Permaculture water-retention project near Travo, Province of Piacenza, Italy

Year of issue

2025

Summary

On a 1.2 ha hillside near Travo (Piacenza), a privately funded permaculture retrofit in 2024 installed a contour-based water retention system to rehydrate compact loamy clays and stop erosion. Using site reconnaissance and a functional analysis, the design by the Italian Permaculture Institute placed several 50×50 cm swales on level curves along primary and secondary flow paths, paired with raised beds and berms. Syntropic tree lines, placentas and food-forest bombs introduce layered, successional plantings across fruit trees, a diversified vineyard, vegetables and aromatic herbs. Mulching with wood chips and composted manure protects the soil, reduces evaporation and feeds soil biology.

With 901 mm of annual rainfall and slopes around 10 to 19 degrees, the system is sized for passive capture and infiltration. A 45 m swale is estimated to store about 20,000 L per year, and the overall swale network at least 70,000 L per year, with safe gravity overflows directing surplus to the valley. Implementation emphasised simple earthworks, precise contouring and minimal mechanical inputs, with maintenance limited to grass cutting, light pruning every three years and periodic compost applications.

Early observations show swales performing as intended, no surface erosion or on-site flooding, improved soil moisture near tree lines and clear increases in insects, birds and herb diversity. Some uneven filling occurred during heavy rain and is being addressed through refinements of inlets and overflows. The project targets flood and drought mitigation at site scale, soil and water conservation, biodiversity gains and long service life of at least 50 years, with full retention potential expected within about five years.

Photo Gallery














Location

44.86246, 9.545366

Sector

Agriculture

Installation Date

2024

Implementation status

Completed

Contact

Italian Permaculture Institute

Overview

Location of the project

Hills near Travo, Province of Piacenza, Italy.

Sponge measures implemented in the case study

Keyline design

Swales

Infiltration Trenches

Mulching

Objectives

Soil erosion control

Rainwater harvesting and infiltration

Biodiversity and biomass increase

Mitigation on slopes during extremes.

Involved partners

Authority type	Authority name	Authority role	Comments	Authority responsibility
Research institute / University	Italian Permaculture Institute	Determination of design details of the measure	design and implementation	Responsible
Private property owners	Zucchetti family	Initiation of the measure	financing and site management	Responsible

Site Information

Climate Zone

Cool temperate moist

Temperature (°C)

12.80 °C

Elevation range

171 m

Slope range

Significant slope about 10.30° to 18.78° (≈18 to 34 %).

Vegetation class

Former walnut grove; now fruit trees, vineyard, vegetables, aromatic herbs.

WFD Ecological status

Good

WFD Chemical status

Good

Water quality status

Spring water is conveyed to a cistern, then transported; no status assessment.

Design and Implementation

Project scale

Micro

Project scale specifications

Site-specific agricultural landscape.

Project area

1.2 ha

Principles

Contour swales intercept primary and secondary runoff paths and spread water along slope to infiltrate compact clays
A 45 m swale of 50×50 cm stores about 20,000 L per year; the swale system is estimated to capture at least 70,000 L per year
Tree rows, vineyard trees and placentas increase roughness, shading and litter for soil biology; mulching reduces evaporation.

Factor constraints

Limiting: slope and high soil compaction reduce infiltration
Favourable: clear contouring and gradients allow swales and tree lines on level curves.

Financing

Total cost

30000.00 €

Total cost information

Earthworks for swales and beds

Tree and plant purchase

Compost and mulch

Labour.

Financing authorities

Authority name	Type of funding	Comments	Financing share
Zucchetti family	Private funds	landowner	100 %

Compensations

No

Policy and Governance

Policy description

Mitigating soil erosion on sloped, compacted clays; not linked to a formal EU directive.

Land ownership

Private (Zucchetti family)

Part of a wider plan

No

Public consultation

No

Has contractual arrangements

No

Impacts and Monitoring

Monitoring System

Monitoring parameters

On-site observation

Soil microbiology checks

Spade tests for organic matter depth

No modelling.

Maintenance

Maintenance requirements

Grass cutting Rare pruning every 3 years Compost application.

Impact Assessment Methodology

Biophysical impact assessment method

Qualitative assessments only.

Biophysical impacts: Hydrology

Information on retained water

Swales worked as intended

No erosion or flooding observed after implementation

Runoff eliminated on site, water directed safely to nearby valley.

Biophysical impacts: Biodiversity

Information on improved biodiversity

Significant increase in diversity of insects, birds and herbs

Biophysical impacts: Water & Soil Quality

Information on water quality overall

Runoff reduction and erosion control reported qualitatively; rehydration of surface soils.

Biophysical impacts: Others

Information on other biophysical impacts

Climate regulation and carbon sequestration co-benefits.

Lessons Learned

Key lessons

On compact clay slopes, small contour swales plus heavy mulching and dense syntropic plantings rapidly cut surface runoff and kick-start soil biology. Correct sizing and placement on level curves are critical. Raised beds upslope of swales slow flow further. Keep design passive and gravity-based to minimise inputs and maintenance. Expect some uneven filling early on and plan safe overflows at swale ends.

Barriers

Barrier type	Barrier role	Comments
Other	Secondary barrier	High soil compaction
Other	Secondary barrier	Slow grass regrowth on disturbed ground

Drivers

Driver type	Driver role	Comments
Organisation committed to it	Main driver	Owner goal of ecological food production and soil erosion control

Success factors

Success factor type	Success factor role	Comments
Existing staff and consultant knowledge	Main factor	Passive design on contour, adequate swale capacity and overflow placement
Other	Secondary factor	Use of placentas and aromatic strips to accelerate soil recovery.

Cost effectiveness

Low input after establishment; long-term benefits exceed initial investment.

Transferability

Applicable in Mediterranean and temperate climates with clay soils and sloped terrain facing runoff issues.

Sources

Sources

Travo project design document

Travo project analysis

Travo site observation and soil assessment