4th Mediterranean Plant Conservation Week

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Drone-based assessment of hydrological microsite-scale processes conditioning post-mining restoration success.

Luna Morcillo, Diana Turrión, David Fuentes, Alberto Vilagrosa

CEAM
FUNDACIÓN CENTRO DE ESTUDIOS AMBIENTALES DEL MEDITERRÁNEO

València, Spain. 3-27 October 2023.

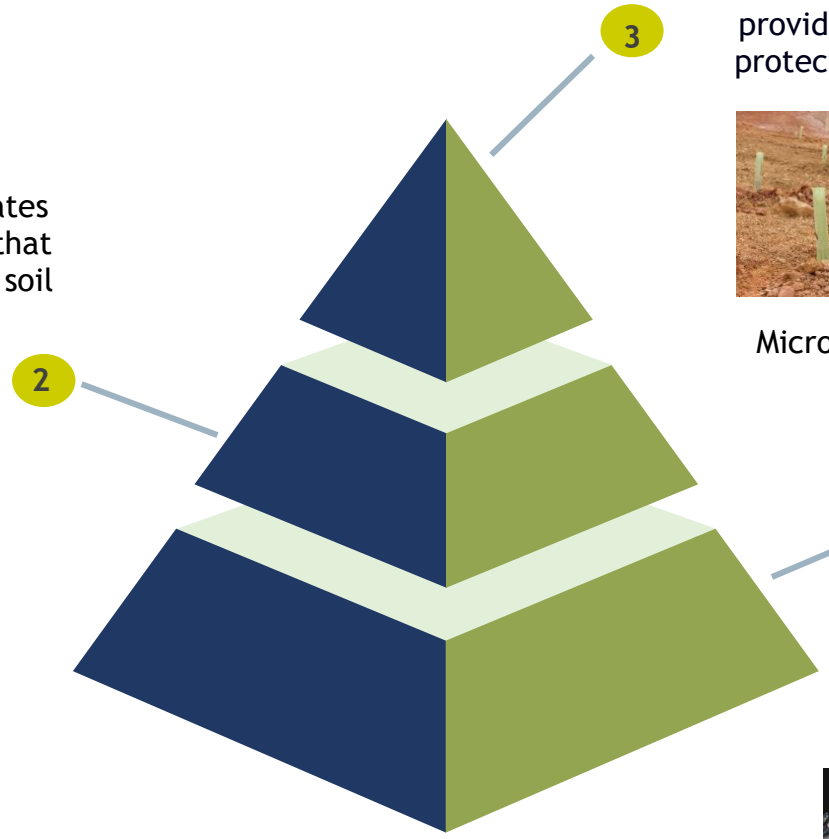
RESTORATION PROCESS

Establishing vegetation

Restoring vegetation cover that provides environmental services (soil protection, biodiversity and C-stock).

Micro-catchment

Diversity



Soil reconstruction

Mixture and/or input of substrates (colluvium, inert and organic) that rebuild a functional and stable soil

Creation of suitable substrates

Land restitution

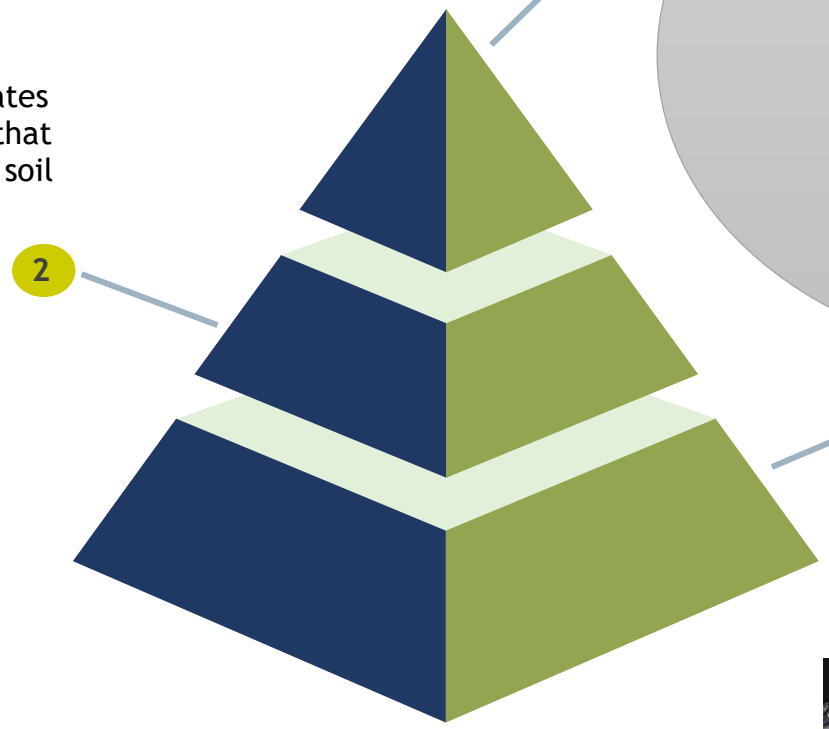
The process of designing and building landforms that mimic the morphology and dynamics of natural ones, where the original relief is transformed.

