IDDRI

BLOG POST December 18th 2023

Smart water management in Europe: lessons from Spain - Frugality, adaptation, mitigation and resilience

Authors

Carlos Alfonso Sánchez

Geógrafo y Master en Evaluación y Corrección de Impacto Ambiental (UPM, UCM y CIEMAT)

Fernando Prieto del Campo

Doctor en Ecología. Ex Dtor. Programas Agencia Estatal Evaluación Políticas Públicas

Raúl Estévez

Biólogo y Master en Evaluación y Corrección de Impacto Ambiental (UPM, UCM y CIEMAT) Observatorio de la Sostenibilidad (OS)

Reading time: 16 min

As part of its editorial project in the run-up to the June 2024 European elections, European States of Mind - Reinventing the Deal, IDDRI is publishing (from November 2023 to March-April 2024) the ideas of European thinkers on what is shaping political debates in the various Member States, on the project that the European Union should support, and how the ecological transition fits with social and economic dimensions.

The second paper of this series, authored by Carlos Alfonso Sánchez, Fernando Prieto del Campo, and Raúl Estévez Estévez from the Observatorio de la Sostenibilidad (Spain), discusses the escalating issue of water scarcity in Europe, particularly in Spain. Resilience and adaptation to climate change, particularly on the water issue, is an unavoidable topic already now, and for the mandate of the next Commission. The paper advocates for not separating the issue of water scarcity and of the protection of water ecosystems. It also advocates for reduced irrigation, increased water efficiency, and comprehensive European policies to address water scarcity, emphasising the need for a more ambitious approach and understanding regional particularities, especially in Southern Member States like Spain. It is hence an important contribution to the debate given that the agriculture and food, and the biodiversity components of the EU Green Deal have been particularly disputed or halted. This paper offers an entry point to continue this conversation for the next

mandate, as it also concludes on investment plans for resilience.

Water resilience in the European Green Deal scenario

While the European Green Deal has enabled progress on several water-related issues due to the Zero Pollution Action Plan, the 2030 Biodiversity Strategy, the Adaptation Strategy and the Circular Economy Action Plan, the issue of water scarcity has not yet been at the centre of discussions. This situation is rapidly changing.

Around 38% of the EU population and 29% of EU territory were affected by water scarcity in 2019, with droughts costing €2-9 billion each year. Costs could reach €65 billion annually by the end of the century1 . Water usage disputes have led to considerable tensions in several Member States, including France and Spain. This deteriorating situation has recently prompted the European Commission to publish new tools to help predict and adapt to sectoral drought impacts, but these measures will be insufficient to reverse the trend.2

Another reason for water becoming more central during the next legislature is the state of the implementation of the Water Framework Directive (WFD). According to the latest assessment of the European Environment Agency (EEA) in 2018, only 40% of Europe's lakes, rivers, estuaries and coastal waters achieved the minimum 'good' or 'high' ecological status in 2010-2015. A vast majority of Europe's water bodies are failing to meet the WFD objectives; however, full compliance is required by 2027.3

In preparation for the next legislature and commission, EU policymakers should reflect on the challenges faced by the most drought-affected countries, such as Spain, and design a new strategy to support water resilience more effectively over the next four years.

The case of Spain: increasing irrigation and dwindling water availability

Droughts are a widely known characteristic of Mediterranean climates. Climate change models and scenarios show that rising temperatures are likely to mean that droughts occur with greater frequency, intensity and extent. Even just a brief glance at the data provides plenty of evidence to support this statement: statistics produced by the State Meteorological Agency (AEMET) show a staggering increase since 2015 in the severity of summer heatwaves in Spain; while 2022 saw an unprecedented 41 days of extreme heat between June and September (previous records were 29 days in 2015 and 25 days in 2017). Moreover, the year 2023 has been particularly devastating: there were four major heatwaves in succession, totalling a combined ordeal of 24 days, and most of the country only had rain in June, accentuating the hydrological drought that has been ongoing for several years. Following the summer of 2023, Spain's reservoirs were at 44% capacity, 10 percentage points lower than 2021 and 20 points lower than 10 years ago. In some basins the situation has been even more dramatic: the Guadiana fell to 28% capacity, the Guadalquivir 27%, and Guadalete-Barbate 30%, all of which were half the average of the last 10 years. The situation extends to the Tajo-Segura water transfer and part of the northern basins such as Galicia.

