Miscellaneous

water and landscape
AGUA y TERRITORIO

Water challenges in the south of Portugal and Spain

Desafíos del agua en el Sur de Portugal y España

Maria Antónia Pires de Almeida
Independent scholar
Braga, Portugal
mafpa@sapo.pt
ORCID: 0000-0002-5583-3099

Article information
Received: 17/11/2024
Revised: 16/07/2025
Accepted: 18/07/2025
Online: 30/06/2026
Publicado: 10/07/2026

ISSN 2340-8472
ISSNe 2340-7743
DOI 10.17561/at.31.9324

ABSTRACT

Drought periods are a feature of the Mediterranean region, but water scarcity has grown in the south of Portugal and Spain since intensive agriculture was introduced and tourism has reached the highest levels. Superintensive olive groves and almond trees are irrigated all year round, using chemicals, technology and seasonal, precarious and illegal workers from Asia and Africa.

How are central and local governments addressing the water scarcity problem? What are the proposals and solutions? Several CSO and NGO advocate a more sustainable agricultural and tourism model. However, plans are being made to supply water to regions in severe and chronic drought, and to increase water consumption and agricultural production.

With research on legislation, and current negotiations, as well as content analysis of the press and social media, this article aims to identify and describe the major issues on the table regarding water management, and present recommendations.

KEYWORDS: Water, Drought, Dams, Agriculture, Tourism.

RESUMEN

Los períodos secos son una característica de la región mediterránea, pero la escasez de agua ha aumentado en el sur de Portugal y España desde que la agricultura intensiva y el turismo alcanzaron niveles más altos. Los olivares y almendros superintensivos se riegan durante todo el año, utilizando productos químicos, tecnología y trabajadores estacionales, precarios e ilegales procedentes de Asia y África.

¿Cómo aborda el Gobierno el problema de la escasez de agua? ¿Cuáles son las propuestas? Organizaciones de la sociedad civil y ONG abogan por un modelo agrícola y turístico más sostenible. Sin embargo, se están elaborando planes para suministrar agua a las regiones afectadas por la sequía y aumentar el consumo de agua y la producción agrícola.

Con una investigación sobre la legislación y las negociaciones actuales, y un análisis de contenido de la prensa, este artículo tiene como objetivo identificar los principales temas en discusión en torno a la gestión del agua y presentar recomendaciones.

PALABRAS CLAVE: Agua, Sequía, Represas, Agricultura, Turismo.

CC-BY

© Universidad de Jaén (España)

O problema da água no sul de Portugal e em Espanha

RESUMO

Períodos de seca são uma característica da região Mediterrânica, mas a escassez de água aumentou no sul de Portugal e de Espanha desde que a agricultura intensiva e o turismo atingiram níveis mais elevados. Os olivais e amendoais superintensivos são irrigados todo o ano, utilizando produtos químicos, tecnologia e trabalhadores sazonais, precários e ilegais da Ásia e de África.

Como está o problema da escassez de água a ser abordado pelo Governo? Quais são as propostas? Organizações da sociedade civil e ONG defendem um modelo agrícola e de turismo mais sustentável. Contudo, estão a ser elaborados planos para fornecer água a regiões afetadas por secas e para aumentar o consumo de água e a produção agrícola.

Com uma investigação sobre a legislação e as negociações atuais, e uma análise de conteúdo da imprensa, este artigo tem como objetivo identificar as principais questões em discussão sobre a gestão da água e apresentar recomendações.

PALAVRAS-CHAVE: Água, Seca, Barragens, Agricultura, Turismo.

Les défis de l'eau dans le Sud du Portugal et en Espagne

RÉSUMÉ

Les périodes de sécheresse sont une caractéristique de la région méditerranéenne, mais la pénurie d'eau s'est accrue dans le sud du Portugal et en Espagne depuis que l'agriculture intensive et le tourisme ont atteint des niveaux plus élevés. Les oliveraies et les amandiers super-intensives sont irriguées toute l'année, à l'aide de produits chimiques, de technologies et de travailleurs saisonniers, précaires et illégaux venus d'Asie et d'Afrique.

Comment le gouvernement aborde-t-il le problème de la pénurie d'eau? Quelles sont les propositions? Les organisations de la société civile et les ONG prônent un modèle agricole et touristique plus durable. Cependant, des plans sont en cours d'élaboration pour fournir de l'eau aux régions touchées par la sécheresse et pour augmenter la consommation d'eau et la production agricole.

À partir d'une enquête sur la législation et les négociations en cours et d'une analyse du contenu de la presse, cet article vise à identifier les principales questions en discussion concernant la gestion de l'eau et à présenter des recommandations.

MOTS-CLÉS : Eau, Sécheresse, Barrages, Agriculture, Tourisme.

Sfide idriche nel Sud del Portogallo e della Spagna

SOMMARIO

I periodi di siccità sono una caratteristica della regione mediterranea, ma la scarsità d'acqua è aumentata nel sud del Portogallo e in Spagna da quando l'agricoltura intensiva e il turismo hanno raggiunto livelli più elevati. Gli uliveti e i mandorleti superintensivi vengono irrigati tutto l'anno, utilizzando prodotti chimici, tecnologia e lavoratori stagionali, precari e illegali provenienti dall'Asia e dall'Africa.

Come viene affrontato dal governo il problema della scarsità idrica? Quali sono le proposte? Le organizzazioni della società civile e le ONG sostengono un modello agricolo e turistico più sostenibile. Tuttavia, si stanno elaborando piani per fornire acqua alle regioni colpite dalla siccità e per aumentare il consumo di acqua e la produzione agricola.

Con un'indagine sulla legislazione attuale e sui negoziati, e un'analisi dei contenuti della stampa, questo articolo mira a identificare le principali questioni in discussione riguardanti la gestione dell'acqua e presentare raccomandazioni.

PAROLE CHIAVE: Acqua, Siccità, Dighe, Agricoltura, Turismo.

Introduction

Our planet is facing an environmental crisis as a result of climate change and increased pressure on resources (soil, water and vegetation), with ecosystem unbalance and loss of biodiversity[1]. Mediterranean countries in particular are being challenged with drought, water scarcity, and depopulation in rural areas, with high impacts on the quality of this region's water resources[2] and on the quality of life of its citizens.

This article aims to identify and describe the major issues regarding water management in Portugal and Spain, where intensive agriculture and tourism are important features of their economic model. Such activities are in place for a few decades and they have already produced extreme challenges for the environment. They are responsible for water scarcity and do not contribute to reverse depopulation in interior and marginal regions. Particularly since irrigation is draining groundwater and dams reach low levels. They contribute to tensions regarding the use of the Alqueva reservoir, and the flow management of rivers during drought seasons. This article expects to be a contribution for the study of how human actions and economic behaviour affect the natural cycle of water and how we may reverse, or at least, mitigate the damage.

We aim to describe the context of the water sustainability problem in Portugal and Spain, to make a diagnosis of the situation, presenting the main economic activities that are contributing to the crisis, and to verify our research problems: a) Are agro-ecological conditions in the Iberian Peninsula (which include soil, water, wind, climate, geography) capable of supporting the extractivist model in agriculture and the excess of tourism? b) What are the damages and who is responsible for them? c) How are central and local governments addressing the water scarcity problem? What are the proposals and solutions? d) How are transboundary water relations being managed?

