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Bringing new life to old mines

Mining provides the EU with crucial raw materials, but its effects on landscapes and ecosystems are drastic. A LIFE project in the Valencia region is testing new techniques to restore inactive mines and allow biodiversity to return.

The LIFE TECMINE project is changing the way that inactive mines are restored so that these areas can support sustained biodiversity.

Extractive mining in the EU remains economically valuable, and mines support the survival of small, sometimes isolated communities.

But many mining operations are conducted in ecologically sensitive and valuable forest areas. Mining has drastic environmental effects – it fundamentally changes the landscape and destroys local ecosystems.

Current restoration practices ineffective

While traditional restoration of inactive mines does take place, it tends not to solve the problems of severe erosion, damage to nearby roads from heavy rain or standing water, visual impacts on the areas, and fauna destruction. This is in part because efforts can be too focused on creating short-term visual improvements rather than achieving long-term sustained biodiversity.

The LIFE TECMINE is showing mining companies, forestry administrations, conservation experts and other interest groups that

- alternatives that consider morphological and ecological principles can make a valid contribution to conservation
- new restoration practices can be replicated in the rest of Spain and beyond

Replicability should be possible because project activities are based at 3 siliceous sand, kaolin and clay mines in Ademuz, and similar terrain is found in other parts of the EU.

Modelling erosion

In January, the project hosted students from a Master's programme on restoring ecosystems. The students came from Spain and beyond – including Colombia, Peru and Israel – to see how a restoration technique called GeoFluv™ is being used at the Fortuna mine in Ademuz. GeoFluv™ is a method to manage water flows to reduce soil erosion, developed with a modelling tool called Natural Regrade.

The method is proving so useful because technicians can develop complex land and water flow modelling. Based on this, land can be reshaped to

- maximise landform stability and minimise soil erosion so vegetation cover can be supported
- help water flows, which in turn allow ecological connectivity
- result in a broad range of complex landforms so that vegetation can benefit from a variety of physical conditions – from drier to humid

14 people have been trained in how to understand and apply the GeoFluv™ Natural Regrade technique to help design natural landforms.

Better water management

The TECMINE team is also testing other ecological restoration techniques that can optimise local environmental conditions and recycle organic waste, explained Juan Uriol, project manager from Generalitat Valenciana.

"We are going to build small catchment areas to direct runoff to the seedlings," explained Mr Uriol. "We will use composted sewage sludge and organic waste, including recycled material from the forest. We'll also apply an accurate plant species selection from Natura 2000 habitats according to the area's micro-environmental conditions."

These 9 000 plants from 31 different species will create 8 new habitat types, including endemic black pine forest, juniper and pseudo-steppic grassland [pdf].

"This is an innovation compared to classic reforestation", added Mr Uriol. "Usually, entire areas were reforested with the same techniques and species. This technique should minimise the irrigation needs of seedlings, thanks to better management of rainfall and runoff collection."

Richer earth and new ponds

Part of the runoff water will be used to create a new pond and provide watering or breeding spaces for species observed in the region. These include water snakes and lizards, dragonflies, ibex goats, roe deer, wild boar and foxes.

Reduced runoff results in better quality soil, increased carbon sequestration and reduced local water stress – all vital improvements needed in Mediterranean areas where seasonal weather variation can be wide.

Industry-driven replication

The tangible benefits from the project are rippling out within the project partners. Technicians from both the Belgian mining company Sibelco and the public environmental company Vaersa are sharing the new practices with their industry partners and with national administrations. Together, the organisations have drafted future restoration projects which partially or completely replicate the Tecmine project.

Funds are already earmarked for 2019 for a replication project within the Valencian government that will involve Vaersa.

"There has been really extraordinary collaboration in this project," said Mr Uriol. "This is the best way to replicate these practices and restore mines successfully."

Tecmine is also working with the LIFE project The Green Link and has made use of some methods developed in the LIFE project ECOQUARRY.

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