ADAPTATION AND MITIGATION MEASURES TO CLIMATE CHANGE IN THE EBRO DELTA (EBRO-ADMICLIM)

Resumen:

The project LIFE EBRO-ADMICLIM (ENV/ES/001182) puts forwards pilot actions for adaptation to and mitigation of climate change in the Ebro Delta (Catalonia, Spain), an area vulnerable to sea level rise and subsidence.

We propose an integrated approach for managing water, sediment and habitats (rice fields and wetlands), with the multiple aim of optimizing ground elevation (through inputs of inorganic sediment and organic matter), reducing coastal erosion, increasing the accumulation (sequestration) of carbon in the soil, reducing emissions of greenhouse gases (GHG), and improving water quality. This type of approach has not been applied so far in the European Union, and it is clearly innovative internationally.

The main pilot adaptation actions focus on sediment inputs from the Ebro River into its Delta. The aim is to demonstrate the feasibility of permanently restoring the sediment flow, both from a water treatment plant on the Ebro (Consorci d'Aigües de Tarragona, CAT) and from the reservoirs along the lowest stretches of the Ebro. Essential for this is a good assessment of the transport capacity of the river and the channels. Mitigation pilot actions are also proposed for the rice fields and wetlands, to optimize carbon and nutrient sequestration and GHG emissions, and increase the ground elevation.

The final conclusions drawn from these pilot actions will allow the elaboration of a Climate Action Plan for the Ebro Delta with specific and effective measures for the mitigation and adaptation of the area to the climate change.

Objetivos:

The project LIFE EBRO-ADMICLIM puts forwards pilot actions for adaptation to and mitigation of climate change in the Ebro Delta (Catalonia, Spain), an area vulnerable to sea level rise and subsidence. We propose an integrated approach for managing water, sediment and habitats (rice fields and wetlands), with the multiple aim of optimizing ground elevation (through inputs of inorganic sediment and organic matter), reducing coastal erosion, increasing the accumulation (sequestration) of carbon in the soil, reducing emissions of greenhouse gases (GHG), and improving water quality. Put it in another way, the idea is to jointly manage the inputs of inorganic and organic matter (i.e. sediment and plant residues respectively) of the ground, in order to optimize vertical accretion processes (soil formation) and organic matter decomposition (GHG emissions) in rice fields and in constructed wetlands. This type of approach has not been applied so far in the European Union, and it is clearly innovative internationally. The main pilot adaptation actions focus on sediment inputs from the Ebro River into its Delta. The aim is to demonstrate the feasibility of permanently restoring the sediment flow, both from a water treatment plant on the Ebro (Consorci d'Aigües de Tarragona, CAT) and from the reservoirs along the lowest stretches of the Ebro. Essential for this is a good assessment of the transport capacity of the river and the channels. Pilot actions are also proposed for the rice fields and wetlands, to optimize carbon and nutrient sequestration and GHG emissions, and increase the ground elevation. The results will serve to establish guidelines for a program of adaptation and mitigation measures (with emphasis on the rice sector) in which it will be essential to design a strategy for voluntary reduction of GHG emissions commanding the support of the rice sector. Improved rates of GHG emissions and carbon sequestration through a change in management practices (for example, a more efficient water management system) would represent a significant improvement that could be applied in other coastal wetlands and rice fields in the EU.

To be specific, we expect:

• To determine the capacity of the irrigation network for transporting and distributing sediments (action B1).

• To determine the theoretical and real capacities of the river for transporting different sediments (clay, silt, sand) under different flow conditions (action B2).

• To optimize the functioning of the constructed/artificial wetlands (green filters) in order to maximize the rate of carbon sequestration, soil elevation and of the reduction of nutrients and pollutants in the drainage canals (action B3).

• To evaluate accurately the carbon stock and accretion rates in the fields where the GHG emission experiments are carried out (action B4).

• To evaluate the GHG emissions in the Ebro Delta rice fields and achieve a reduction in GHG via specific agricultural practices (Actions B4 and B5).

• To evaluate the impact on birdlife of changing water management practices during the post-harvest period and its relationship to GHG emissions (action B5).

• To evaluate accurately the subsidence affecting the Delta and determine which areas are most vulnerable to a relative rise in sea level (action B6).

• To draw up a Climate Action Plan for the Ebro Delta (action B7) with specific and effective measures of adaptation and mitigation for climate change, establishing the directives and actions to be carried out following the finalization of the project. Likewise, there will be a proposal for agricultural practices and measures specifically orientated to climate change adaptation and mitigation.

Objectivos contribución:

The University of Córdoba involved in the development of actions B1, B2 and C1:

B1. Pilot test of injection of sediment into the Ebro Delta irrigation network. The objective of this action is to carry out inputs of sediments to evaluate the transport and distribution capacity of the irrigation canals, to evaluate the rate of silting within the rice fields, and to offer a solution for the silt and sediments generated at the Tarragona Water Consortium (Consorci d'Aigües de Tarragona, CAT) water treatment plan by transforming them into a resource which would contribute to the adaptation to climate change.

B2. Pilot test of injecting sediment into the final stretch of the river Ebro. The objective of this pilot action is to determine the current capacity of the river Ebro for transporting sediments (sand and clay) to the sea and the Delta surface area.

C1. Monitoring the flows of water and sediments, water quality, and sediment deposition. The objective of river flow monitoring aims to track the sediment dispersion while determining the potential sediment transport capacity under the current hydrological regime. In the irrigation canals the objective of the monitoring is to assess the sediment transport capacity and the distribution through the irrigation network to the rice fields.

Entregables:

- Report of the results of the sediment transport models simulation and calibration in the irrigation network (action B1) and in the river (action B2).

- Memory of the transport capacity and diffusion of the injected sediment in the river and irrigation canals and deposition rates in rice fields.

- Recommendation report for the restoration of the sediment flow in the Ebro River.

- Recommendation report for the operation of sediment injections.

Impacto:

The results obtained in the project will allow us to demonstrate the viability of re-injecting the sediments generated at the Tarragona Water Consortium (Consorci d'Aigües de Tarragona, CAT) water treatment plant (action B1), as well as laying down the bases for a (bypass) system for transferring sediments from the reservoirs to the Delta (action B2). The results will offer us a good assessment of the river and irrigation canals' capacities for transporting sediments, as well as the effects on rice fields and wetlands. If action B1 is viable, a significant saving will be produced in economic resources and in the energy and material consumption at the CAT plant. Returning the sediments from the plant to the irrigation network would also mean a simplification of the process at the plant as actions relating to the collection, drying out, transportation and storage of sediments could be removed from the overall process.

The results obtained from the management actions in the rice fields and wetlands regarding land elevation, and optimizing GHG emissions, carbon and nutrient sequestration (actions B3-B5), will allow future directives to be developed for a programme of adaptation measures. Among these directives will be the design of a scheme for voluntary reductions in GHG.

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