process-form interactions

Note 1 to entry: In some situations, chemical changes along the length of a river, as well as physical and hydrological ones, could also be important in defining river reaches

[SOURCE: EN 14614:2020, 3.47]

3.39**riffle**

fast-flowing shallow water area of a river bed with a distinctly broken or disturbed water surface over a gravel/pebble or cobble substrate

[SOURCE: EN 14614:2020, 3.50]

3.40**riparian zone**

transitional, semi-terrestrial area of land adjoining a river channel (including the river bank) that is regularly inundated and influenced by fresh water and can influence the condition of the aquatic ecosystem (e.g. by shading and leaf litter input and through biogeochemical exchanges)

Note 1 to entry: 'Riparian corridor' is the linear extension of this concept along a channel or reach length. In this document, the term 'riparian zone' does not include the wider floodplain.

[SOURCE: EN 14614:2020, 3.51]