Slope stabilisation and landscape integration

GeoFluv™

RESTORATION PROCESS

ECOLOGICAL RESTORATION



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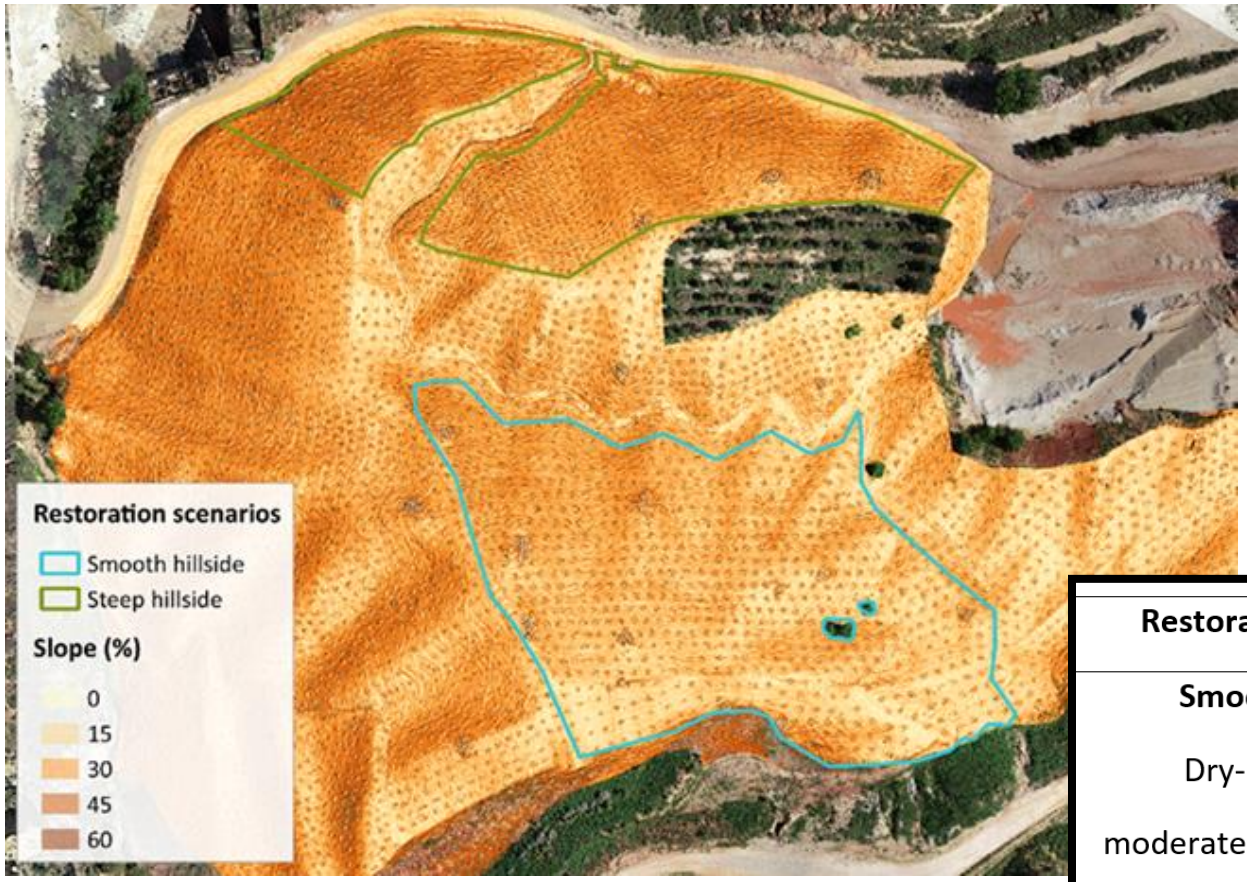
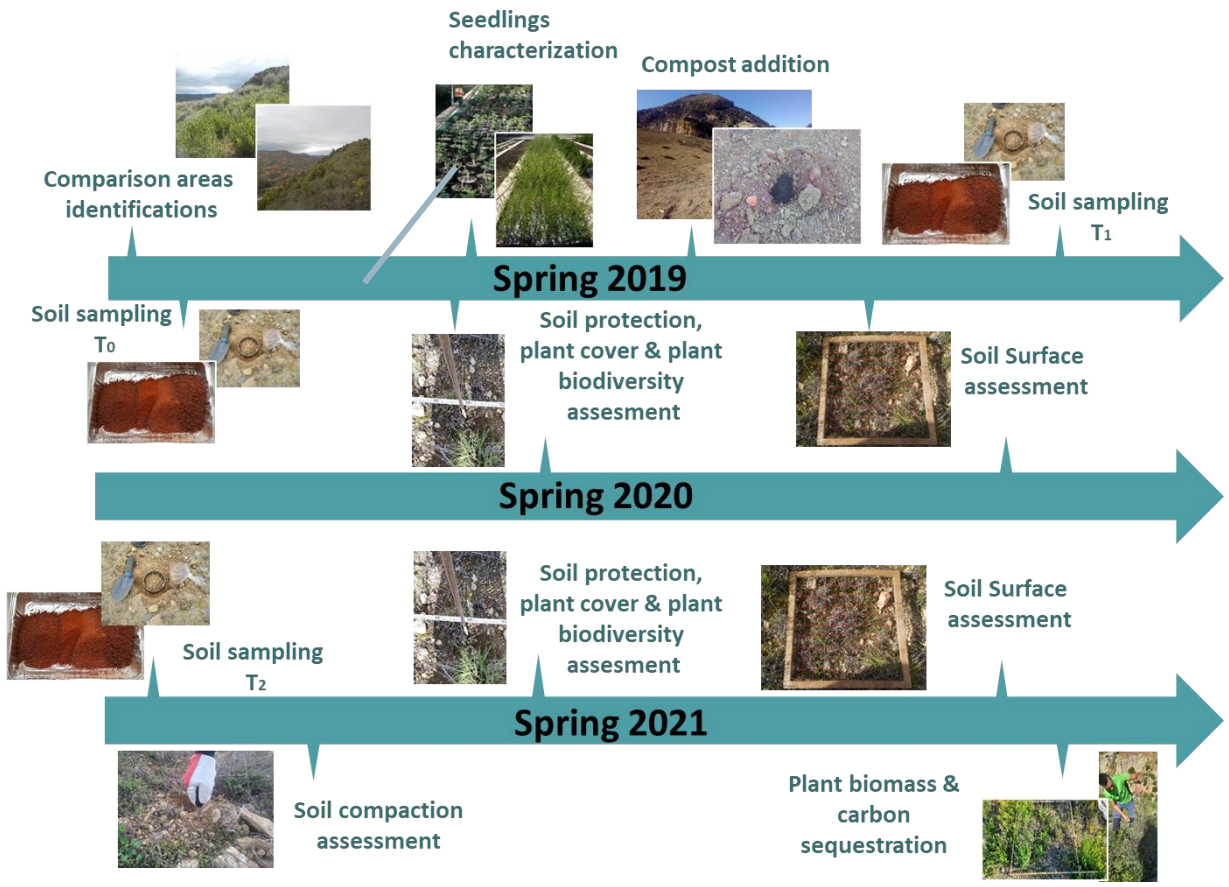
RESORATION ACTIONS

