

Linee guida per la riqualificazione delle aree litorali lacustri



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Purpose of the document

- This document provides a guideline on how and why to intervene with redevelopment projects in lakeshore areas, providing project plans through sample sheets and completed works.
- A practical guide for the redevelopment of lake shores and coastal environments, for authorities, public bodies, operators, and planners.
- This guideline is because the coastal zone constitutes a refuge for aquatic biocenoses; it is a transition zone between aquatic and terrestrial biocenoses; it is a habitat of community interest.



Document structure: Basic reference principles

- The **movements of lake water**, wave motion, currents, and wind action that define the morphological characteristics of the shoreline and littoral zone;
- The **presence of tributaries** into the lake;
- The **natural morphology of the lakebed**, which represents a fundamental element for planning and designing renaturalization projects for riparian, shoreline, and littoral areas;
- The **shoreline habitats**, which support a high level of biodiversity, strengthened by a high level of physical complexity and connectivity;
- The **hydrological regime**, which strongly influences the composition and activity of biocoenoses, such as vegetation and macroinvertebrates.



Restoring the functionality of coastal areas must therefore involve restoring the **ecosystem services** that these areas are able to provide.

Document structure: Types of action

- Non-structural interventions
 - Measures that modify the urban planning structure;
 - Administrative measures that discourage the artificialization of the banks of adjacent riparian areas or the construction of structures in floodplain areas;
 - Legislative activity that protects riparian and lakeshore environments.
- Structural interventions
 - Realization of works:
 - Transformation of an area, possibly including removal of hydro-morphological barriers;
 - Conversion of traditional engineering structures with bioengineering structures;
 - Beach nourishment;
 - Resurfacing and/or replanting.

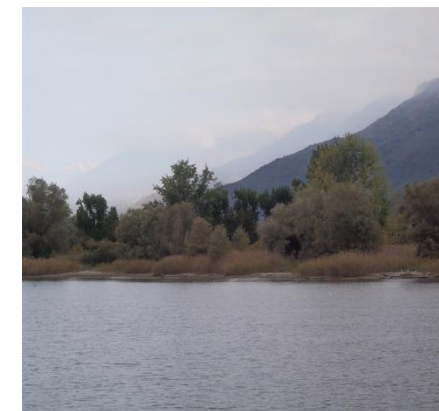
Document structure: Technical sheet

- Natural areas subject to impacts related to level changes;
- Degraded natural bank;
- Semi-natural bank, little artificialized;
- Artificial bank;
- River mouths.

- a) Description
- b) Project design
- c) Design criteria
- d) Execution instructions
- e) Environmental effects
- f) Maintenance
- g) Cost items

Technical sheet: Natural areas subject to impacts related to level excursions

- The actions that can be implemented in these types of areas are: protection, maintenance of the naturalness of the area, maintaining its biodiversity, and the possible increase of natural areas in the area behind the riparian zone in the event of significant artificialization;
- An example of a typical intervention for this type of area is the one carried out by the company Oikos - Consulenza e Ingegneria Ambientale Sagl, for the naturalistic enhancement of the shore of Lake Ceresio near the mouth of the Scairolo stream, near the Pian Casoro nature reserve in Barbengo (Lugano) during the winter of 2007-2008.



The aim of the project was to reorganize the area, redefining and clearly separating the spaces for public use and the tranquil spaces for nature, enhancing them.

Technical sheet: Degraded natural bank

- A degraded natural bank is considered as a bank or a section without the presence of resection and/or reinforcement interventions through classical engineering works and at the same time without the typical lacustrine vegetation, or again if there are invasive plant species or signs of erosion on the bank;
- The intervention can include the planting of typical aquatic and riparian vegetation species based on the steepness of the bank and the substrate, the surrounding characteristics and the human use of the area;
- An example of a coastal redevelopment project aimed at increasing the reed bed in a specific area of Lake Comabbio, for this type of area, is the one carried out near the Varano Borghi plant nursery in 2007 by the company Blu Progetti SA.



The aim of the project was to redevelop a stretch of shore by planting new reeds using bank rollers.

Technical sheet: Semi-natural bank, little artificialized

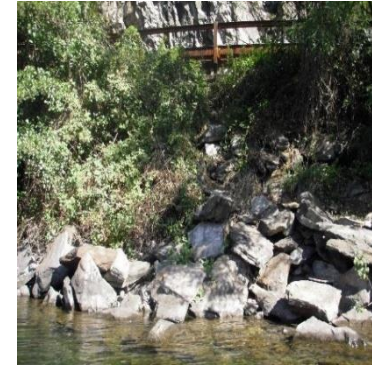
- This type of shoreline includes all those areas subject to human intervention aimed at "light" tourist, recreational, or infrastructural use that do not completely disrupt the environment but still cause pressure and impact. There are also areas that have spontaneously "renaturalized" after the impact has ceased, but where invasive vegetation has taken over the native vegetation;
- Retreating coastal/riparian ecosystems to face higher average levels is still possible, as is reconnecting the shoreline with the riparian area. Aquatic vegetation restoration interventions are also possible, as are actions to improve/expand beach areas;
- An example of an intervention in this type of area is the expansion of a public bank by filling it with natural alluvial material to create a new riverbed and a new reed bed. This project was carried out at the mouth of the Cremignone stream in Muzzano in 2015 by the company Oikos - Consulenza e Ingegneria Ambientale Sagl.



The aim of the project was to increase the surface area of the existing reed bed and improve the diversification and succession of riparian vegetation.

Technical sheet: Artificial bank

- Those artificial and impacted banks were considered where intervention is still possible, even if only partial, to renaturalize and reconnect the coastal areas with the riparian ones;
- A redevelopment/renaturalization of the bank with the reconversion of the bank defenses even in the event of erosion phenomena, would bring benefits to the biocenoses of the coastal areas;
- As an example of a possible action for this type of area, we report a bank consolidation project on an artificial shoreline, replacing an old reinforced concrete wall with a naturalistic engineering work. The project was carried out in Costa Volpino, on Lake Iseo, in 2022 by Blu Progetti SA.



The aim of the project was to consolidate the bank and improve its ecological function by diversifying the contact area between the water and the emerged bank.

Technical sheet: River mouths

- The presence of a river mouth is a highly dynamic element, both hydrologically and morphologically, characterized by high biodiversity. The possibility of maintaining or restoring a natural environment in this context is of particular interest for both the river/stream and the lake;
- Once the hydromorphological characteristics of the mouth area have been defined, it is possible to define and plan redevelopment, renaturalization and/or protection interventions;
- The example reported in the document describes a naturalistic restoration intervention at the mouth of the Brima stream, near Piazzale Torre in Ascona, carried out in the period 2019 – 2020 by the company Dionea SA – Consulenza ambientale, pianificazione, Ingegneria forestale.



The aim of the project was to reopen the final stretch of the Brima stream and revitalize its mouth into the lake from a naturalistic and landscape perspective.



Thank you for your attention