In these challenged territories there is urgent need for sustainable water resource management and conservation measures, including water for human consumption, for irrigation, and for the preservation of the environment and landscape. Several CSO —civil society organizations and NGO— Non-Governmental Organizations are raising awareness and confronting authorities. Particularly, they advocate a more sustainable agricultural model and different forms of tourism, based on nature and low use of resources. Plans are being made by policy makers and agricultural and tourism associations to supply water to regions in severe and chronic drought and water scarcity. Proposed solutions include building new dams, water transfers from North to South, desalination of sea water. However, these projects are meant to increase water consumption and agricultural production, not to reduce it.

Considering theoretical and practical studies on the subject, and definition of concepts, our methodology and research design are based on the study of legislation and international treaties, analysis of current negotiations, as well as content analysis of the press and social media. Some case studies regarding intensive agriculture, water scarcity, excess tourism and new projects are presented and they are our main contribution for the literature on the subject. Recommendations for public policies by governments are included, according to experts on the subject.

Definition of concepts

According to the European Commission, water scarcity and droughts occur when water demand exceeds the sustainable supply capacity of the natural system in river basins. They are increasingly frequent and widespread in the European Union. Overexploitation of available water resources can exacerbate the consequences of droughts. Further deterioration of the water resources in Europe is expected, if temperatures continue to rise as a result of climate change. Beyond water quantity, a situation of water scarcity can also emerge when pollution leads to reduced clean water availability.

Droughts are a temporary decrease of the average water availability due to insufficient rainfall, and are considered natural phenomena. The impact of droughts can be exacerbated when they occur in regions with low water resources or where these are not being properly managed. EU statistics inform us that 38 % of the EU population and 29 % of EU territory were affected by water scarcity in 2019[3].

[1] Roxo, 2023, 11.
[2] Abdelkarim et al., 2024.
[3] https://environment.ec.europa.eu/topics/water/water-scarcity-and-droughts_en#:~:text=Water%20scarcity%20is%20a%20seasonal,water%20abstraction%20or%20water%20use

In 2006, Kofi Annan, then United Nations Secretary-General, defined desertification as "the loss of the land's biological productivity"[4]. In 2003, on World Day to Combat Desertification and Drought (17 June), he had already stated that "desertification and drought pose an ever-increasing global threat. Human activities such as overcultivation, overgrazing, deforestation and poor irrigation practices, along with climate change, are turning once fertile soils into unproductive and barren patches of land. Arable land per person is shrinking throughout the world, threatening food security, particularly in poor rural areas, and triggering humanitarian and economic crises". In order to combat water scarcity he highlighted the need for "better water conservation and management"[5]. In Portugal, over 70 % of soils are in a high state of erosion and on the way to desertification[6].

Depopulation and desertification are social and political phenomena, and humans are at the core of the problem, both as instigators and victims. The planet's natural resources are under pressure due to human activities[7], particularly since we've entered the Anthropocene Age.

The concept of Anthropocene Age was introduced by Crutzen and Stoermer[8] (2000), establishing its beginning around 1750, with the Industrial Revolution, when humans first left striking and lasting marks on the planet, such as the chemical structure of the atmosphere, the ozone layer, water cycles, biodiversity balance, global temperature average and others. Other definitions followed and presently the date is closer to the end of World War II. Steffen, Broadgate, Deutsch, Gaffney and Ludwig present a series of socio-economic graphs which confirm the "Great Acceleration" since 1950[9].

The main cause for the loss of biodiversity may be found in the destruction of habitats caused by transformations in soil use, particularly the conversion of natural areas into agricultural and pasture land[10]. Intensive agriculture uses a chemical-mechanical model, with increased input consumption: fertilizers, pesticides, water, fuel, and electricity, which reduces the efficiency of agriculture production, leading to pollution and inacceptable ecological costs. It devastates the few remaining natural ecosystems by increasing deforestation and CO_2 emissions, producing a biodiversity crisis[11]. It is related to the concept of Agribusiness, defined in 1957, as "the business of agricultural production which involves the production, protection, sales, and marketing of the product to satisfy the customers need"[12]. It includes agrichemicals, breeding, crop production (farming or contract farming), distribution, farm machinery, processing, and seed supply, as well as marketing and retail sales. And it implies processing and distribution of the resulting commodities, such as food, fibre, wood products, natural resources, horticulture, and other plant and animal products and services.

Superintensive monoculture and capital-intensive enterprises are features of Agribusiness and of "neoextractivism", both developed in Latin American economies since the beginning of the twentieth century, in a production intensive approach to development, or a "development illusion". This is part of an international land-grabbing trend with a socio-territorial model linked to monoculture, in which water and land are all mobilized, wasting soils, eliminating other forms of production, damaging local and regional economies and driving people away[13]. "Extractivism involves appropriation of natural and human resource wealth, producing a drain that damages or depletes its source in a potentially irreversible way (...) biodiversity loss, and deforestation, are wedded to capital accumulation and the drive for continued exponential growth of the world economy"[14].

Since the nineteenth century, the myths of the new technological society, or the development paradigm, believe in illimited growth, blind faith in science and loss of connection to nature. Equilibrium is based on technology and the arguments of green energy and increased production disrespect local communities, because gains are not used locally[15].

The limits to growth are not a new concern: a 1972 report discussed the possibility of exponential economic and population growth with finite supply of resources, with consequences to the environment. Among this book's conclusions: it is possible to alter these growth trends and to establish a condition of

[4] https://press.un.org/en/2006/sgsm10501.doc.htm
[5] https://press.un.org/en/2003/sgsm8750.doc.htm
[6] Martins-Loução, 2021.
[7] Roxo, 2023, 22-23.
[8] Crutzen; Stoermer, 2000.
[9] Steffen et al., 2015.
[10] Santos, 2017, 15.
[11] Santos, 2013.
[12] Davis; Goldberg, 1957.
[13] Svampa, 2019.
[14] Chagnon et al., 2022.
[15] Martins-Loução, 2021.

ecological and economic stability that is sustainable[16]. Liberals considered this report a violation of the religious dogma of exponential growth. But the bottom line was that there should be a new notion of progress based not exclusively in material indicators, such as GDP —Gross Domestic Product[17]—.

Against the old concept of development, the *Brundtland Report - Our common future*, published in 1987, defined sustainable development as meeting "the needs of the present without compromising the ability of future generations to meet their needs". For that matter, "land should not be degraded": "Development tends to simplify ecosystems and to reduce their diversity of species". Sustainable development "requires the conservation of plant and animal species" and it also "requires that the adverse impacts on the quality of air, water, and other natural elements are minimized so as to sustain the ecosystem's overall integrity"[18].

Decades later "modern-day land grabbing is being facilitated by a continued persistence of the neoliberal economic paradigm", with "frugal governmental involvement with the affairs of the private business sector and the pursuit of a business-friendly investment climate"[19]. Spain and Portugal are complying with this paradigm and the results are challenging.

International organizations and treaties

In the twentieth century the world began to pay attention to the water issue: in 1965 UNESCO declared an International Hydrological Decade, alerting to scarcity, pollution and inequalities in the access to water; in 1968 the European Council approved the European Water Chart, reinforcing the vital importance of water to life and alerting to the necessity of an inventory and efficient management. And in 1972 the Stockholm Conference –The United Nations Conference on the Human Environment– was the first event where governments committed to convergent environmental policies and the future of natural resources, including water[20]. 113 States participated, including Spain and Portugal. Recommendations included applied research on soil and water conservation.