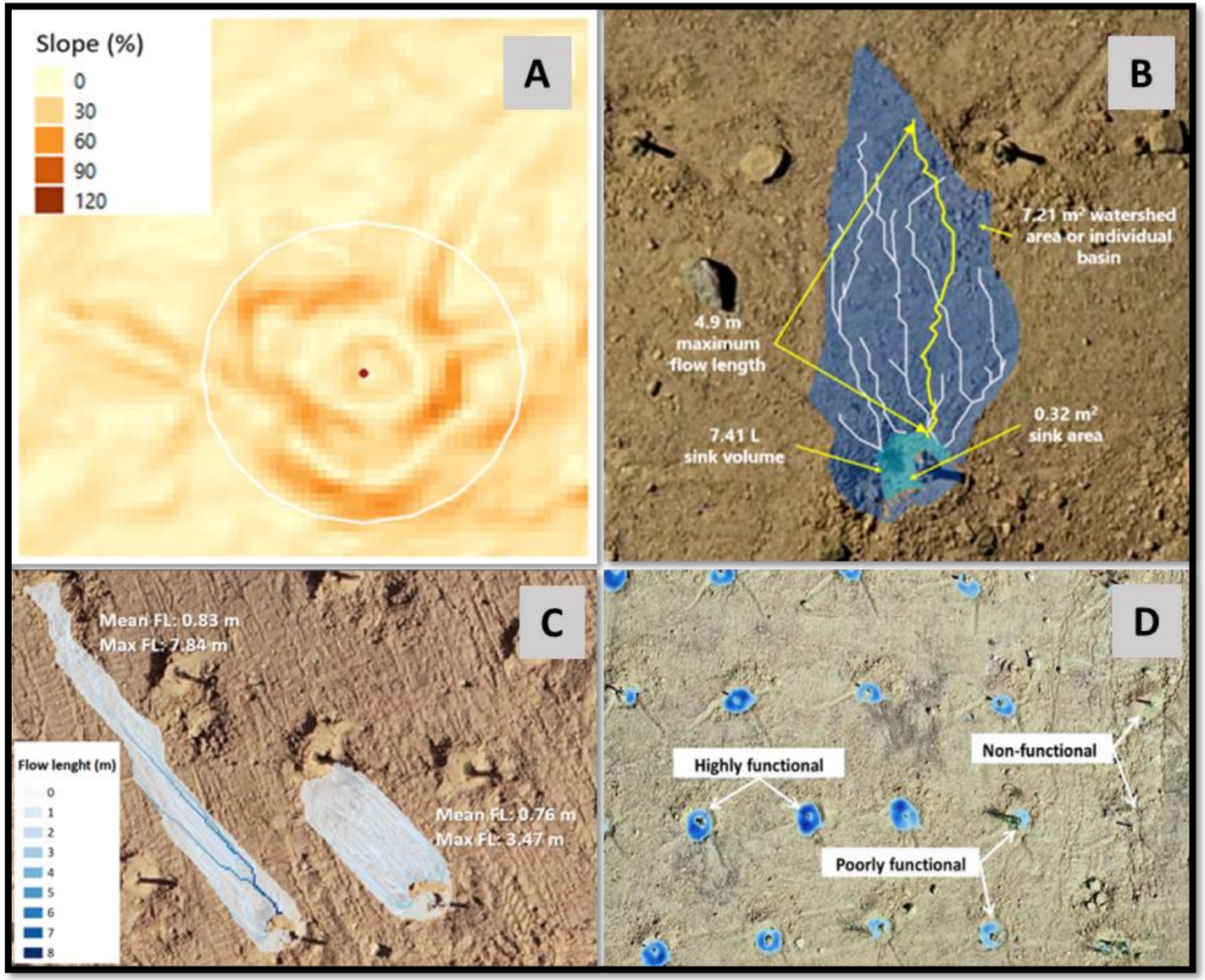


Restoration scenario	Surface (Doses)	Plantation (Density/Doses)
Smooth hillside Dry-mild areas, moderate slopes (15-30%)	- Sowing (100-150 kg seeds/ha) - Compost (20 Tn/ha)	- Standard holes + Microcatchment (600 holes/ha) (722 planting holes; 1.08 ha) - Compost (2 kg/hole; 125 Tn/ha)
Steep hillside Dry areas (sun-exposed), Steep slopes (>30%)	- Sowing (100-150 kg seeds/ha)	- Standard holes (1,000 holes /ha) (766 planting holes; 0.76 ha) - Compost (2 kg/hole; 125 Tn/ha)

