Spatial and temporal dependencies of water scarcity in a Mediterranean river basin. Analysis of water demand and supply dynamics in the context of global change

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Keys

(1) Global change involves increasing water demand and decreasing water supply >> conflicts among stakeholders

(2) Supply to demand (S:D) ratio used as metric to quantify water scarcity and estimate water pricing

(3) Analysis of spatial and temporal dependencies of the **S:D ratio** to find out scales at which conflicts among stakeholders appear, as well as the effect of climate extremes in gradients along the basin

Objectives

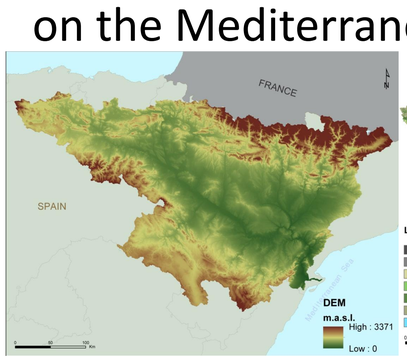
(1) to characterize the effect of the considered spatial scale on water scarcity:

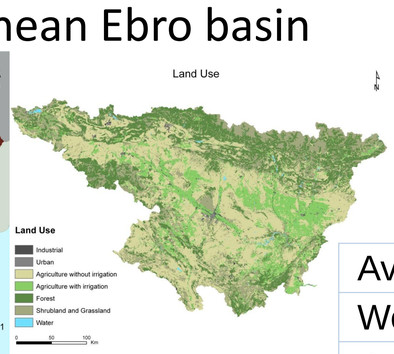
- determine the relationship between spatial scale and water pricing
- determine the scale at which water scarcity is more pronounced and conflicts among stakeholders might appear

(2) to characterize the effect of the temporal scale (as interannual variation) on water scarcity

Method

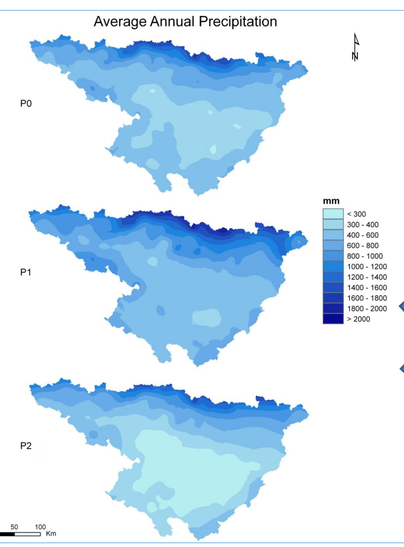
Model: InVEST (Tallis et al., 2011) on the Mediterranean Ebro basin





Precipitation scenarios and water demand assessment

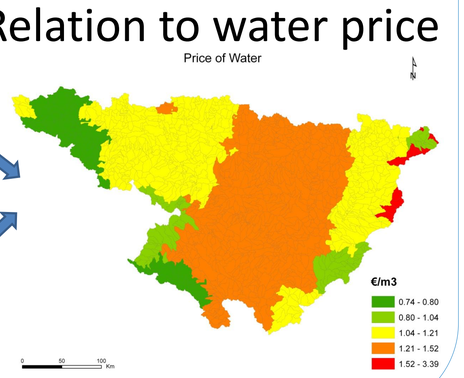
Avg (1991-2010)	P_0
Wet (96, 97, 03, 08)	P_1
Dry (94, 95, 98, 01)	P_2



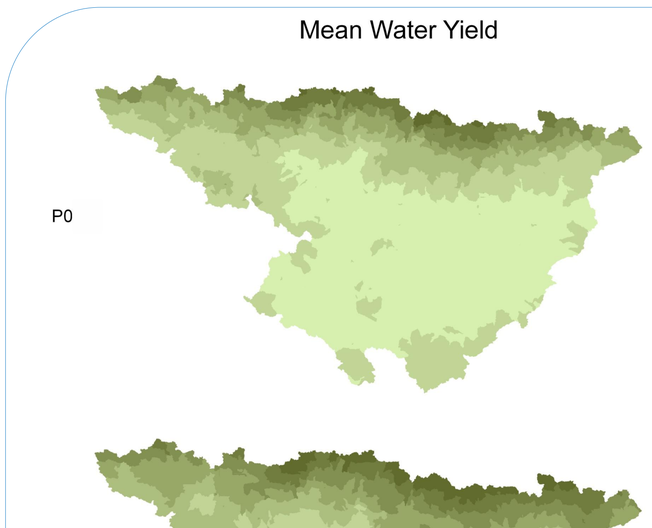
Spatial aggregation (province, region)

