

How to address environmental and social challenges in water management

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A study carried out by researchers from Universidad Politécnica de Madrid (UPM) and Universidad Complutense de Madrid (UCM) suggests alternatives of adaptation to climate change of rice production

in the wetlands of Doñana (Spain).

Climate change is a global challenge with increasing consequences at local levels. According to a study published in *Water Resources Management*, the accelerated state of [climate change](#) is already affecting the [rice](#) production and the natural ecosystem in the wetlands of Doñana and the availability of water for the agriculture in this zone.

The aim of this research, carried out by experts from UPM and UCM, was to identify flexible options of adaptation to the local environmental, social and political context using a combination of quantitative and qualitative methodologies including the active participation of diverse groups of interests.

Rice production in coastal wetlands provides essential ecosystem services such as the flood control and the habitat maintenance of protected species. Rice was introduced in the 10th century in the Iberian Peninsula. Today Iberian rice accounts for about one-quarter of the total rice production of the European Union, almost exclusively cultivated in the coastal wetlands of Spain, with permanent flooding.

"The intensive water management required to produce rice stands is a crucial point since freshwater supply is deteriorating at an unprecedented rate," says researcher Ana Iglesias from the group of Hydroinformatics and Water Management. She adds "Here we explore flexible adaptation options to climate change in the Doñana wetlands—a world heritage and biodiversity site—from two points of view: What are the [policy](#) options for agricultural water management in view of climate change? How can informed stakeholders contribute to better adaptation?"

The first question is addressed by simulating water availability to farmers with the WAAPA model (Water Availability and Adaptation Policy Assessment) developed at the UPM. This model simulates

possible results for water availability for adaptation strategies derived from the groups of interest: farmers, environmentalists, and administrative actors.

The second question was addressed by means of participatory research. Adaptation options are framed according to the local environmental, social and policy context. The decision-making processes of adaptation options are variable according to the stakeholder views and results suggest that perception on new water infrastructure and farming subsidies dominates the decision process.

The interrelation of the qualitative and quantitative components of the study has allowed researchers to elaborate different potential interventions of policies related to water management and provide a quantitative estimation of their effectiveness. For instance, a policy addressed to improve water urban use could reach major improvements of water availability for irrigation and in turn, avoid reduced water for environmental use by adaptation policy.

However, the simulations showed that the effect of improving [water availability](#) of this policy was not significant. In addition, researchers also studied adaptation options to improve the [water management](#) by interconnections connecting upstream [water](#) bodies to the rice fields. These simulations clearly showed improvement of less than 20 percent except in a few sub-basins.

However, the adoption of this type of policy was especially controversial among the stakeholders and this data is relevant when it comes to making decisions.

The data provided in this study was used to elaborate the final adaptation options carried out in this area in the framework of the adaptation programme to climate change. As a conclusion Ana Iglesias says, "we

can say that our research contributes to the definition of sustainable [rice production](#) in Europe."

More information: Ana Iglesias et al. Towards Adaptation to Climate Change: Water for Rice in the Coastal Wetlands of Doñana, Southern Spain, *Water Resources Management* (2015). [DOI: 10.1007/s11269-015-0995-x](#)

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