MONITORING PROGRAM



MICRO-SITE SCALE HYDROLOGICAL PROCESSES



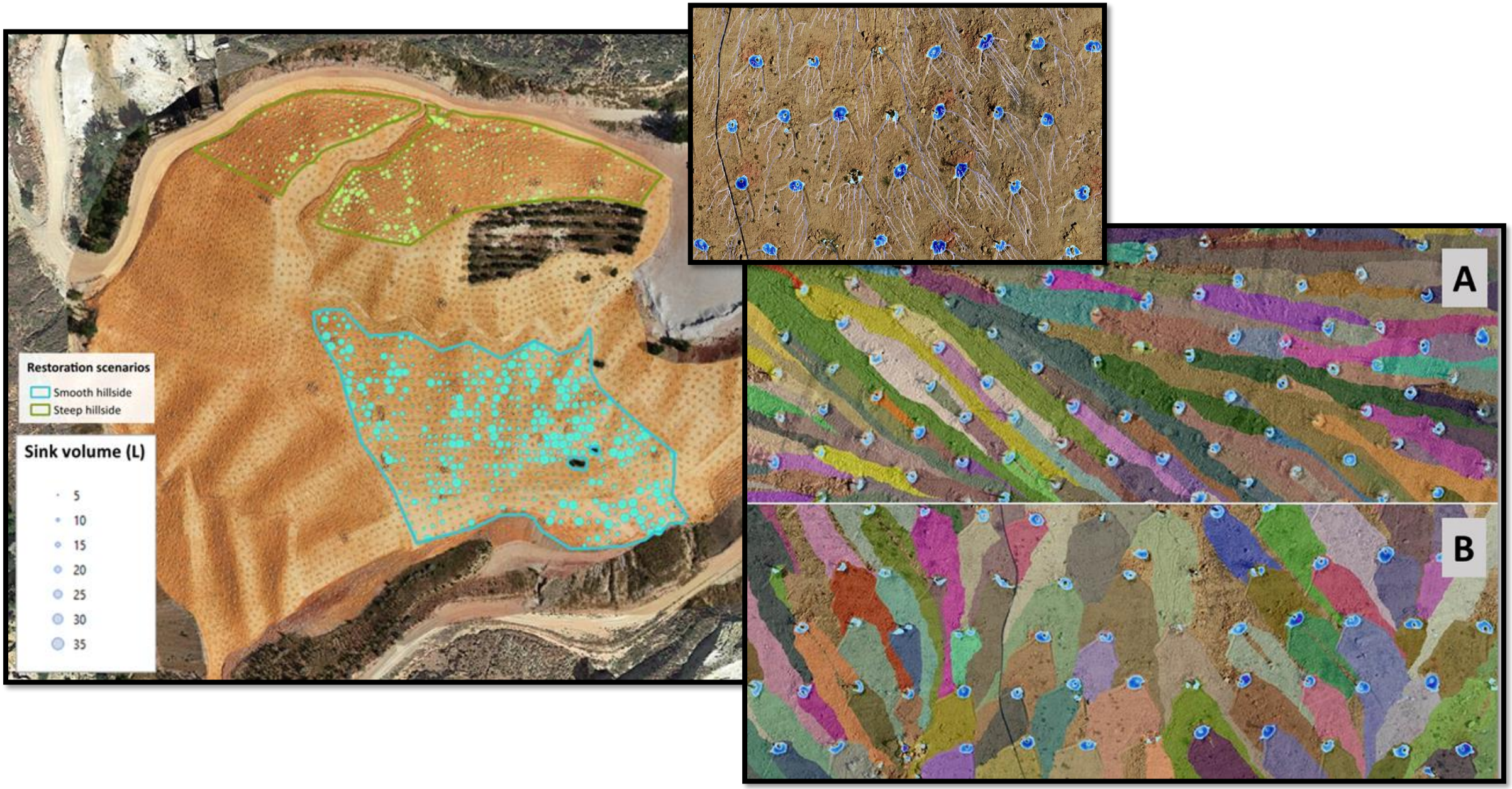
A) Planting hole microtopography

B) Individual catchment area

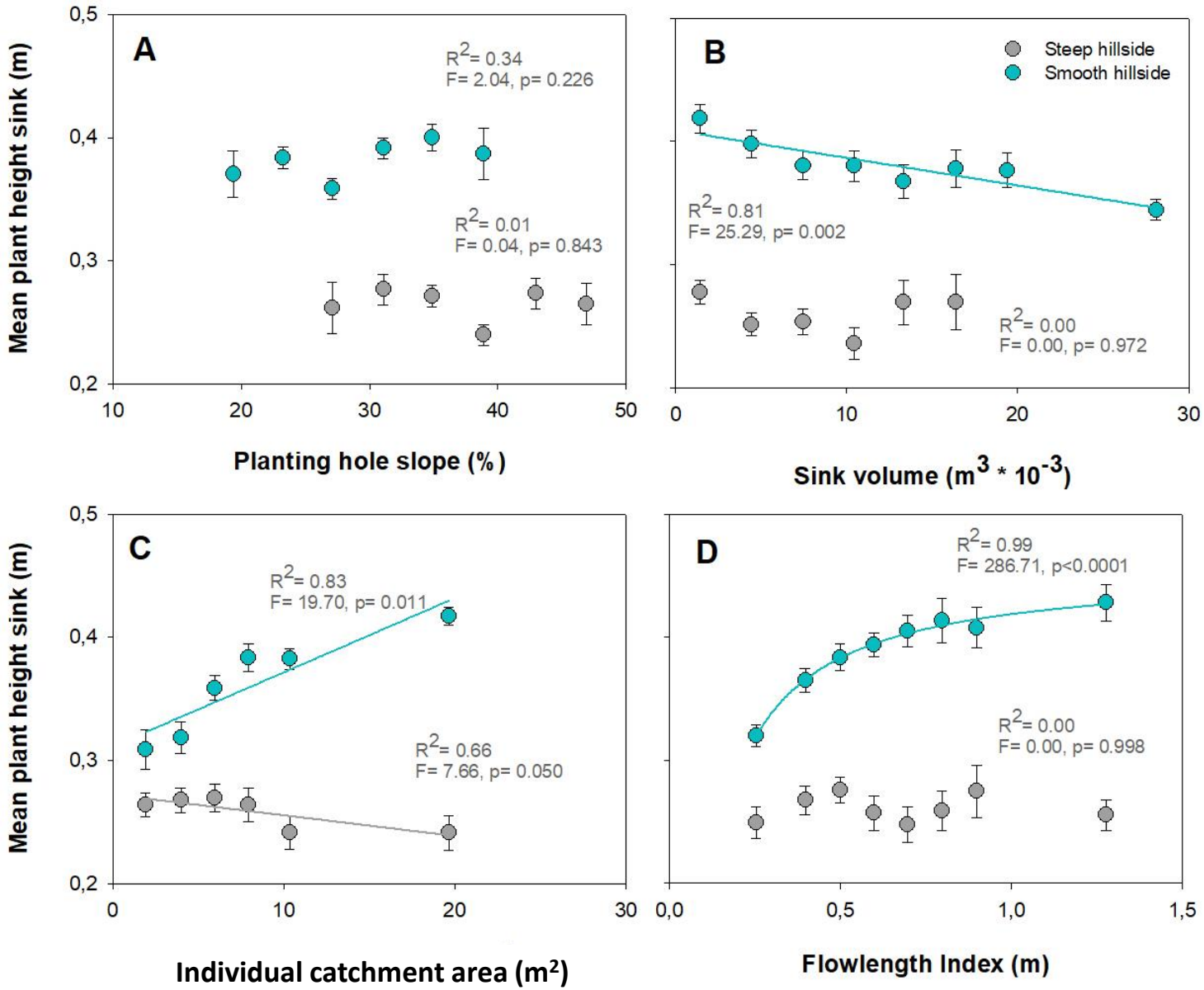
C) Flow Length calculation

D) Planting hole functionality

