Impact on soil degradation factors of changes in rain intensity patterns in southern Spain

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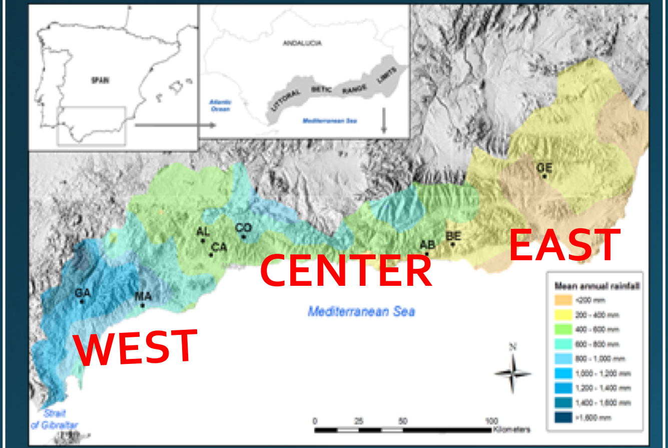
In southern of Spain, the torrential nature of the rainfalls alters the soil water availability for vegetation and, consequently, its spatially and temporally pattern. This fact, combined with the current global warming, raises a modification of the eco-geomorphological processes dynamics in Mediterranean areas.

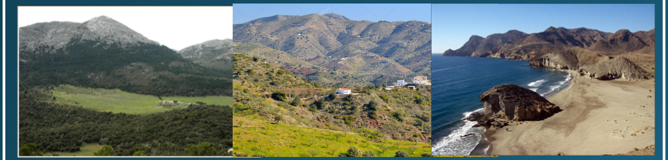
AIM AND OBJETIVES

Aim:

- This study analyzes, the dynamics of the torrential rainfall and their incidence on the soil surface components (SSC) and water availability over the last quarter of the century.
- The study was carried out in the south of Spain along a Mediterranean pluviometric gradient (8 experimental areas with total amount of rainfall values that range between 1.100 and 240 mm/year).



1.100 ← *PRECIPITATION (mm)* → 240



RESULTS FOR SOIL DEGRADATION

A factorial analysis (PCA) has been performed in order to determine the main soil degradation factors and their association with the rainfall pattern.

WEST — CENTER — EAST

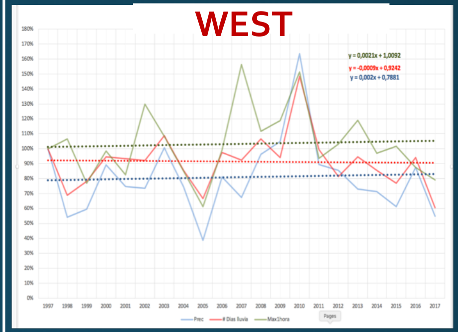
	1.100 mm/y^{-1}	750 mm/y^{-1}	550 mm/y^{-1}	350 mm/y^{-1}	240 mm/y^{-1}
BIODIVERSITY	Quercus suber, Quercus faginea, Quercus ilex, Cistus salvifolius, Erica arborea, Cistus albidus, Phlomis purpurea, Pistacia lentiscus, Calicotome villosa	Cistus monspeliensis, Phlomis purpurea, Retama sphaerocarpa, Calicotome villosa, Daphne gnidium, Lavandula stoechas, Pistacia lentiscus, Chamaerops humilis	Quercus suber, Cistus monspeliensis, Cistus albidus, Phlomis purpurea, Lavandula stoechas, Helychrisum stoechas, Genista umbellata, Chamaerops humilis	Cistus clusii, Lavandula stoechas, Thymus mastichina, Genista umbellata, Thymelaea hirsuta	Stipa tenacissima, Thymus mastichina.
VEGETATION COVER (%)	90	75	65	45	40
CLAY CONTENT (%)	24.2	21.7	20.3	14.9	11
BULK DENSITY	1.06	1.08	1.26	1.31	1.44
AGGREGATE STABILITY (%)	80.6	77.2	73.9	70.9	58.6
SOIL ORGANIC MATTER (%)	11.3	6.5	5.9	2.7	1.6
SOIL ORGANIC CARBON (kg ha^{-1})	35037.7	25939.8	17643.7	9868.5	6392.9
SATURATED HYDRAULIC CONDUCTIVITY (cm h^{-1})	45.1	39.5	19.8	18.7	15.1
CATIONIC EXCHANGE CAPACITY (meq $100g^{-1}$)	33.0	22.4	20.5	8.9	6.6
USLE K Factor	0.09	0.13	0.26	0.38	0.43

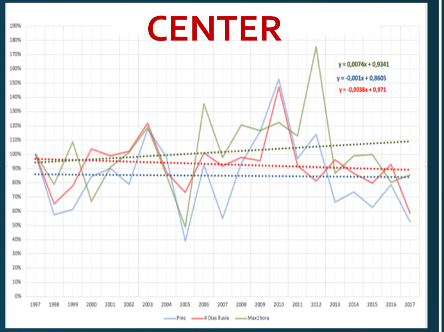
BIOTIC — *KEY FACTORS* — ABIOTIC

- ← → +

SYSTEM VULNERABILITY

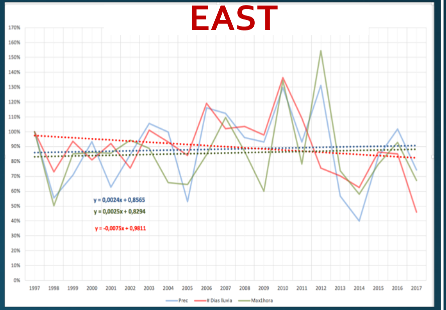
RESULTS FOR PRECIPITATION TREND





In the **West**, the rain tends to increase, while the number of rainy days is reduced.

In the **Center**, the precipitation is reduced, as well as the number of rainy days, while the maximum hourly rainfall increases



In the East rains more, in less days, and with greater intensity.

CONCLUSIONS

The results showed how the dominance of the biotic and abiotic factors was linked to the pattern of precipitation in each experimental site. In semiarid conditions, it implies that abiotic factors acted as the main driver. Besides, it can be stablished to "rainfall threshold" for soil degradation around 500 mm / year. This was explained because of the presence of a higher soil moisture content.