S:D ratio

Relation to water price

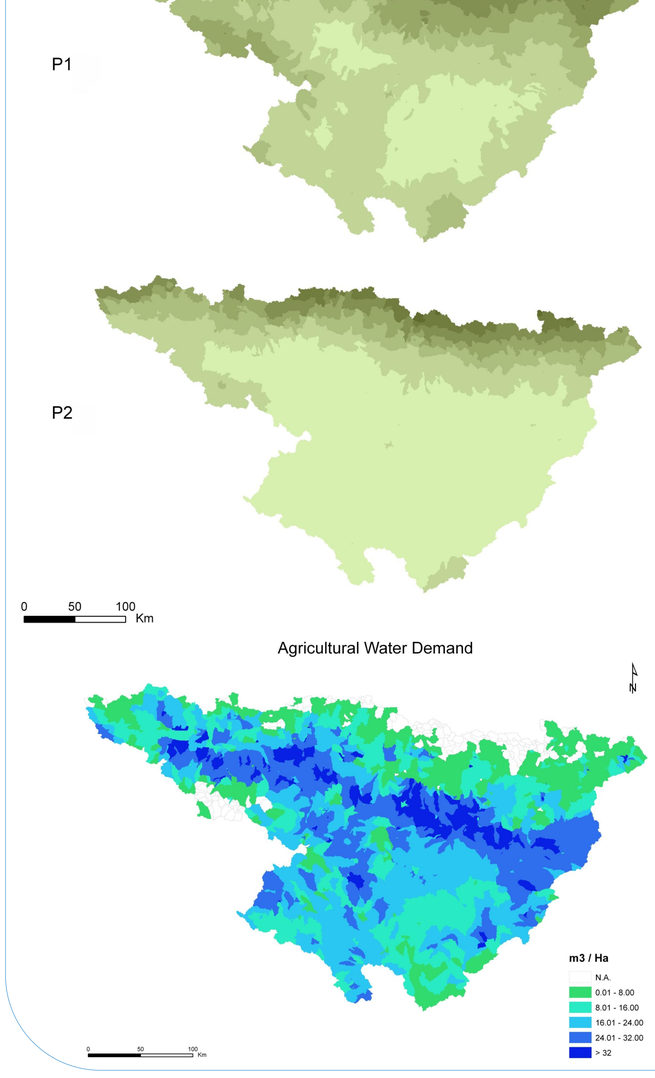


Results

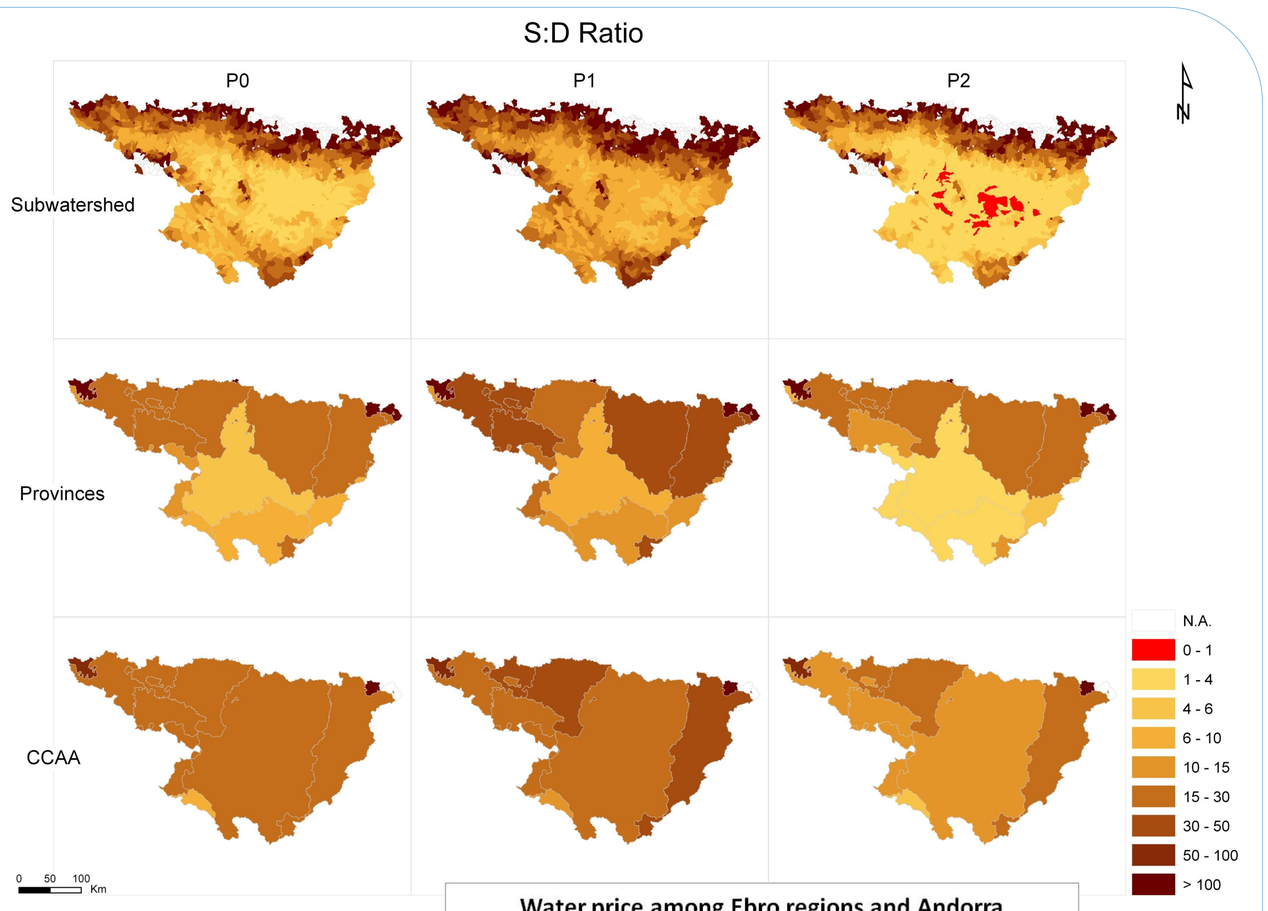


Respect to interannual water yield generated with P_0 (in m^3):
- water yield of P_1 is +53%
- water yield of P_2 is -21%

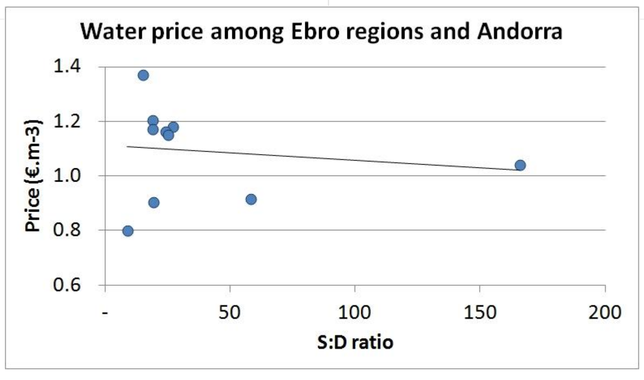
S:D ratio <1 disappears at larger spatial scale: water scarcity is a local issue.



Water demand for agriculture was calculated as the difference between the water demands of grasslands and crops. It is higher in areas of intensive irrigation.



Industrial and drinking water price slightly changes with S:D ratio.



Perspectives

Calibrate water yield (parameters: ETK, Zhang, water demand)
Relate S:D to infrastructures (dams, pipes, canals)
Include water price policy for agriculture will in the study
Test water scarcity mitigation practice: more or less irrigated areas