In Portugal, desertification was mentioned for the first time in the nineteen fifties. In 1971, a National Committee for the Environment was created[21]. However, huge problems persisted in water supply and sewage. In 1974, the year of the Carnation Revolution, there was a cholera epidemic in the Algarve, Lisbon and Porto, with a thousand registered cases and fourteen deaths. Authorities were forced to intervene in the water supply chain and sewars[22]. Back then, 50 % of the Portuguese population had no running water and only 17 % had access to the sewer system. In 1980 there was a severe drought and the scientific community looked into the problem, but not much was improved in public policies[23]. Upon entering the European Union in 1986 (EEC at the time), European funds helped solve most of these problems and a new environmental paradigm was enforced[24].

In 1987 the Single European Act added a chapter on environment to the 1957 Treaty of Rome. It was considered the greening of the Common Agricultural Policy. Legislation was produced and transposed into each country's laws. For example, the Nitrate Directive, in 1991 (91/676/CEE), was the first common policy towards agriculture with the purpose of reducing water pollution. It was written into the Portuguese Law in 1997 (Decree n. 235/97, 9 March).

In 1993 Spain introduced a Hydrological Plan whose objective was to retain water in international rivers. This caused alarm in Portugal and led to negotiations, resulting in the Albufeira Treaty, for the shared management of Portugal's five major rivers, whose source is in Spain, following Recommendation number 51 of the Stockholm Conference, which concerned "the creation of river-basin commissions or other appropriate machinery for co-operation between interested States for water resources common to more than one jurisdiction"[25].

The Abufeira Treaty was signed in 1998, put in place since 2000, and it incorporates EU common policies on water. Its main purpose is to cooperate for the protection and sustainable use of water resources of hydrographic basins shared by Portugal and Spain: Minho, Lima, Douro, Tejo (Tagus) and Guadiana, and to protect their aquatic and terrestrial ecosystems. There was a

[16] Meadows et al., 1972.
[17] Soromenho-Marques, 2023, 52.
[18] WCED, 1987.
[19] Pols; Romijn, 2017.
[20] Ferreira; Sereno, 2023, 157. United Nations, 1973: 4.
[21] Pessoa, 2023, 38-39.
[22] Almeida, 2013b, 70.
[23] Roxo, 2023, 71.
[24] Ferreira; Sereno, 2023, 161.
[25] United Nations, 1973, 17.

revised protocol in 2008 with the purpose of defining a flow regime necessary to guarantee the waters' good conditions for each hydrographic basin[26].

In 2001 Spain issued a National Water Plan (Law 10/2001, 5 July). There was a Special Drought Plan in 2018 (Order TEC/1399/2018, 28 November) to review drought management plans for most Spanish rivers. It contemplated climate change and new demands for irrigation. And Law 7/2021, 20 May, regarding climate change and energy transition, contemplated water management[27].

In 2005 a Water Law was approved in Portugal (Law n. 58/2005, 29 December), after European Parliament Directive n. 2000/60/CE, establishing the basis for sustainable water management. And in 2016 a National Water Plan was put in place by the National Environment Agency for ten years, after Decree n. 76/2016, 9 November[28]. The agricultural sector is one of the main concerns of this plan, particularly the use of water for irrigation, and pollution.

In 2019, an EU growth strategy introduced the European Green Deal. Based on sustainable development, it mentions water, but only in regard to quality and pollution[29]. Worldwide, the United Nations 2030 Agenda for Sustainable Development established seventeen goals, which include references to sustainable agriculture, water management, terrestrial ecosystems, desertification, and to "halt and reverse land degradation and halt biodiversity loss"[30]. All of them are being challenged by extractivism and the type of resource mismanagement hereby described. The UN *Summit of the Future* in New York, September 2024 produced a *Pact for the Future*. Among its goals: to prevent and manage water scarcity and ensure the availability and sustainable management of water and sanitation for all; to deal with causes and adverse impacts of climate change, biodiversity loss, pollution, water scarcity, floods, desertification, land degradation, through the implementation of existing intergovernmentally agreed commitments and multilateral environmental agreements[31].

Water management in Portugal and Spain: dams and reservoirs for irrigation

For centuries, the Iberian Peninsula has faced water management as a serious issue, regarding the Mediterranean climate, with rainy winters and dry summers. Traditional Iberian agriculture required little irrigation. The *Montado*, or *Dehesa*, in Spain, is a system which combines forest and pasture, with cork tree and holm oak woodlands. Oaks provide firewood, coal, and acorn to feed the swine. Cork trees supply cork for an industry which has placed Portugal as a worldwide leader in the business. Fire prevention is another example of an important regulating service provided by well-managed *Montado*. As a complement to *Montado*, there were cereal crops, both for human and animal consumption, vegetable and fruit gardens, olive trees for olive oil, vines for wine production, cattle herds of swine, sheep, goats, and cows for meat, milk and cheese, as well as small farm animals: chickens, rabbits, even bees for honey[32].

Alentejo region occupies 40 % of the Portuguese territory and for centuries it has been considered that it should provide for the entire country, therefore it needed more water for irrigation. The "Agrarian Question" was first put in writing by Father Manuel Severim de Faria in 1655[33]. Several eighteenth century physiocrat and mercantilist authors who were published in *Memories of the Academy of Sciencies of Lisbon* were Faria's followers. They presented solutions for increasing wheat production[34]. Soares de Barros, the author who introduced demography in Portugal, wrote in 1789 that someday Alentejo should become Portugal's barn[35].

There were several policies put in place to increase wheat production in this southern región. Since the late ninteenth century there were plans for dams construction, and in the 1930s these projectsd became a goal of the authoritarian regimes of Franco and Salazar[36], with multiple purposes: demographic, economic, cultural and social development of the people; to supply electricity to cities and industries; to increase industrialisation; to irrigate crops and to increase agricultural

[26] https://www.cadc-albufeira.eu/
[27] https://www.miteco.gob.es/es/agua/temas/sistema-espaniol-gestion-agua.html
[28] https://apambiente.pt/agua/plano-nacional-da-agua
[29] Dias, 2020, 15.
[30] https://sdgs.un.org/2030agenda.
[31] https://www.un.org/en/summit-of-the-future.
[32] Almeida, 2020, 3.
[33] Faria, 1740.
[34] Santos, 1993.
[35] Barros, 1990. Almeida, 2020.
[36] Faísca, 2023.

production[37]. These public works policies enhanced an extractivist culture around water resources during the long phase of productive intensification in both countries, which is still ongoing, including the intensive use of groundwater[38].

None of this has prevented a rural exodus in the 1960s, both in Spain and Portugal[39], resulting on the *España Vacía* (Empty Spain)[40]. Reasons include industrialization and construction works in the outskirts of Portugal and Spain's large cities, which attracted rural labourers to better paid jobs; emigration to other European countries, and search for better life and working conditions. In Portugal, the Colonial War was also an important factor at the time, not only because of the young men who went to war, but also the ones that deserted and escaped abroad.

In Spain there are over 1,200 large dams, 450 built before 1960. They are considered an engine of the Spanish economy, because of the benefits they provide for irrigation, public supply, electricity and industry, as well as flood prevention[41].

