OPERANDUM at a glance

Research for a more resilient Europe

OPERANDUM is a European research project that aims to demonstrate the efficacy of **sustainable solutions** inspired by nature to **adapt territories** to hazards derived from **extreme weather events**, such as floods, droughts, landslides and storm surges, making human communities more resilient to climate change.

Nature-Based Solutions Adapting landscapes to climate change

The frequency of severe hydro-meteorological events is rising in many regions of the world as a consequence of **climate change**. Society must be ready to make landscapes more resilient. **Nature-Based Solutions (NBS)** are inspired and supported by nature and provide environmental, social and economic benefits, while helping to **build resilience against climate change**. OPERANDUM has been built to deliver **tools and methods** to demonstrate the efficacy of a variety of **locally-adapted** NBS, involving **multiple stakeholders** in the process, such as citizens, associations, business players and policy makers.

The Geospatial Information Knowledge Platform

The project offers a **Geospatial Information Knowledge Platform** (GeoIKP) as an online **open hub** to exchange knowledge about Nature-Based Solutions. This way, OPERANDUM provides the basis to strengthen **adaptation policies** whilst boosting **new business opportunities** to build more resilient landscapes and communities.

Find out more

- www.operandum-project.eu
- ☑ info@operandum-project.eu
- www.geoikp.operandum-project.eu

The project in numbers

International Open-Air Labs 10 areas to examine Nature-Based Solutions

OPERANDUM **tests the efficacy** of multiple NBS through 10 Open-Air Laboratories (OALs) distributed across the world. Based on the concept of **living lab**, the OAL is an original multidisciplinary framework that connects research institutes, enterprises and stakeholders to co-design, co-develop and co-deploy NBS. The OALs provide the framework to build **scientific evidence** of the efficacy of the NBS to mitigate the impact of hydro-meteo hazards, thereby enabling their replication and upscaling in other regions.



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ITALY Panaro river







cmcc

Panaro River

An OAL to test solutions against floods

This Open-Air Laboratory is located in the river Panaro, a tributary of the Po river in the **province of Modena** (Northern Italy). The Panaro basin is a **populated area** that holds many industrial and agricultural activities.

However, they are threatened by a **high risk of flooding**, which could be consequent to the collapse of the earthen embankments in case of extreme events. The risk of damages to the exposed elements is exacerbated by the vulnerability of the infrastructures and the lack of flood proofing of the properties and buildings.



Co-creation of the NBS A whole area involved in the process

From the **early design phases** of the NBS to its **implementation** and **monitoring**, Operandum **collaborates with local stakeholders** and the **authorities of the Po river** (AIPo). The project organises **focus groups** and **meetings** to define technical aspects, the authorization process and the implementation procedure.

If you want to find out the **updated results**, visit www.geoikp.operandum-project.eu

Deep rooted vegetation

An NBS to adapt areas to floods and soil erosion

Operandum has planted on the Panaro riverbank herbaceous species with **deep roots** to **mitigate** the soil erosion that may lead to **collapses** in case of extreme flood events.



1. From 2000 to 2020 there have been **21 flood events** over the moderately critical warning threshold. The main one occurred in 1982, after which a **detention basin** was built upstream of the river.

2. To deal with the risk of flooding, Operandum is planting **deep-rooted vegetation** on riverbank slopes. **This mitigates the erosive action of water flow** and **improves soil resistance**, reducing the instability mechanisms that may lead to the collapse of levees and riverbanks during floods.

3. Twelve species of perennial *cespitose* and *Leguminosae graminoid* grasses have been planted. They are characterised by a **root system** able to reach **more than one meter of depth** within the first vegetative year.

4. The NBS is **continuously monitored** through **sensors** installed at different depths up to three meters below the embankment surface and collect information on **pore water pressure, soil suction** and **water content**.