MICRO-SITE SCALE HYDROLOGICAL PROCESSES



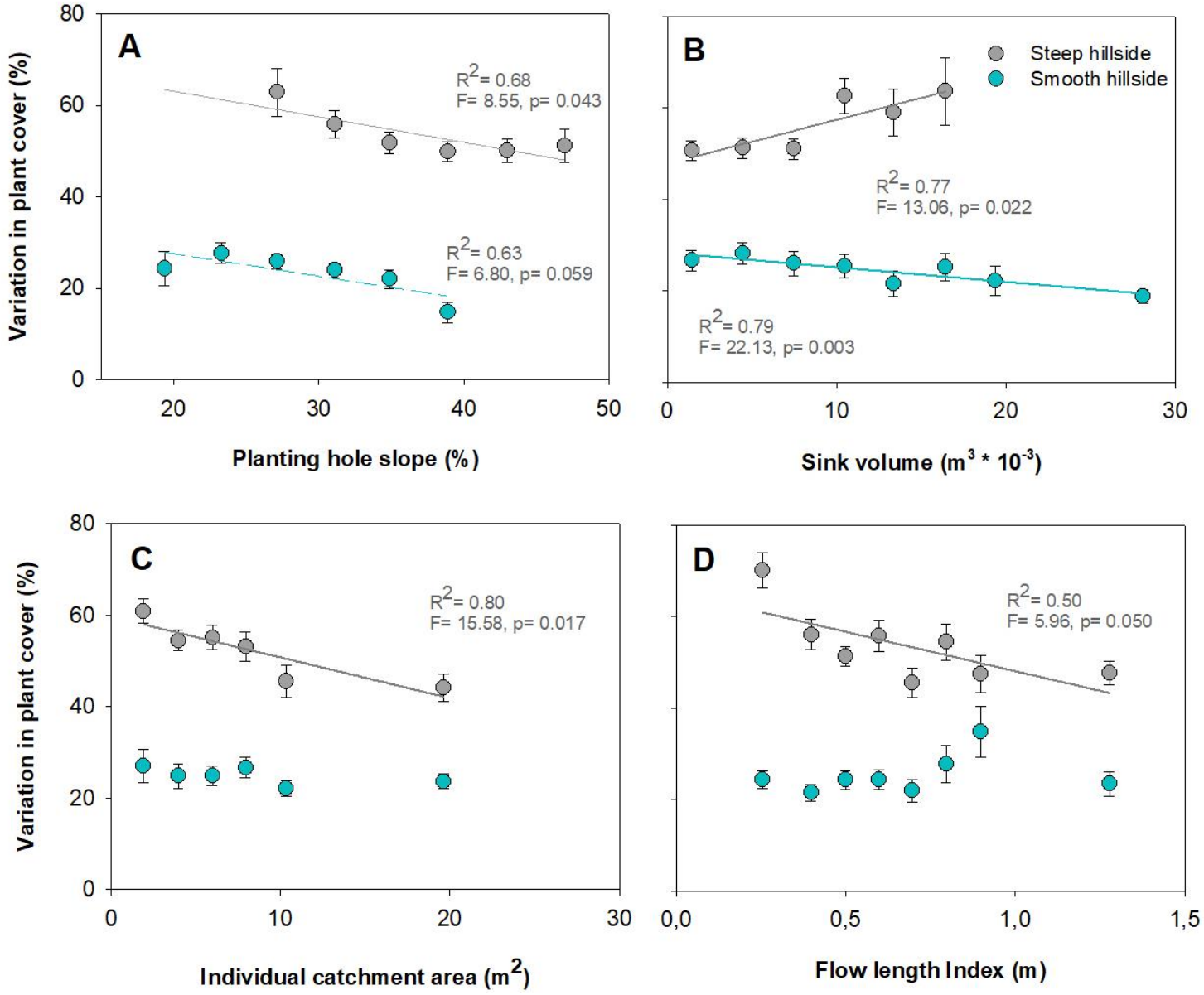
DIFFERENCES AMONG RESTORATION SCENARIOS



- All microsite-scale variables differed among RSs.
- Sink volume, Individual catchment area and Flow-length influenced plant height in Smooth hillside.