In Portugal, these huge public works of the Estado Novo regime irrigated over 75,000 hectares (ha) in Alentejo. After the Alqueva Dam was completed in 2010, with 250 square kilometres, or 25,000 ha, there are now over 176,000 ha of irrigated land in the region. Dams are used to irrigate agriculture, to supply public water, to produce electricity, for leisure, sports, rowing, sailing, fishing, and for flood prevention[42]. Alentejo and Algarve, on the South of Portugal, have the highest concentration of irrigated land, because they are the driest regions in the country. In the North, where water is abundant, dams are used mostly for the production of energy and flood prevention.

Our case study is the Maranhão and Montargil reservoirs, with 3,600 ha. Located in Avis and Ponte de Sor, Northern Alentejo, these two dams were inaugurated in 1959. Since then, they have produced electricity and have irrigated over 18,000 ha of tomato, maize and rice fields for 124 km all the way to Vila Franca de Xira[43]. Throughout five decades, Maranhão's water was enough to irrigate all these farms.

From the reports of the Association of Vale do Sorraia Beneficiaries, which privately owns and manages the Maranhão and Montargil dams and reservoirs, we realice that olive groves have only been irrigated since 2006[44]: traditional olive groves had no need for irrigation; from then on, superintensive olive groves have been irrigated in environmentally sensitive areas with inappropriate climatic conditions, where rain has diminished lately[45]. The area they occupy has grown from almost zero in 2006 to almost 5,000 ha in 2022[46].

In the last decades, Alentejo's superintensive olive groves were planted in lands where the main quality products of the Portuguese agriculture were produced: corks for champagne and wine bottles, olive oil for gastronomy, and wine. They were bought by foreign investment funds and venture capital companies, mostly Spanish[47]. Farms who had been in possession of the same families for centuries[48], are now owned and explored mostly by foreigners in an international trend for land grabbing and resource appropriation.

However, from top quality olive oil, produced in olive groves where trees are thirty feet apart and need no irrigation, the new superintensive olive trees are two feet apart (Figure 1 and Figure 2), they need irrigation all year long, using chemicals and pesticides (Figure 3), and technology. This chemical-mechanical model has huge input consumption: water, fertilizers, fuel for mechanization, electricity. It has been described by agronomists as inefficient in costs and in the use of chemical inputs[49].

This model seems to create a limited number of new permanent jobs. It generates mostly temporary ones, with low wages and seasonal, precarious and illegal workers, mostly male, without family. Due to the lack of local labour, this workforce is recruited seasonally by agencies in Eastern Europe, Nepal, Thailand, Pakistan and Africa[50]. They live in inadequate conditions, many of them in crowded rooms and containers, walking the roads of Alentejo to find work in farms away from the

[37] Lei n.º 1949, de 15 de fevereiro de 1937 (Ministério da Agricultura, 1937). Lei n.º 2002, de 26 de dezembro de 1944 (Ministério das Obras Públicas e Comunicações, 1944).
[38] Vilariño Alvaredo, 2024.
[39] Faísca, 2023.
[40] Molino, 2016.
[41] https://www.miteco.gob.es/es/agua/temas/seguridad-de-presas-y-embalses/desarrollo.html
[42] https://apambiente.pt/prevencao-e-gestao-de-riscos/barragens-de-portugal#:~:text=%E2%80%8B%E2%80%8B%E2%80%8B%E2%80%8B%E2%80%8B,1%20milh%C3%A3o%20de%20metros%20c%C3%BAbicos.&text=As%20barragens%20existentes%20t%C3%AAm%20diferentes,e%20a%20produ%C3%A7%C3%A3o%20de%20energia
[43] Almeida; Faísca; Freire, 2023. https://www.arbvs.pt/index.php/culturas/carta-agricola.
[44] https://www.arbvs.pt/index.php/culturas/area-regada.
[45] Roxo, 2023, 33.
[46] https://www.arbvs.pt/index.php/culturas/area-cultivada.
[47] EDIA, 2023, 124, 127.
[48] Almeida, 2013a.
[49] Santos, 2013.
[50] Silveira et al., 2018, 262.

villages (Figure 1, Figure 2, Figure 3, Figure 4). Portugal has social and welfare laws, minimum wage, insurance policies, regulations for hygiene and safety at work. However, these immigrants are victims of illegal human traffic and have no guarantee of proper working conditions. The use of immigrant workforce in illegal conditions replicates the Californian model, both in the South of Portugal and Spain[51]. Although the arrival of these labour immigrants might have been considered an opportunity to reverse depopulation in rural areas of Spain and Portugal, their migratory strategies and seasonality compromise their settling[52].

Figure 1. Tradicional olive grove in Avis, Alentejo



Source: Author's photograph 4 December 2022.

Figure 2. Superintensive olive grove near the traditional *montado*, Avis, Alentejo



Source: Author's photograph 4 December 2022.

[51] Corrado; Castro; Perrotta, 2016. Gertel; Sippel, 2014. Hoggart; Mendoza, 2002.
[52] Camarero; Sampedro, 2019, 60-61.

Figure 3. Pulverising chemicals on superintensive olive groves, Avis, Alentejo



Source: Photograph by Fernando Máximo, Avis.

Figure 4. Migrant workers on the roads of Alentejo



Source: Author's photograph 20 May 2024.

Chemicals are contaminating groundwater and the Maranhão reservoir, whose margins are filled with green waves of microcystins: toxins produced by cyanobacteria that cause liver damage in humans and livestock.

The new olive groves have helped increased exports and the Portuguese GDP: in 2021 exports rose 12.3 %,

in 2022 they rose 17.4 %, as GDP rose 6.8 % in 2022[53]. These figures are a delight to politicians and economists, with no consideration for the consequences[54]. Particularly because they were produced at the expense of the wellbeing of the rural populations that inhabit these territories, where pollution became a reality, and depopulation continues to rise, genetic and soil erosion are there to be observed, and water consumption has grown exponentially, in times of chronic water scarcity.

Southern Iberian territories have become "multiply stressed regions"[55]. There are problems with air pollution caused by fumes produced by mills, and residue disposal of olive pomace has grown exponentially. There is also the excessive use of plastics: in Almeria greenhouses for fruits and vegetables, based on the exploitation (and overexploitation) of groundwater[56], occupy 30,000 hectares (from a total of 70,000 ha in Spain) and may be observed from space since 1985[57]. In Southwest Alentejo and Vicentine Coast Natural Park, a part of the 2000 Natura Network, investment companies completely ignored the law that protects natural parks. Located on top of cliffs, in 2023 greenhouses occupied 4,000 ha in Odemira, for the production of berries and other fruits and vegetables, mostly to be exported to Northern Europe[58]. There are also avocados and citrus plantations, which consume enormous amounts of water. New avocado plantations are being projected for the Sado region, but public petitions by NGO and CSO are being considered to stop them. And showing results, since authorities have rejected them[59]. This is agricultural densification in an agro-silvo-pastoral territory with great ecological sensitivity, which resulted in cutting traditional *montado* forest, loss of biodiversity, and enormous pressure on water resources, particularly groundwater[60].

The agricultural sector was incorporated into neoliberal policies and globalization. This new agrarian model based on intensification is harmful for local economy, and social development. Unemployment is high in these regions, as well as aging population, emigration, and social emptiness[61], due to depopulation and particularly when communities are disolved and shared experiences are absent. The 2021 census showed a drastic reduction of the population in most of Alentejo's municipalities. From 2011 to 2021 the municipality of Avis has lost 16.6 % of its population. Among those who have remained, 32.8 % were over 65 years old in 2021, and only 19.8 % were younger than 24[62]. Unemployment rates were 8.6 %. Municipalities near the Alqueva irrigation area, and Odemira, where the largest concentration of greenhouses and foreign workforce is located, unemployment rates were even higher[63]. The latest studies on the Alqueva highlight that the municipalities within the Alqueva irrigation perimeter have not yet demonstrated any demographic or economic differentiation compared to other inland Portuguese regions[64]. The reservoir has produced a residual impact on depopulation, and dependency on migrant workers, which creates challenges for profesional integration and pressure on housing and local infrastructures[65].

On the other hand, as a consequence of the new technological agriculture, there are new qualified jobs: agronomists are in high demand[66]. However, they don't usually live in these territories: they only go there to work. And most of the companies' headquarters are located elsewhere[67].

Large investments have been made and they are only viable for sizable estates, the dimensions of which exceed traditional latifundia in Portugal. According to the Alqueva management report, olive groves should be explored in large estates to reduce production costs and increase mechanisation[68]. One of the landowners in the region possesses 7,000 ha of olive groves, plus two processing plants, and controls distribution of olive oil[69].

This type of largescale investment has recently moved North of the Tagus River for the plantation of almond trees. Those farms are owned by three international investment funds, who, in 2021 controlled 3,650 ha, causing structural change in the municipality of Idanha: from small farms to international scale agriculture, there was an increase of the use of resources, mainly water[70].

[53] https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_destaques&DESTAQUESdest_boui=593631212&DESTAQUESmodo=2
[54] Martins-Loução, 2021.
[55] Horstink; Schwemmlein; Encarnação, 2023.
[56] Vilariño Alvaredo, 2024.
[57] Dias, 2024b; 2024c.
[58] Moreira; Lopes, 2023.
[59] Tomás, 2024b.
[60] Dias, 2024a.
[61] Silveira et al., 2018, 269.
[62] https://www.ine.pt/scripts/db_censos_2021.html.
[63] IEFP, 2024.
[64] Faísca, 2023.
[65] Suspiro, 2025.
[66] Carvalho, 2024.
[67] EDIA, 2020, 64.
[68] EDIA, 2020, 23.
[69] https://www.sovenagroup.com/pt/o-nosso-mundo/segmentos-de-atuacao/agricultura-sourcing/.
[70] Carvalho, 2024.

Drought and water scarcity: agriculture and tourism

Over the last decade there has been extreme drought in Mediterranean countries, particularly in the South of Spain and Portugal. Compared to the precipitation average from 1940 to 1998, there was a decrease of 15 % in 2022-2023. For the Sado River Basin, in the Western Alentejo region, precipitation decreased 47 %. To aggravate the problem, groundwater in the South of Portugal has been decreasing in the last twenty years and is now under 20 % of its capacity, as a result of lack of rain and unregulated and uncontrolled extraction[71]. On July 2024 the Government divulged that there were 3,790 illegal wells pulling groundwater for public supply, disregarding hydric resources protection laws (Decree n. 382/99, 22 September 1999, and the Water Resources Use Regime, Decree n. 226-A/2007, 31 May 2007). From then on, Decree n. 69/2023, 21 August 2023, which requires georeferencing of captures and sending data to the Portuguese Environment Agency, is supposed to be enforced[72].

In some regions there were a few years when rain did not fall at all, causing dams to reach levels never observed before. On the Maranhão reservoir, water storage was less than 25 % in 2017-2018, 2019, and 2022[73] (Figure 5). On 15 April 2024, after a rainy winter, the Spanish water reserves were at 66.6 % of their capacity[74]. Catalonia, Murcia, Andalusia, and Valencia were the regions where water was scarcest: their main cities were already reducing private consumption of water.

Figure 5. Empty Maranhão reservoir, 28 October 2017



Source: Author's photograph.

In Portugal, the main source for drinking water supply, agricultural, and industrial purposes, is groundwater. However, groundwater is limited and in recent decades has suffered a qualitative and quantitative degradation caused by anthropic (over-exploitation and pollution) and natural (type of climate and global warming) constraints. It is diminishing and becoming salty and contaminated with toxic agrochemicals, particularly nitrates: "In Europe, agriculture is the main source of diffuse groundwater pollution. The over-application of nitrogen soil inputs promotes nitrate leaching to surface and groundwater and associated impacts on human health and biodiversity (...) This situation is mainly due to a decrease of surface water recharge, associated to the increase of pollutant sources, as well as inadequate agricultural practices"[75].

According to a study commissioned by the Calouste Gulbenkian Foundation Sustainable Development Programme, "the agri-food industry accounts for 75 % of total water used, a sharp contrast with the European average (24 %) and higher than the world average (69 %), although in line with Mediterranean countries such as Spain and Greece. This is explained by the use of irrigation." Main findings: Portugal faces the risk of water scarcity in the next 20 years; the majority of farms do not measure the amount of water they use (71 % don't have a water meter); water is, mostly, withdrawn from boreholes, ponds, wells and other private structures. Water is a low cost in the overall expenditure of the activity[76].

Drought periods have always been a feature of the Mediterranean region, but water scarcity has grown exponentially since intensive agriculture was introduced in the South of Spain and Portugal. And this is killing the traditional *montado*, with oak trees dying from lack of groundwater[77]. In Portugal, agriculture uses 70 % of all water consumed in Portugal. Intensive olive and almond groves have grown exponentially in Alentejo, as in Algarve, oranges and avocados highly contribute to water scarcity[78]. And it's precisely in those regions were irrigation is at its fullest, both in agriculture and tourism, that reservoirs have reached their lowest point. On October 2023 the Bravura reservoir, in

[71] Ramos, 2024. Dias, 2024a.
[72] Lusa, 2024a.
[73] https://www.arbvs.pt/index.php/agua/albufeiras.
[74] https://www.embalses.net/.
[75] Gomes; Antunes; Leitão, 2023.
[76] https://gulbenkian.pt/en/initiatives/sustainable-development-programme/gulbenkian-agua/.
[77] Roxo, 2023, 36, 90.
[78] Tomás, 2025.

Algarve, was 7 % of its capacity. On November 2024 it was 12 %[79]. And resorts are being built with golf courses that shall consume even more water.

Near the border with Portugal, in the Doñana National Park, drought, high temperatures and intensive agriculture are draining groundwater, and damaging the ecosystem. In 2021 the CJEU —The Court of Justice of the European Union condemned the Spanish Government for failing to act against the "excessive extractions of groundwater"—. Over a thousand illegal wells are irrigating approximately 4,700 ha of red fruits in the region. According to scientists, groundwater is currently under 30 % of its capacity[80]. The park has already lost its lagoons, and it has been removed from the IUCN —International Union for the Conservation of Nature green list, because of poor management[81]—.

Along with superintensive agriculture, tourism is greatly responsible for water scarcity. It consumes large amounts of water, particularly groundwater to irrigate golf fields and supply swimming pools and water parks[82]. In general, tourism is one of the causal agents of climate change, as it generates transformations in land use and favours CO_2 emissions, especially due to air travel. Travellers have reached around 1.5 billion per year, with environmental repercussions and a relevant carbon footprint[83].

26.5 Million tourists visited Portugal in 2023, mostly from Spain, the UK, France, and the USA[84].

Spanish tourist industry represents 12.8 % of its GDP and 12.6 % jobs; over 85 million foreign tourists visited Spain in 2023, placing the country in second worldwide, after France. In Catalonia, water scarcity is directly related to tourism: 18 million visited Catalonia in 2023, 12 million in Barcelona. On April 2024 Catalonia was the Iberian region with the lowest water reserves, even with the 2023-2024 rainy season. Restrictions to water consumption were applied, leading entrepreneurs in the tourism sector to purchase a 1.5 million euros desalinator, to remove bathtubs from hotel rooms, and to use processed water in water closets[85]. This was the water scarcity situation before the DANA storm in the Valencia region on 29 October 2024 and then Malaga on 13 November, which has killed over two hundred people and caused mass destruction[86].

Recently, the West Coast of Alentejo has been discovered and investors call it "The new Hamptons". International celebrities are buying properties, and resorts are being built on top of cliffs and dunes, damaging the ecosystem and consuming enormous amounts of water, particularly for golf courses. Troia, Melides and Comporta: the empire of seashore golf courses, when Portugal is going through extreme drought?[87].

Local reactions and actions

Several CSO and NGO in Portugal are raising awareness and confronting authorities. Particularly, they advocate a more sustainable agricultural and tourism paradigm. For example, *Dunas Livres*[88] have contested in court the construction of a resort in Comporta, over the dunes, which limits the beach access to a privileged elite, against Portuguese law. However, the mayor of the municipality of Grândola issued a "public interest" justification to the resort and the construction moved on. Demonstrations by concerned citizens took place in Grândola. This municipality is the symbol of the 1974 Portuguese Revolution, because the Revolution's theme song was "Grândola Vila Morena", where "the people are in command". Apparently international resorts are above the law and the people are no longer in command. On the 2024 parade to celebrate the fiftieth anniversary of the Revolution, a sign read: "1974 – Carnation Revolution; 2024 – No water for carnations" (Figure 6). Carnations were also a symbol of the revolution, but water is no longer available to irrigate them.

In Barcelona there have been several demonstrations against excessive tourism, such as the ones on 27 June and 6 July 2024, with 2,800 protesters on the streets. The major concern is the price of housing: according to the municipality, rentals have increased 68 % over the last decade, with negative consequences on local commerce, environment and working conditions[89]. On February 2025 the Spanish Government and the Communes of Catalonia have agreed to double the tourist tax up to 15 euros a night, and allocate 25 % of its income to combat the housing crisis, in a "new package

[79] https://barragens.pt.
[80] Alcalde, 2024.
[81] Soares, 2023. Ramos, 2024.
[82] Roxo, 2023, 43.
[83] Dorta-Antequera et al., 2024, 155-158.
[84] Ribeiro, 2024.
[85] ZAP, 2024. Lusa, 2024b.
[86] Khalip; Landauro, 2024.
[87] Fazendeiro, 2023.
[88] https://dunaslivres.pt/en/.
[89] Lusa, 2024b.

Figure 6. Demonstrations in Lisbon on the 50th anniversary of the 25 April 1974 Revolution



Source: Traditional parade down the Avenida da Liberdade, in Lisbon. Photo by Catarina Rosa, *Dunas Livres* – https://dunaslivres.pt/en/

of fiscal measures to deal with the impact of tourism and combat property speculation"[90].

The desalination of sea water in the Algarve is also being contested in a lawsuit by a large number of environment associations, with the argument of violation of national and European laws regarding the National Ecological Reserve, and land and marine habitats. They also claim that desalination will not mitigate the problem of water shortage in the Algarve region[91]. However, the project was approved, with RRP financing[92].

Transboundary water solutions

Within this economic model, with agriculture and tourism draining all the water, with consecutive drought years, and groundwater reserves reaching the lowest levels, tensions tend to arise, particularly when there is the largest manmade lake in Western Europe near the border: the Alqueva reservoir.

The Alqueva Dam was built with Portuguese public and private funds. The current beneficiaries are mostly foreigner landowners. And locals don't seem to benefit from this type of agriculture. On the contrary: resources are used, pollution increases, profits go abroad, workers come from abroad. The problems with Spain arise from the fact that Huelva's farmers have been using water from the Alqueva reservoir for the last two decades, without paying (Alqueva's water has a price). Huelva region is facing extreme water scarcity, not only because of lack of rain, but because of intensive agriculture (superintensive olive groves and fruits). EDIA, the public company that manages the Alqueva's water, divulged that Spanish farmers had illegally extracted water for twenty years. At two million euros per year, there was a forty million debt[93].

On the other hand, the Algarve region needs the Guadiana River's water, because its water reserves are at their lowest point, both on reservoirs and groundwater. Internal tensions also arise from this situation, because of opposite interests of agriculture and public water supply. There is a project to use Guadiana's water to supply the Algarve region, with an investment of 61.5 million euros to divert water near the border, to the Odeleite Dam (36 km South), with European funds. But the municipalities of Southern Alentejo and some environmental agencies and NGO consider that this project should prioritise public consumption and small farmers, the ones that have suffered the most in the last few years with restricted access to water. They are against the excessive use of water for intensive agriculture[94].

On 26 September 2024 the Ministers of the Environment from Spain and Portugal reached an agreement on the management of the Tagus and Guadiana Rivers' regular ecological flow and the use of the Alqueva water. Spanish users shall pay the services of the Alqueva reservoir with the same conditions and the Portuguese users. The twenty-year debt was forgiven[95].

[90] Toro; Alcobendas; Pruna, 2025. Whitehead, 2025.
[91] Tomás, 2024a.
[92] Revez, 2024.
[93] Brito, 2024.
[94] Lusa, 2024c.
[95] Flor, 2024.

Recommendations for public policies

Mediterranean native biodiversity isn't compatible with current irrigation systems[96]. Considering that agriculture and tourism are main factors to water scarcity, here are some recommendations, according to experts in different fields.

An integrated vision of the environmental issue, based on science and the educational system, should be enforced, with the support of public funds in articulation with market players and civil society[97]. Measures and actions to promote conservation and regeneration of soils and ecosystem biodiversity imply environment, social, economic, and cultural strategies: to inform society; to promote knowledge regarding soil and biodiversity literacy; to divulge good practices; to finance applied experimental research; to improve the knowledge of each territory and to adapt different policies to different geographical and climate conditions; to increase resilience and good governance practices of the land and the people who live there; territorial planning must promote sustainable development based on natural and human resources for each different region[98].

The same recommendations may be found on the study commissioned by the Calouste Gulbenkian Foundation, which added a list of stakeholders that should meet these long-term challenges: farmers, the agricultural sector, the food industry, large-scale distributors and, ultimately, the end-consumer[99]. This study introduces the theme of consumer responsibility for "designing new standards for the conscious use of water". Consumer choices should take into consideration health, source, use of chemicals, carbon footprint and other factors: "with regard to food choices, retailers and the agri-food industry are the major enablers for making 'indirect water use' part of purchase decisions"[100].

Responsibilities regarding solutions should be shared both by local and national actors. Should we all be bystanders or actors? To avoid irreversible damage and loss of well-being, the ability of households or society to make meaningful choices should be strengthened[101]. Consumer behaviour may respond to product differentiation regarding ecological footprint; and bio products could benefit from direct economic incentives[102].

Regarding sustainable agriculture, the 1987 *Brundtland Report* mentioned that "future increases in productivity, in both developed and developing countries, should be based on the better controlled application of water and agrochemicals, as well as on more extensive use of organic manures and non-chemical means of pest control"[103]. Low intensity farming is a type of agriculture compatible with the environment[104]. Extensive agrarian systems are important for biodiversity, and they were classified as Farm Areas of High Natural Value by the European Agency for the Environment. They are important for the future of agriculture production, because it depends on genetic diversity. The loss of biodiversity results on less resilient local ecosystems[105].

There are contradictions regarding the way farmers are viewed by society: pollutants versus guardians of the environment and rural landscape[106]. Intensive monoculture is all about pollution and resource appropriation. On the other hand, there are examples of successful farms, farmers associations and networks that practice extensive agriculture, with multiple traditional activities, such as Montis[107], Rewilding Portugal[108], Montado do Freixo do Meio[109], Herdade dos Lagos[110], Natura Connect[111]. They prove that it is possible and viable to practice agriculture without consuming extensive amounts of water for irrigation. The products of this type of agriculture have higher value on the market, and they have socio-economic impact on their regions[112]. However, since they are more expensive, they may be considered luxury items, not affordable to most of the population.

Agriculture also has an important job at contributing to landscape, which is a fundamental feature of rural areas' cultural activities, whose economic impact may be accounted for[113]: travellers enjoy beautiful landscapes, with lakes and biodiversity. Hunting and gastronomy are also traditional activities included in the heritage experience of the new uses for the rural[114].

96 Martins-Loução, 2021.
97 Soromenho-Marques, 2023, 54.
98 Roxo, 2023, 120-122.
99 https://gulbenkian.pt/en/initiatives/sustainable-development-programme/gulbenkian-agua/.
100 Dias, 2020, 14-15.
101 Pols; Romijn, 2017.
102 Santos, 2013.
103 WCED, 1987.
104 Mansinho et al., 2018, 604.
105 Santos, 2017, 13-15.
106 Madureira; Mansinho; Fontes, 2018, 593.
107 https://montisacn.blogspot.com/p/montis.html.
108 https://rewilding-portugal.com/.
109 https://freixodomeio.pt/en/.
110 https://herdade-dos-lagos.de/en/.
111 https://naturaconnect.eu/.
112 Mansinho et al., 2018, 605.
113 Madureira; Mansinho, 2018, 587-589.
114 Almeida, 2020.

Farmers are important as nature's keepers for leisure activities, which are incompatible with intensive agriculture. There should be a new paradigm regarding economic benefits for ecologic regeneration[115].

These practices do not exclude technology, which has increased the efficient use of water resources in agriculture[116]. In order to encourage "the adoption of sustainable agricultural practices", there is the need to foster "environmental awareness, technical knowledge, and on-farm demonstrations; and, on the economic and financial level, incorporation of both general incentives and subsidizing specific costs"[117]. Regarding irrigation, water has a cost. The price of water for agriculture has to be accounted for and farmers must adopt irrigation practices that save water[118]. Not only extraction laws must be enforced, but inspection resource use hasn't been applied so far[119].

Other dams are expected to be built, one of them already approved with European Funds from the 2021 Recovery and Resilience Plan: the Pisão Dam, whose main objective is to increase the Alentejo Region's irrigated area for intensive agriculture[120]. According to the plan, this dam shall prevent the increase of depopulation and contribute to the economic development of the region. However, if these objectives weren't accomplished in 1959 when the Maranhão Dam was built in nearby Avis, how can they be now? Recently the Portuguese government has created a six-month working group with the purpose of elaborating a new national strategy for water management, with the Alqueva management company (EDIA) as one of the main partners (16 July 2024). The national strategy should now be focused on water efficiency, water safety, and territorial economic planning. A new irrigation plan for agriculture is to be created, considering more water storage and efficient distribution. And new water sources, such as recycling, desalination, and water transfers from river basins[121]. In sum, intensive agriculture is encouraged with the creation of these new water sources, with the goal of territorial cohesion and viability of the agriculture economic sector.

This problem is not exclusive to the Iberian Peninsula: according to the recent OECD report on agricultural policy, "total support to agriculture across the 54 countries covered by the latest OECD Agricultural Policy Monitoring and Evaluation report averaged USD 842 billion per year during 2021-23. (...) Payments with specific requirements for sustainable farming practices or for environmental public goods makes up 5 % of producer support." Its recommendations are: "Governments can promote sustainable productivity growth by increasing the share of producer support that is linked to environmentally sustainable production practices and make sustainable management and use of natural resources a core part of agricultural policy"[122].

Regarding excessive tourism, in Spain public administrations and private agents are implementing actions for mitigating and adapting to climate change: a "Long Term Strategy for a Modern, Competitive and Climate Neutral Spanish Economy in 2050" was approved in 2020 (ELP 2050). Some hotels and apartments have developed efficiency actions in the management of water and energy in their facilities: "Obtaining certificates or quality seals (ISO 5001 or Biosphere hotels seal) has become a brand image of the tourism company"[123].

Barcelona is considering the end of Airbnb and short-term rentals for tourists[124], as Florence did and New York City has already done so since 2023, enforcing a 2022 law that banned people from renting their homes for fewer than 30 days[125]. Bertocchi and Visentin[126] (2019) have described the Venice case. In Portugal, affordable housing versus Airbnb, and gentrification of old neighbourhoods, are on the political agenda. Another measure could be aviation taxes in Europe with a foreseeable increase in prices, which would limit air travel. Some NGO are advocating for different experiences, more nature oriented than the traditional beach and bars packages in the Algarve region. Within a framework of post-tourism concepts[127], mountain resorts and spas, with hiking programs and gastronomy, events, shows, and festivals are a trend and have entered regional programs and attraction strategies, some supported by interior municipalities[128].

[115] Martins-Loução, 2021.
[116] Velasco-Muñoz et al., 2022, 322-325.
[117] Aznar-Sánchez et al., 2020.
[118] Madureira; Mansinho, 2018, 585.
[119] Santos, 2013. Martins-Loução, 2021.
[120] Ferreira; Sereno, 2023, 167. Almeida; Faísca; Freire, 2023, 10. Faísca, 2023.
[121] https://diariodarepublica.pt/dr/detalhe/despacho/7821-2024-872108077
https://sigims.edia.pt/ediaportal/apps/sites/#/aguaquenosune
[122] OECD, 2024.
[123] Dorta-Antequera et al., 2024, 163-164.
[124] Lusa, 2024b.
[125] Reuters, 2023. Rosenberg, 2024.
[126] Bertocchi; Visentin, 2019.
[127] Bourdeau, 2018.
[128] Almeida, 2017.

Discussion and conclusions

In sum, there is the need for more sustainable and diversified agriculture and tourism, with reduced water consumption. State intervention and public policies are a requirement for adequate management of groundwater and for the use of new irrigation and water management technologies, as well as direct measures for environmental sustainability, in articulation with market stakeholders and civil society, including inputs from the media and the education system to raise awareness of the need for a water culture driving action and consumer responsibility. Consumer choices should take into consideration health, source, use of chemicals, carbon footprint and other factors. These goals, as well as all the sustainable development goals of 2030 Agenda, should be at the core of European, national and local policies. Free markets should also have a high level of environmental commitment.

A place-based approach is fundamental: territories, cities and regions are important as main actors towards achieving sustainability goals, better practices, capacity building and financing. Therefore, the promotion of the well-being of rural territories and their inhabitants is required to prevent, or even revert, depopulation. And only with people living in the territories may soil recovery and ecosystem regeneration be implemented[129]. Think globally, act locally, with local political commitment level. Multilevel governance is fundamental, with the collaborations of universities and civil society. Regardless, financing environmental policies hasn't been a political priority of successive governments. Public policies for the rural world are insufficient and hard to enforce, and they are contradicted by the deregulation of economic practices enforced by large companies[130].