Along with the increase in irrigated area, there has also been an increase in land artificialisation, especially in arid and semi-arid areas of the Mediterranean where a large part of the resident population and tourism is concentrated. The artificial land area increased year after year until the COVID-19 crisis, when there was a brief hiatus before the increase continued. Furthermore, water management problems have been accumulating for decades, with high losses in the supply and transport system, a lack of tertiary-treatment purification throughout the country and a lack of management and transparency in decisions on this strategic and constrained resource for socio-economic development. In addition, the increase in temperatures that has already been detected in Spain is leading to greater

evapotranspiration and an increase in crop water demand.

As of November 2023, 9 million people in Spain face water restrictions, while droughts have become chronic in large regions such as Andalusia and Catalonia. Moreover, the future looks uncertain. Climate models predict a decrease of the water supply in Spain of up to 25% in the coming years. Agricultural uses represent 78% of total water consumption. The reality and forecasts clash with the contents of our laws and plans: in Spain, an increase in irrigated land is planned for the next decade; it is hoped, without sufficient evidence, that the savings in consumption due to the modernization of current irrigation systems will balance the increased demand resulting from this increase in surface area. This assumption neglects to consider the Jevons paradox, where an increase in efficiency promotes greater demand, which would suggest that water consumption is likely to be increased rather than reduced. The traditional orientation of the Common Agricultural Policy (CAP) and the political decisions on water, which are subject to strong pressures, have transformed the Spanish countryside into a financial speculation scenario.

On analysing the irrigation planning specified in the 3rd Cycle Revisions of the River Basin Hydrological Plans, the intention is to increase the irrigated area to an alarming extent around the Duero, Ebro and Guadiana rivers, especially in the former two: new irrigation will occupy 86,000 ha in the Duero and 150,000 ha in the Ebro. In the Guadiana, it is intended to increase the irrigated area by 5,000hectares as it flows through the centre of Extremadura, but the River Basin Hydrological Plan does not specify the scope of irrigation in the area around Doñana and in the terminal stretch of the river, contrary to the conclusions of the analyses of the UN, WWF, IUCN and other research centres, which advise against new interventions in this direction. On the other hand, it is impossible to know the real demands of the country's 7,000 irrigation communities, as public information remains inaccessible and can channel pressures from financial networks interested in high-yield investments in Spanish agriculture.

The process of accelerated commodification of agriculture and livestock farming has been going on for a long time in some Spanish regions. The 2009 and 2020 agricultural censuses provide figures that illustrate this process. In the Ebro region, the increase in irrigable UAA (utilised agricultural area) between the two censuses was 10.09% in Catalonia, 9.60% in Aragon, 13.98% in Navarre, while the accumulation of UAA in farms of more than 50 ha grew by 3.51% in Catalonia, 3.49% in La Rioja, 8.16% in Navarre and 8.09% in Aragon. At the same time, the penetration of trading companies in the countryside grew by 41.93% in Aragon between the two censuses, 35.04% in Catalonia, 40.47% in Navarre and 37.76% in La Rioja.

For three time horizons (2040, 2070 and 2100), the evaluation of climate scenarios evaluated by CEDEX Centre for Public Works Studies and Experimentation) estimates respective precipitation reductions of 2%, 6% and 7%, and an increase in potential evapotranspiration (ETP) of 3%, 7% and 9%, following RCP 4.5; for RCP 8.5, precipitation reductions of 4%, 8% and 14%, and an increase in ETP of 4%, 10% and 17% are estimated. In other words, all scenarios foresee a reduction in precipitation and an increase in vegetation demand due to temperature increase. Moreover, currently irrigated areas are already having a major impact on the territory:4

- 33% of irrigated lands are located on aquifers with poor quantitative status;
- 46% are located on water bodies with poor chemical status;
- 57% are on soils vulnerable to nitrate pollution;
- 16.9% are located in areas where a change in climatic classification (Köppen) has already been confirmed;
- 6.5% are in the immediate vicinity of, or even within, protected natural areas of major importance (national and natural parks);
- 16.23% are in places where the first three of these statistics apply;

- 3.67% are in places where the first four of these statistics apply.

According to State Meteorological Agency (AEMET) data, the estimated increase of arid climates (type B) in Spain is around 1,517 km2/year, while temperate climates (type C) and cold climates (type D) have decreased at a rate of 1,392 km2/year and 125 km2/year, respectively. To alleviate these pressures, in addition to rebalancing the ratio of usable water resources to crops in future, irrigated areas and associated water volumes need to be reduced below the current level.