Morcillo et al., *in press. J.Environ. Manage.*

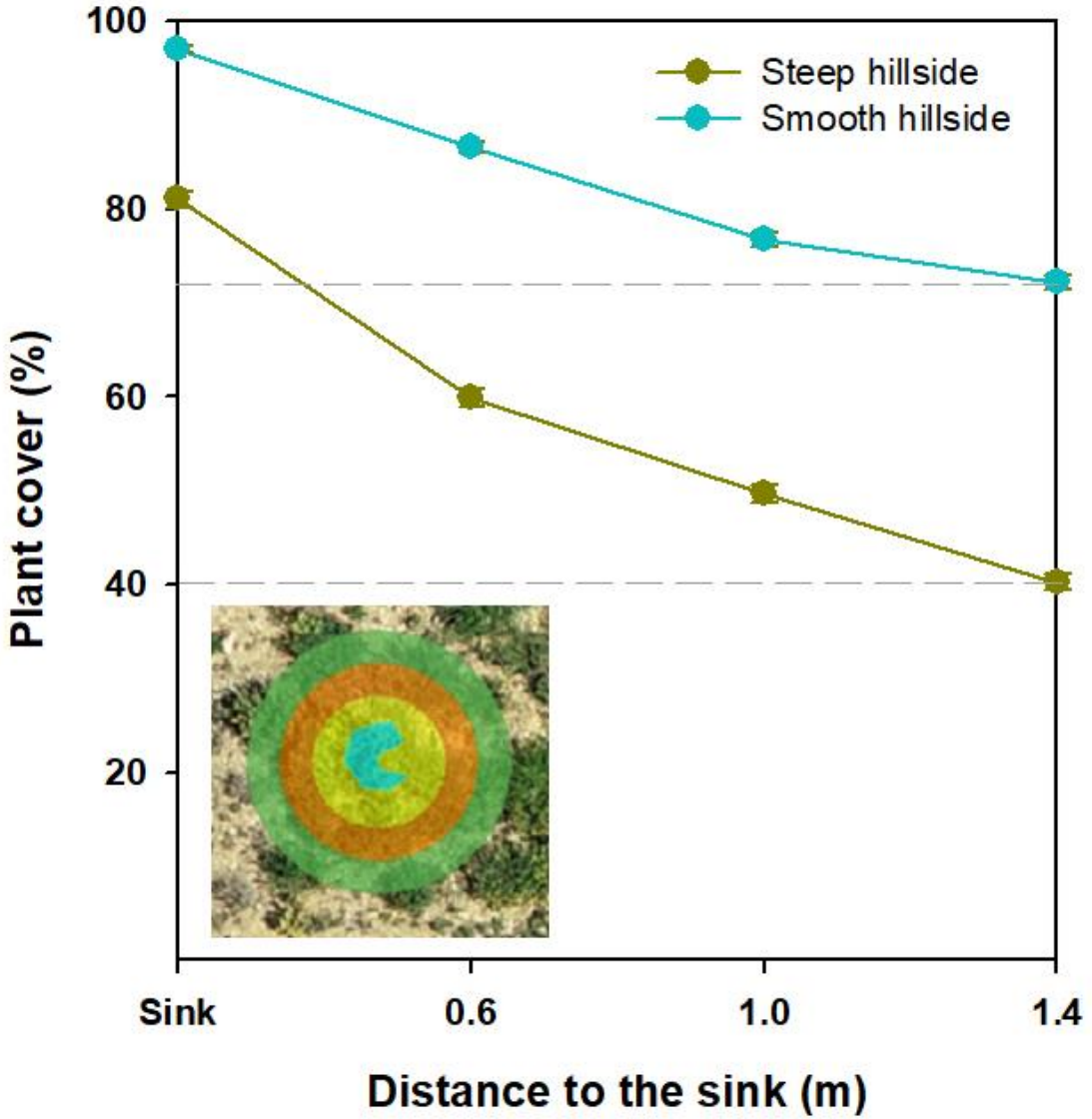
DIFFERENCES AMONG RESTORATION SCENARIOS

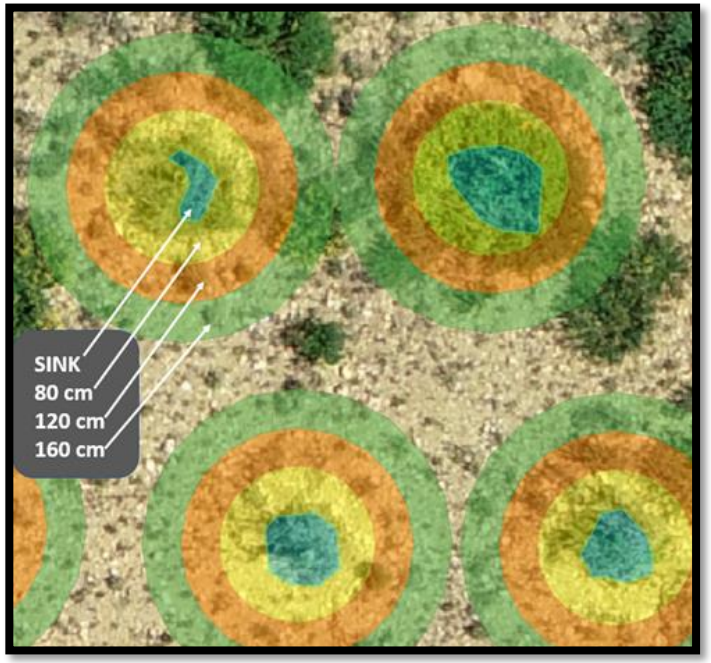


- Plant cover was highly affected by all microsite-scale variables in the Steep hillside.
- In Smooth hillside plant cover was negatively affected by sink volume.

