POLICY BRIEF | IBERIA CASE STUDY

INTEGRATED SOLUTIONS TO ADDRESS HIGH LEVELS OF CLIMATE CHANGE

We are not yet on track to meet the Paris goal to keep global mean temperatures below 2°C (and ideally below 1.5°C) above pre-industrial levels. IMPRESSIONS modelled the impacts of higher levels of climate change (above +2°C) in the Tagus River basin under different socio-economic scenarios, including the interactions between agroforestry, water, hydropower and biodiversity.

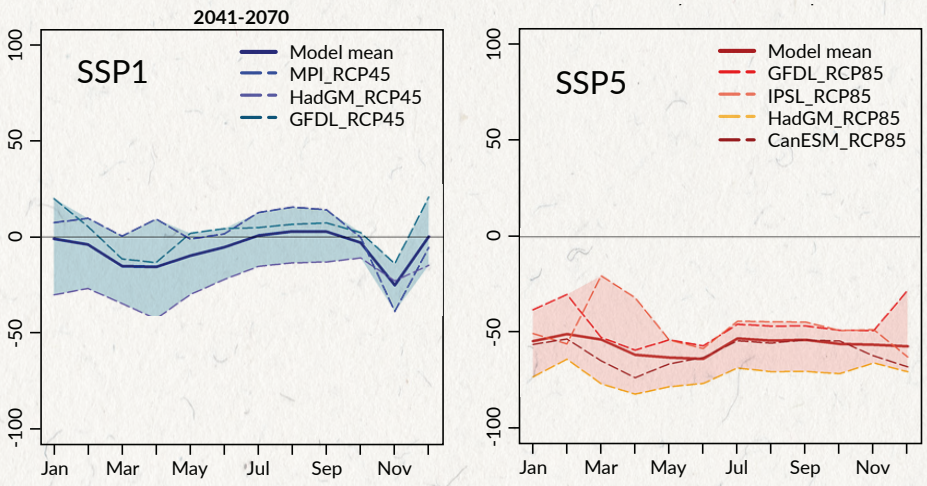
Key Findings

- **The Tagus Basin faces severe challenges from climate change.** In a scenario consistent with current emission trends (RCP8.5), lower rainfall is projected to lead to halving of hydropower production, complete cessation of cork production and failure to meet projected water demands by the end of the century.
- **Transformative strategies are needed,** centred around equity and wellbeing; sustainable management of land, energy, food and water; sustainable lifestyles; and participatory governance.

What are the impacts and risks in a future above 2°C?

Modelling projects significant decreases in precipitation, continuing the current trend towards a drier and more vulnerable landscape in the Iberian Peninsula. Overall water availability is projected to fall under all socio-economic scenarios, but the impact can be reduced in scenarios that focus on water efficiency. In more resource-intensive scenarios, higher climate change impacts and water withdrawals reduce flows at the Tagus River outlet drastically, by 55% to 65% in 2071–2100. This contributes to a failure to meet the Albufeira Convention, which specifies the amount of water that should be discharged from the Spanish section of the Tagus into the Portuguese section. Hydropower production is also predicted to fall dramatically, by up to 50% in 2071-2100. Changes to the management of reservoirs in the upper catchment can help to sustain natural environmental flows (with higher discharge in winter and lower in summer) in the Tagus River, but this involves cutting the water volume transferred to south-east Spain to less than the amount specified in the Segura Basin Management Plan.

More frequent and intense droughts are expected to reduce the supply of ecosystem services from the unique Montado / Dehesa cork oak agro-forestry landscapes under all scenarios. Droughts increase the number of years where not enough forage is produced, so that livestock graze oak saplings instead, preventing growth of new trees. If grazing is maintained at current levels, cork production will decrease even without climate change, but droughts will kill adult trees and cut production even further. Under current climate projections (without further action towards the Paris target), cork production is projected to fall steeply by 2050 and both cork and pine production could cease completely by the end of the century.



Change in discharge (%) of the Tagus river in 2041-2070 compared to 1981-2010 under a co-operative and sustainable scenario (blue, left) and a resource-intensive scenario with higher climate change (red, right)

What are the transformative solutions?

Stakeholders developed a set of pathways for transforming society to address the causes of climate change while also adapting to the impacts. Transformative solutions can change social structures and develop new knowledge systems, resulting in positive tipping points that accelerate change to a sustainable society. Three of the pathways play a key transformative role in all scenarios.

Integrated and collaborative water management and sustainable water use	This includes: goals (e.g. 100% water re-use) to protect water quality, quantity and equal access; participatory transboundary water governance systems that are regularly revised; new infrastructure (e.g. rainwater harvesting, water treatment and re-use, metering, efficient irrigation and appliances); strong regulations, incentives, eco-labels, taxes and quotas to cut water use; and real-time monitoring systems to control water quality and river flows.
Sustainable lifestyles	Fundamental shifts in values and behaviour are enabled by a new education system, accessible by all age groups, underpinned by research on how to communicate environmental and social problems. Awareness-raising activities promote energy efficiency, local renewable energy, healthy food, different diets, waste reduction, intermodal mobility, water saving and reuse, social cohesion and tolerance.
Organic and conservation agriculture following ecosystem-based adaptation principles	This includes conservation agriculture; new (or traditional) crops and livestock adapted to drier and warmer conditions; agro-forestry and sustainable forestry; natural fertilisers; technological innovation (e.g. hydroponics; soil sensors for irrigation); regulations; integrated land use management (e.g. shifting irrigated crops to the north-west; reduced grazing density); payment for ecosystem services; and training for farmers.

These pathways tackle some of the most severe climate-related problems facing Iberia – water scarcity and falling crop yields – at the same time as reducing reliance on resources and strengthening social, human and natural capital so that society is more resilient to future change. However, there are limits to adaptation: it is difficult to maintain the flow of the Tagus River and to achieve resilience to droughts under all scenarios involving global climate change greater than 2°C.

Policy Recommendations

- Strengthen efforts to meet the Paris Agreement. All impacts are more severe under higher levels of climate change, and adaptation pathways cannot avoid all impacts, so both mitigation and adaptation are essential. Early moves towards sustainability can avoid some of the worst impacts.
- Set up participatory, multi-level and transboundary water governance systems that manage water use, quality and quantity, taking into account the need to maintain environmental flows of the Tagus (and other rivers) and balancing competing demands from the Albufeira convention, hydropower production, and transfers to Segura.
- Support integrated water and land use policies promoting conservation agriculture and ecosystem-based adaptation for Iberian agro-forestry landscapes. Reduce grazing pressure to increase cork tree regeneration and support the long-term recovery of these unique eco-systems.
- Urgently invest in efficient water and energy-saving technologies and promote behaviour change to cut water and energy demand in all sectors (household, agriculture, business and energy), using awareness campaigns, regulations and incentives.
- Integrate sustainability into education systems to promote behavioural change across all age groups.
- Support cross-regional structures such as Euroregions and Working Communities in the development of climate resilience solutions, new forms of climate knowledge and information and its use for policy-making.

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