

Science for Environment Policy

Soil erosion: moss helps land to recover from fire damage, Portugal

Moss helps prevent soil erosion on fire-damaged land, a Portuguese study suggests. The researchers analysed water that ran off from post-fire hillsides. They found less sediment and organic matter in run-off from patches of land with high levels of moss than from those with low levels of moss. Moss quickly establishes itself on land after fires, so the study suggests that land managers could take advantage of its restorative effects by deliberately encouraging its growth.

Layers of moss provide many benefits to soil. For instance, they can help control soil moisture and temperature, improve soil stability, and fix carbon and nitrogen in the land rather than the atmosphere. This new study, conducted under the EU RECARE¹ project, now suggests that they could also help to prevent soil erosion in land that has been devastated by fire. This, in turn, may limit the loss of nutrients from soil, and reduce the risk of desertification.

The researchers set up six small plots of land (0.25m²) at a hillside eucalyptus plantation in central Portugal that had been moderately damaged by wildfire. Over the course of one year immediately following the fire, they regularly monitored the ground cover (e.g. moss, stones, bare soil) in the plots, and the amount of rainwater that ran off the plots. They also measured the levels of soil sediment and organic matter in the run-off.

At the start of the study, the plots were half covered with ash and charcoal. These gradually disappeared and, in their place, moss started to grow. Stones, bare soil and some other plants also appeared — but moss (mostly *Funaria hygrometrica*, or 'cord moss') was the dominant plant. Some plots had much more moss cover than others, which allowed the researchers to compare its effects on run-off, sediment loss and organic-matter loss.

The two plots with the highest levels of moss cover had more run-off than the plots with lower levels of moss cover. This may be because the moss prevented water from sinking into the soil. However, the run-off from high-moss plots had significantly lower concentrations of sediment and organic matter.

Based on their results, the researchers calculated that plots with moss cover of over 67% would reduce sediment loss by 65% (0.4 tonnes per hectare of land) during the rainy season (January–May), compared to a moss cover of 50%. Loss of organic matter would be reduced by 34% (0.15 tonnes per hectare).

Although this was a small-scale and short-term study, it is significant in that it was the first to measure the effects of moss on run-off, sediment and organic matter losses in fire-disturbed soils. It provides clues as to how moss could be used deliberately to manage post-fire land and restore ecosystems.

Mosses have specific habitat needs and cannot grow on all types of slope. However, in suitable areas, land managers could encourage their quick growth and spread to help the area to recover — a restoration tool that has not been used before.



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