Morcillo et al., *in press. J.Environ. Manage.*

DIFFERENCES AMONG RESTORATION SCENARIOS





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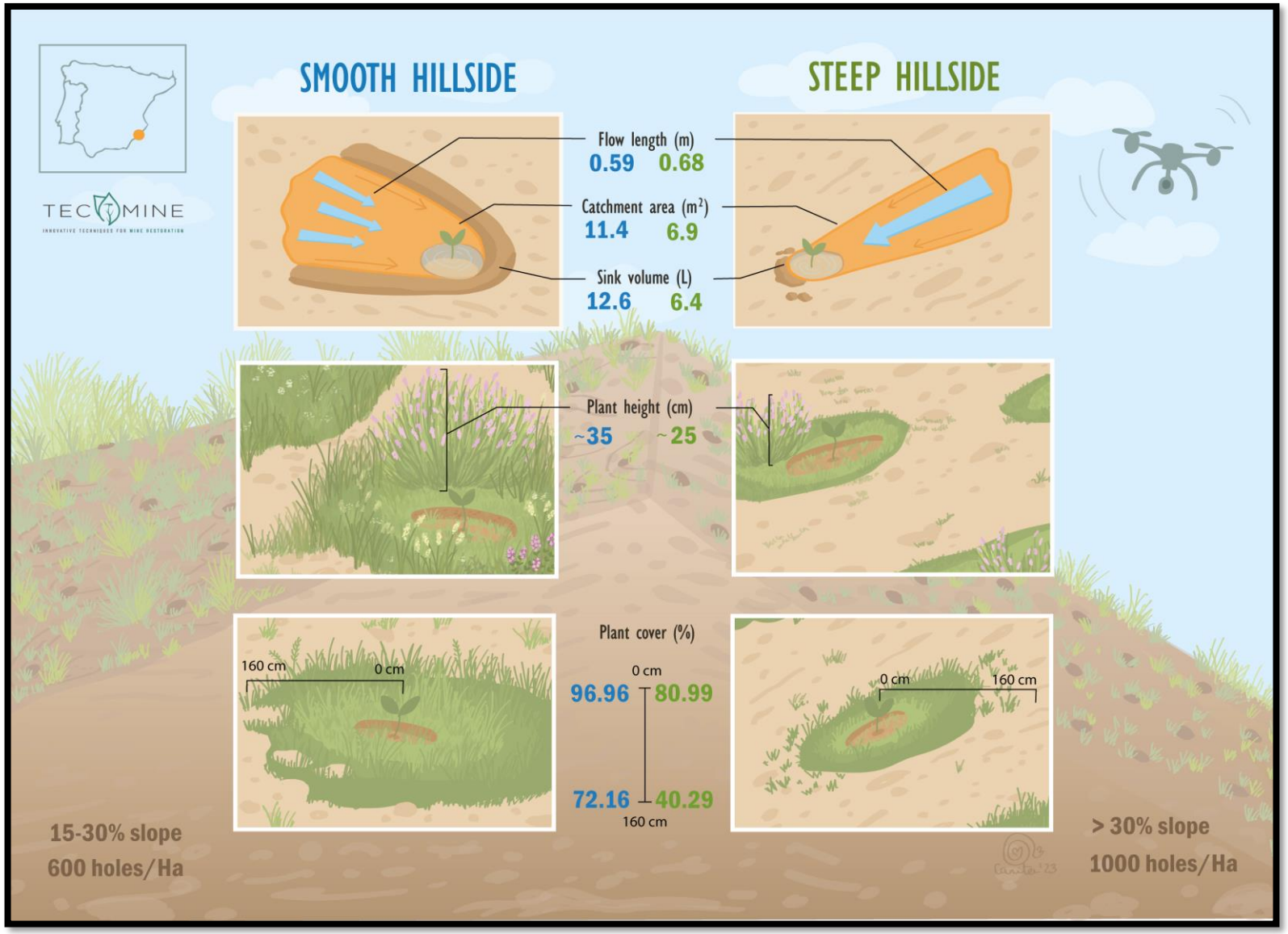

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HIGHLIGHTS

- High-resolution images prove very effective in assessing restoration actions.
- Hillside topographic slope strongly influences microsite-scale processes.
- Effectiveness of planting holes as sinks varies among restoration scenarios.
- Hydrological processes differently interact to determine sink functionality.

THANK YOU!

sustainability

MDPI

Article

Innovative Techniques for Landscape Recovery after Clay Mining under Mediterranean Conditions

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TECMINE
INNOVATIVE TECHNIQUES FOR MINE RESTORATION

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