Open areas in patchy ecosystems: key spaces for vegetation survival

Borja Rodríguez-Lozano[1,2*], Emilio Rodríguez-Caballero[1,2], Yolanda Cantón[1,2]

[1]Agronomy Department, University of Almería, 04120 Almeria, Spain; *brl169@ual.es
[2]Centro de Investigación de Colecciones Científicas de la Universidad de Almería (CECOUAL), Almeria, Spain

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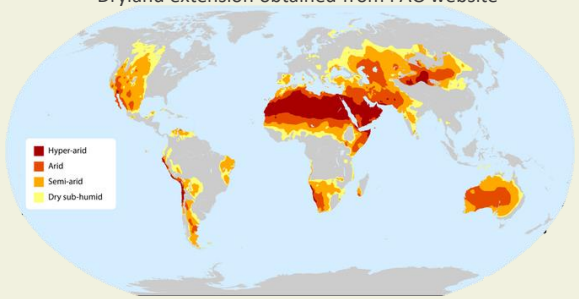
Introduction

- Drylands are the largest earth biome, being water availability the main driver of their ecosystem biological activity.
- Vegetation appears forming patches surrounded by open areas.
- During most rainfalls, runoff is generated in open areas (runoff sources) and redistributed through vegetation patches (runoff sinks), therefore increasing water and nutrients availability for plants.

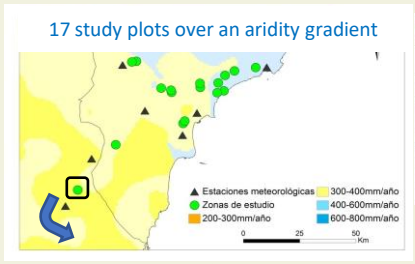
Dryland extensión obtained from FAO website

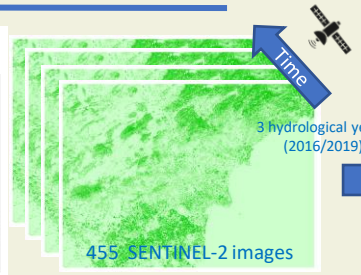


- Run-off redistribution processes determine vegetation productivity and modulate their spatial distribution. Also, it could ameliorate the predicted negative effects of climate change over these ecosystems.

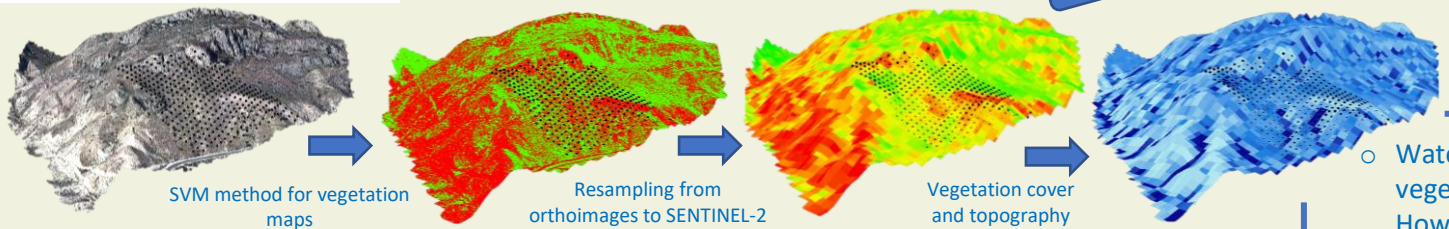
*The main goal was to **quantify** the impact of **water redistribution** processes **on vegetation performance**, and to evaluate how this effect varies in response to aridity*

Material and methods





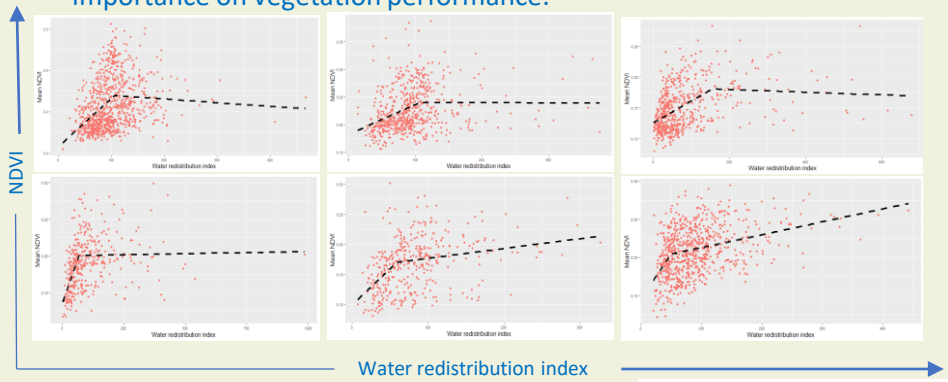
Mean NDVI



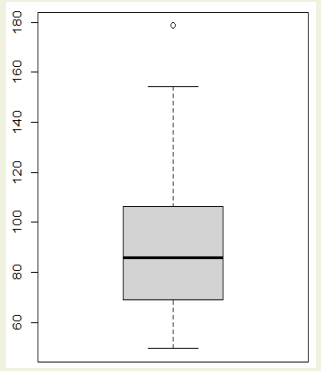
- We analysed NDVI from SENTINEL-2 in 17 plots along an aridity gradient. A water redistribution index was calculated by combining topographical information built from a digital elevation model (DEM) and a vegetation cover classification obtained from PNOA orthoimages.

Results and discussion

- NDVI increased as potential water redistribution did, revealing its importance on vegetation performance.



- The relationship between potential water redistribution and vegetation performance is non-linear, existing clear thresholds.
- The existence of thresholds reveals the limited capacity of vegetation to retain runoff. Therefore, a global increase on ecosystem hydrological connectivity increases local water losses for vegetation.
- Local factors such climate could explain the variability of thresholds



Breakpoints (m^2) over the aridity gradient.

Conclusions

- Water redistribution affects positively vegetation in drylands ecosystems. However, there are thresholds beyond which water redistribution effects disappear. This process could be essential for drylands functioning, specially under increases in aridity due to climate change.

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