



## The governance of soils and Forest Fires: the hidden hand of hydrophobicity

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The relationships between erosion, fire and desertification are paradoxical in the Mediterranean. In 1994 a workshop was organized that reviewed all of the then current research findings. The unexpected conclusion, which still holds today, is that, except under special circumstances fire tends to improve the ability of soil to retain water and increases its fertility. Mediterranean forest trees and shrubs have adapted or altered soil properties so that water is usually trapped in the soil. The volatile oil in the leaves of Mediterranean vegetation make it very flammable, which to many of us, must have sounded contra-dictionary at first sight, but is now perceived as an inherent fire adaption strategy of the ecosystem. These same oily substances from the leaves and litter are a main source that can lead to hydrophobic soil layers in arid/semi arid areas. Soil hydrophobicity characteristics tend to change through the seasons; hydrophobicity tends to increase in dry soils, while it decreases or vanishes following precipitation or extended periods of abundant soil moisture.

The common consensus on soil hydrophobicity is that it reduces infiltration, increases runoff which leads to higher erosion rates to name just a few. These aspects have been investigated and are well documented, though many research challenges remain in the field of soil hydrophobicity.

To govern a soil one needs to have an approach. An approach is based on a certain perception. The perception the authors share is that hydrophobicity reduces infiltration when looking from the atmosphere to the soil. When looking from the soil to the atmosphere soil hydrophobicity reduces evaporation. The Mediterranean climate has hot and dry summers and this is the season with the highest risk on forest fires. Warm and dry periods favour soil hydrophobicity. The mechanisms of the ash and hydrophobic layer after forest fires could therefore be acknowledged as a means of water-use efficiency. The hydrophobic layer keeps the scarcely available soil moisture trapped in the soil. The created ash layer functions as a sponge, and when wetted by precipitation, will decrease the water repellency so water can infiltrate.

Forests fires and wildfires generally do not cause erosion in themselves. The main problems are the post fire activities of the community, who are extracting a living from the land and exploiting the situation. Preventing erosion could largely be achieved by keeping people off the land and allowing nature to recover, which generally takes three to four years.