Decreasing irrigation and increasing efficiency as a scalable solution that can be extrapolated to other latitudes

The following arguments support this essential need for irrigation reduction:

1. The forecasts of the Centro de Estudios y Experimentación de Obras Públicas (Centre for Public Works Studies and Experimentation, CEDEX) study only consider two trajectories (RCP) out of the seven examined. These are theoretical models about which there is considerable uncertainty. In fact, the 2010 edition of the CEDEX report[5] , carried out on the hypothesis of the emissions scenarios (SRES), indicated higher percentages of reduction in water resources. A greater effect of climate change on precipitation and temperatures should not be ruled out, as highlighted in forecasts from the Guide to Regionalised Climate Change Scenarios for Spain, published by the AEMET. In Southern and Mediterranean regions, the largest reductions in precipitation are expected during the 21st century, reaching 18-38% in the Andalusian Mediterranean Basins (CMA), a value that far exceeds the SRES projections. All pathways indicate increases in dry periods, mainly in the south and east of the peninsula.

2. In 2019 WWF calculated the surface area of illegal irrigation and the volume of groundwater illegally extracted in four areas of high ecological value, including the areas around Doñana (Andalucía), around Daimiel (Castilla-La Mancha), Campo de Cartagena and around the Mar Menor (Murcia) and Los Arenales (Castilla y León), estimating figures of 88,000 hectares and 220 million cubic metres. In addition, some policies are not working in their favour: there is an ongoing struggle in Doñana to prevent the legal regularization of 1,700 hectares of illegal irrigation, with the protected area currently in a critical situation.

3. Climate change forecasts for the first two decades of the 21st century have already been exceeded, as can be seen in the AdapteCCa[6] (Platform on Adaptation to Climate Change in Spain) tool: the estimated values are lower than the real measured values, which indicates that the current rate of warming is higher than predicted, which also makes it necessary to consider as a priority this reduction in the use of water for irrigation.

4. The water reserve and its use to ensure truly functional ecological flows and other environmental aspects in rivers and wetlands must also be increased in a scenario of global ecological crisis. The increase of these uses will be another factor to be considered to the detriment of agricultural uses.

5. Household food waste in Spain is quantified in an annual report which concluded that in 2021 every Spaniard threw away an average of 28.21 kilogram-litres of food. This amounts to a total of 1,245.88 million kilogram-litres of wasted food in 2021. Food wastage includes the primary sector as well as households: distribution companies such as markets and supermarkets, the hotel and catering industry, food banks, and also the public sector, including collective canteens (hospitals, residences, schools and institutes). A reduction in food waste would clearly lead to a reduction in water use, as a significant part of this waste is from products directly related to irrigation.

6. Agricultural surpluses represent an important part of agricultural production which, due to bad planning, cannot enter the market or are discarded. This means that a range of agricultural products that involve water consumption are either thrown away as surplus or transformed into other products with much lower added value. Better planning in this regard would also enable a possible reduction in irrigation.

7. Pig "macro-farms" typically use maize, sorghum and soybean meal protein for animal feed. In Spain, maize is one of the most widespread irrigated crops, accounting for 9% of the total irrigated area and 37% of the total irrigated cereal area. Maize is characterised by high water consumption per hectare, especially in the Mediterranean area where estimates reach 6 to 9 m3 of water per hectare. It is clear that a move away from macro-farms towards more extensive livestock farming would result in a reduction of crops associated with livestock feed, which would therefore reduce the pressure on the water system. In addition, by reducing water consumption and limiting the discharge and use of slurry on fields, the quality and sustainable use of water in the system as a whole would be improved through a reduction in nitrification.

For all these reasons, it is necessary to be more ambitious in the reduction of irrigation, to reach a point where the activity is sustainable in the current situation. To this end, we propose two targets for the reduction of irrigated land, which differ depending on whether the figures of SIOSE[7] (Spanish Land Occupation Information System) or ESYRCE[8] (Survey of Crop Areas and Yields) are used as a reference: according to SIOSE data, the reduction should be 20%; according to ESYRCE, this reduction should reach 25%. Both figures apply for the whole territory, including the Northern basins.

Frugality, adaptation, mitigation, resilience and European investments

Climate change in Europe will force water management to become more restrained and adapted to the changing weather conditions in which we are already immersed. European countries and regions must also be able to recover from impacts such as extreme weather phenomena like floods or droughts. However, other challenges that should have been solved decades ago are still pending, such as ensuring safe and clean water, which requires the modernization of plants and the elimination of pollutants, especially in small municipalities.

The allocation of EU Next Generation funds will be distributed in Spain as follows: 1.7 billion will be allocated to the water cycle through the Directorate General for Water (DGA); 600 million for sanitation and purification; 800 million for environmental restoration and 250 million for digitalisation. A further 800 million will be allocated to the improvement of irrigation through the Ministry of Agriculture. However, if these funds are compared with measures already established, they indicate that the funds managed by the 2021 Recovery, Transformation and Resilience Plan (PRTR) for water will be used to implement actions already planned in the River Basin Plans. As the forecast of actions for the coming years of the Plans amounts to more than 28,000 million euros, the 1,700 million euros of the PRTR will not be key to meeting the objectives of the WFD. Although the PRTR funds will help with some objectives, such as the digitalization of the water cycle, hydro-morphological restoration and flood prevention actions, and to improve sanitation, the fact remains that no significant change is envisaged in the way water will be managed in Spain. The EU Next Generation fund is financing PERTE (Strategic Projects for Economic Recovery and Transformation), involving the digitization of data related to the hydrological cycle and water resources, with a budget of €4 billion, to help renew infrastructure and deploy the necessary technology to consistently and reliably calculate how much water is withdrawn, made drinkable, reaches the consumer, and how it is returned to nature. With this PERTE funding, the EU policy will facilitate the transition towards a more accurate knowledge of water data. While PERTE is a much-needed step, it must be accompanied by greater coordination of larger-scale policies, such as the CAP.

The CAP has taken insufficient account of regional particularities and has allowed, even encouraged, undesirable effects in terms of sustainability and equity. The provisions of the recently inaugurated new CAP, which has a more "environmental" outlook, clash with the evolution of the production model that has been briefly described above, and are detached from the reality of Spain's ecology and its unique rural socio-economy.

At the same time, climate change mitigation cannot be neglected by European policy, and we cannot focus exclusively on adaptation actions. Some of the most important microclimatic studies in the EU are located in Spain. One such study has been developed by CEAM since 1991, which concludes that climate change in the Western Mediterranean Basin derives from a range of factors, among which the tourism and production development model for the coast is one of the most influential.9 These changes are not only occurring on the Spanish coast, as similar anomalies have been reported on the French Mediterranean coast and in large parts of Italy. It is not possible to act directly on the Jet Stream, the Azores High or the temperature of the Mediterranean; it is only possible to act on that part of the hydrological cycle over which there is room for manoeuvre in the medium or short term. And this will only be possible by implementing large-scale forceful response actions based on Green Infrastructure (GI) and Nature-based Solutions (NBS) that guarantee the functionality of ecosystems including the hydrological cycle and its expression in the climate. These interventions can only be achieved through joint research and collaboration. And, because of this, future EU policy should provide stronger, agreed climate change mitigation and hydrological cycle mechanisms, as our adaption efforts will not be sufficient in the face of natural cycles. If we do not take urgent and extensive action, we may reach a situation where efforts to adapt to extreme conditions are no longer viable.

Another lesson learned concerns irrigation in protected areas in a process that affects several emblematic wetlands such as Doñana, Daimiel or Mar Menor. Agreements such as the one signed between the Government and the Junta de Andalucía to prohibit new irrigation–this should have been done preventively–are undoubtedly vital for the conservation of one of the most important wetlands in Europe such as the Doñana National Park, and are key to making progress towards intelligent water management.

It is very likely that water scarcity will become the new normal in many parts of Europe. Therefore, a reinvented Green Deal must address water scarcity through European investment programmes, an updated Water Framework Directive and the CAP. To obtain the support of Southern Europe, European institutions must do much more to address the specific circumstances of Southern Member States like Spain, given their strategic significance for EU food production and environmental protection.

---

1 https://www.eea.europa.eu/publications/water-resources-across-europe-confronting ; https://environment.ec.europa.eu/news/drought-and-water-stress-commission-report-shows-water-management-progressing-too-slowly-and-2021-12-15_en

2 https://environment.ec.europa.eu/news/commission-publishes-new-tools-help-predict-and-adapt-sectoral-drought-impacts-2023-10-11_en

3 https://www.waternewseurope.com/water-framework-directive-brussels-does-not-foresee-respite-after-2027/

4 See the chapters on stressed and critical areas in the report prepared by OS for Greenpeace. https://es.greenpeace.org/es/sabla-de-prensa/informes/la-burbuja-del-regadio-en-espana/

5 https://www.miteco.gob.es/content/dam/miteco/es/agua/temas/planificacion-hidrologica/ImpactoCCSistemasExplotacion_tcm30-98561.pdf

6 https://escenarios.adaptecca.es/

7 https://www.siose.es/presentacion

8 https://www.mapa.gob.es/es/estadistica/temas/estadisticas-agrarias/agricultura/esyrce/

9 Centro de Estudios Ambientales del Mediterráneo (CEAM), organismo asesor de la Comisión Europea. Workshop del Proyecto CIRCLE-2 SHARE.

CLIMATE PACTE VERT EUROPÉEN WATER GREEN DEAL EUROPE UE

BIODIVERSITY EUROPE