PREDICTING TEMPORARY WETLAND PLANT COMMUNITY RESPONSES TO CHANGES IN THE HYDROPERIOD

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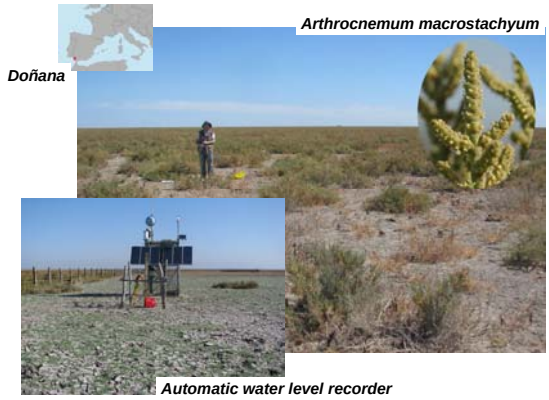
INTRODUCTION

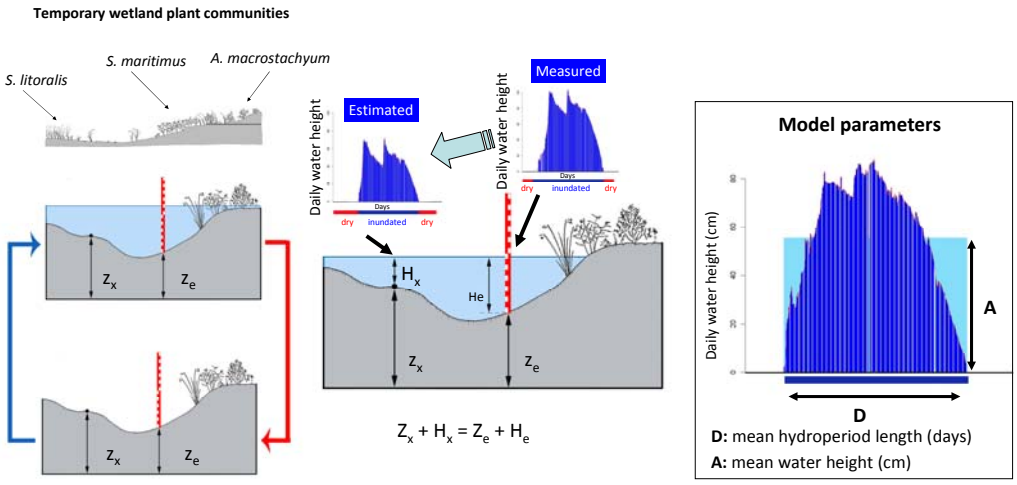
Location: Doñana National Park (Spain), a very important avian diversity hotspot with over 27,000 ha of wetlands

Major plant communities: A*lmajar* (dominated by *Arthrocnemum macrostachyum* and *Juncus subulatus*) occurs on the higher areas with the shorter hydroperiod. ***Castañuelar*** (dominated by *Bolboschoenus maritimus* or *Scirpus maritimus*) occurs at lower levels, close to the ***bayuncar*** (dominated by *Schoenoplectus litoralis* or *Scirpus litoralis*), with . These plant communities play an important global role as nesting zones, breeding resources and shelter areas.

The distributions of ***almajar*, *castañuelar* and *bayuncar* communities strongly depend on the hydroperiod** pattern (García-Viñas et al., 2005). Nowadays, the main input to the hydroperiod is the flow from surface watercourses (La Rocina and El Partido), both depending on rainfall regime (Díaz-Delgado et al., 2006). Therefore, hydroperiods, and subsequently the distribution of the plant communities, are **sensitively exposed to climatic change events**.



HOW COULD CLIMATE CHANGE AFFECT THE DISTRIBUTION OF *Arthrocnemum macrostachyum* COMMUNITIES?



METHODS

Species occurrence data: We recorded *Arthrocnemum macrostachyum* presence or absence in the 1,385 points of the topographic leveling (Mintegui et al., 2003).

Environmental predictors: Mean length of the hydroperiod (D) and mean water height during the hydroperiod (A). The parameters A and D were estimated for each point transferring corrected daily water height from the closest water level recording station (García-Viñas et al., 2005).

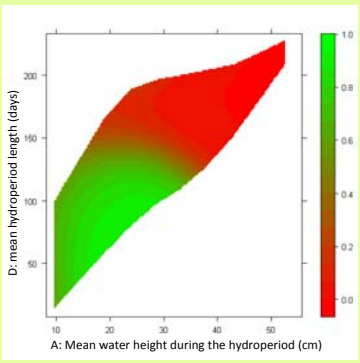
Modeling strategy: We fitted a penalized logistic regression model using restricted cubic splines (k=4) and a linear interaction. The model was internally validated using a bootstrap procedure (Steyerberg et al., 2001).

RESULTS

The probability of occurrence of *Arthrocnemum macrostachyum* increases with decreasing hydroperiod length and water height.

The predictive performance of the model is excellent (AUC = 0.936; calibration intercept = -0.005; calibration slope = 0.990)

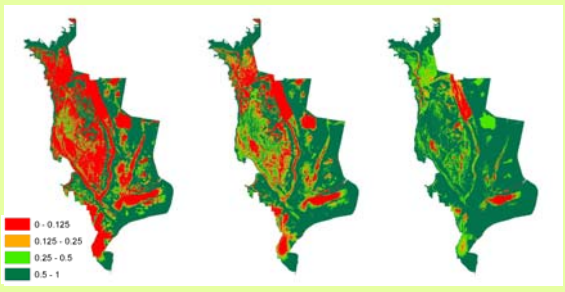
The model predicts a great expansion of the *almajar* if the maximum expected rainfall reduction for 2031-2060 happens.



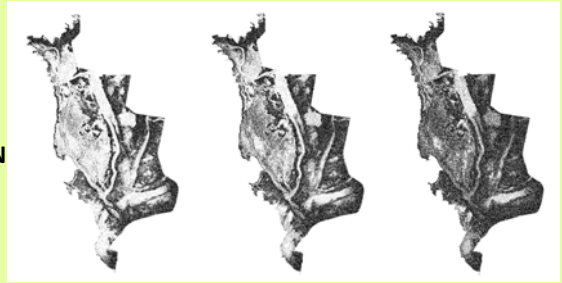
CLIMATE CHANGE SCENARIOS (2031-2060)

NO CHANGE **-10% RAINFALL** **-20% RAINFALL**

PREDICTED OCCURRENCE PROBABILITY



SIMULATED DISTRIBUTION



CONCLUSIONS

The distribution of the *almajar* communities largely depends on the hydroperiod and the expected rainfall reduction could cause a significant increase of its area in the Doñana wetland.

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