Anyway, good intentions bump into territorial (un) planning: there is a persistence of tensions connected to real estate, tourism and banking, which create structural obstacles to environmental policies. Any attempt to territorial planning faces a most powerful dynamic of use, occupation and transformation of soils, as well as a systematic discontinuity of environmental policies at the mercy of the rotation of electoral cycles[131]. And when there are government plans, they tend to encourage water use, not diminish it. This a cultural issue that has yet to be discussed properly.

[129] Roxo, 2023, 14.
[130] Santos, 2013.
[131] Schmidt, 2023, 150-151.

Bibliography

Abdelkarim, Bilel; Agoubi, Belgacem; Abaab, Nabil; Antunes, Imhr. 2024: Predicted impacts of global warming and climate change on groundwater resources in a semi-arid region, south-eastern Tunisia. *Euro-Mediterranean Journal for Environmental Integration*, 9, 325-337. https://doi.org/10.1007/s41207-023-00436-5

Alcalde, Sergi. 2024: El regadío está secando Doñana. Así afectan las explotaciones ilegales a la preservación del humedal más grande de Europa. *National Geographic España*, 22 May. https://www.nationalgeographic.com.es/medio-ambiente/regadio-seca-donana_17870

Almeida, Maria Antónia. 2013a: Landlords, Tenants and Agrarian Reform: Local Elites and Regime Transitions in Avis, Portugal, 1778-2011. *Rural History*, 24(2), 127-142. https://doi.org/10.1017/S0956793313000046

Almeida, Maria Antónia. 2013b: *Saúde pública e higiene na imprensa diária em anos de epidemias, 1854-1918.* Lisboa (Portugal), Colibri.

Almeida, Maria Antónia. 2017: Territorial inequalities: depopulation and local development policies in the Portuguese rural world. *AGER*, 22, 61-87. https://doi.org/10.4422/ager.2016.08

Almeida, Maria Antónia. 2020: The use of rural areas in Portugal: historical perspective and new trends. *Revista Galega de Economía*, 29(2), 1-17. http://dx.doi.org/10.15304/rge.29.2.6750

Almeida, Maria Antónia; Faísca, Carlos Manuel; Freire, Dulce. 2023: Regadío y desarrollo agrícola en Portugal: repercusiones de la construcción de presas en el Alentejo (1958-2022). *Mundo Agrario*, 24(55), e209. http://dx.doi.org/10.24215/15155994e209

Aznar-Sánchez, José A.; Velasco-Muñoz, Juan F.; López-Felices, Belén; Del Moral-Torres, Fernando. 2020: Barriers and Facilitators for Adopting Sustainable Soil Management Practices in Mediterranean Olive Groves. *Agronomy*, 10(4), 506. https://doi.org/10.3390/agronomy10040506

Barros, José Joaquim Soares. 1990: Memória sobre as causas da diferente população de Portugal em diversos tempos da monarquia, in Cardoso, José (Ed.), *Colecção de Obras Clássicas do Pensamento Económico Portugués. Memórias económicas da Academia Real das Ciências de Lisboa, para o adiantamento da agricultura, das artes, e da indústria em Portugal e suas conquistas (1789-1815)*, T. I. Lisboa (Portugal), Banco de Portugal, 99-117. https://www.bportugal.pt/sites/default/files/ocpep-1_t1.pdf

Bertocchi, Dario; Visentin, Francesco. 2019: 'The overwhelmed city': Physical and social over-capacities of global tourism in Venice. *Sustainability*, 11(24), 6937. https://doi.org/10.3390/su11246937

Bourdeau, Philippe. 2018: L'après-tourisme revisité. *Via Tourism Review*, 13. https://doi.org/10.4000/viatourism.1936

Brito, Ana. 2024: Ministra do Ambiente confirma que Espanha deve 40 milhões por água do Alqueva. *Público*, 10 July. https://www.publico.pt/2024/07/10/economia/noticia/ministra-ambiente-confirma-espanha-40-milhoes-agua-alqueva-2097091

Camarero, Luis; Sampedro, Rosario. 2019: Despoblación y ruralidad transnacional: crisis y arraigo rural en Castilla y León. *Economía agraria y recursos naturales*, 19(1), 59-82. https://doi.org/10.7201/earn.2019.01.04

Carvalho, Manuel. 2024: Fundos e investidores estrangeiros fazem 'revolução silenciosa' na agricultura. *Público*, 9 April. https://www.publico.pt/2024/04/09/economia/noticia/fundos-investidores-estrangeiros-fazem-revolucao-silenciosa-agricultura-2085953

Chagnon, Christopher W.; Durante, Francesco; Gills, Brry K.; Hagolani-Albov, Sophia E.; Hokkanen, Saana; Kangasluoma, Sohvi M. J.; Konttinen, Heidi; Kröger, Markus; LaFleur, William; Ollinahoa, Ossi; Vuola, Marketta P. S. 2022: From extractivism to global extractivism: the evolution of an organizing concept. *The Journal of Peasant Studies*, 49(4), 760-792. https://doi.org/10.1080/03066150.2022.2069015

Corrado, Alessandra; Castro, Carlos; Perrotta, Domenico (Eds.). 2016: *Migration and agriculture. Mobility and change in the Mediterranean area.* London (UK), Routledge. https://doi.org/10.4324/9781315659558

Crutzen, Paul; Stoermer, E. 2000: The 'Anthropocene'. *Global Change Newsletter*, 41, 17-18.

Davis, John; Goldberg, Ray A. 1957: *A Concept of Agribusiness.* Boston (USA), Harvard University.

Dias, Carlos. 2024a: Produção de abacates, mirtilos, citrinos e hortícolas em Alcácer do Sal já ocupa 3000 hectares. *Público*, 22 January. https://www.publico.pt/2024/01/22/azul/noticia/producao-abacates-mirtilos-citrinos-horticolas-alcacer-sal-ja-ocupa-3000-hectares-2077477

Dias, Carlos. 2024b: Gigantesco espelho de plástico das estufas de Almería vê-se do espaço. *Público*, 3 February. https://www.publico.pt/2024/02/03/azul/noticia/gigantesco-espelho-plastico-estufas-almeria-vese-espaco-2078452

Dias, Carlos. 2024c: Com novo Governo em Portugal, Espanha insiste em exigir acesso à água de Alqueva. *Público*, 2 May. https://www.publico.pt/2024/05/02/azul/noticia/novo-governo-portugal-espanha-insiste-exigir-acesso-agua-alqueva-2088920

Dias, Filipa (Coord.). 2020: *Water use in Portugal. Looking at, understanding and engaging with key players.* Lisboa (Portugal), Fundação Calouste Gulbenkian. https://gulbenkian.pt/en/publications/water-use-in-portugal-10-key-takeaways/

Dorta-Antequera, Pedro; Sánchez-Almodóvar, Esther; López-Díez, Jaime; Díaz-Pacheco, Abel; Olcina-Cantos, Jorge. 2024: Climate Change and Tourism in Spain. The Case of the Canary Islands and the Costa Blanca (Alicante), in Remoaldo, Paula; Lopes, Hélder; Ribeiro, Vítor; Alves, