Geophysical Research Abstracts
Vol. 15, EGU2013-1099, 2013
EGU General Assembly 2013

Ash after forest fires. Effects on soil hydrology and erosion

Merche B. Bodí

SEDER Soil Erosion and Degradation Research Group. Departament de Geografia, University of Valencia, Valencia, Spain. merche.bodi@uv.es www.soilerosion.eu

Hillslopes were though to be most susceptible to enhanced hydro-geomorphological responses immediately following burning, with susceptibility declining during the first months or years depending on the soil and vegetation recovery. However, Cerdà (1998) found some indices in that immediately after the fire, the thin wettable ash layer that typically covers the ground could absorb rainfall and prevent or delay the onset of overland flow and associated erosion. Therefore the time lag while ash remains on the ground become of crucial importance to protect the soil after a wildfire. The effect of this ash layer was rarely been considered in detail because ash has often been reduced or redistributed by wind or water erosion before the onset of monitoring and thus the data collection typically begun some weeks or month after the fire. The first papers focussed only on ash and its hydrological effects were published by Cerdà and Doerr (2008) and by Woods and Balfour (2008). The results showed that the soil covered with ash indeed reduced and delayed surface runoff, reduced soil splash detachment and produced lower sediment yield compared to bare terrain. However, these findings arose more questions, as for instance: Why in other research there were indices that ash reduces infiltration? what is the mechanism by which why ash reduces overland flow? The research went further with Bodí PhD. First of all, it was crucial the agreement on the fact that the material "ash" is very variable depending on the original vegetation and the type and temperature of combustion. Therefore ash properties are different between wildfires even and within a fire. This is the main reason of its different effects and thus ash not always reduces runoff and sediment yield. In this way, depending on the nature of ash, it can increase overland flow if it is crusted (usually it contains a high content of calcium carbonate), it is water repellent (with high contents of organic carbon and specially from certain Eucaliptus and Pinus), or if clog soil pores (depending also on the soil type). If ash is wettable, it can store even 80% of its volume and then it will delay and reduce overland flow proportionally to the thickness of the ash layer. Once ash gets saturated, the flow tends to adjust to an infiltration rate similar to the soil itself, or sometimes higher due to the protection of ash that can reduce soil water repellency and soil sealing (Bodí et al. 2011, 2012). Still, many other aspects on ash remain unknown and ash present us more questions like, what it is its role on the carbon cycle? what is the extent of the ahs effects at basin scale? what is the fate of ash and how long it remains in the ecosystem? are there specific effects of ash depending on the ecosystem and so the type of ash?

Acknowledgements
This work was supported financially by a research fellowship (AP2007-04602) from the Spanish Ministry of Science and Innovation (M.B. Bodí) and the projects PT2009-0073 and CGL2010-21670-C02-01.

References
Bodí, M.B., Mataix-Solera, J., Doerr, S.H., Cerdà, A., 2011, The wettability of ash from burned vegetation and its relationship to Mediterranean plant species type, burn severity and total organic carbon content. Geoderma 160, 599-607.
Bodí, M.B., Doerr, S.H., Cerdà, A., Mataix-Solera, J., 2012, Hydrological effects of a layer of vegetation ash on underlying wettable and water repellent soil. Geoderma 191, 14-23
Cerdà, A., 1998, Changes in overland flow and infiltration after a rangeland fire in a Mediterranean scrubland. Hydrological Processes 12, 1031–1042.
Cerdà, A., Doerr, S.H., 2008, The effect of ash and needle cover on surface runoff and erosion in the immediate post-fire period. Catena 74, 256-263.
Woods, S.W., Balfour, V., 2008, The effect of ash on runoff and erosion after a forest wildfire, Montana, U.S.A. International Journal of Wildland Fire 17, 535-548.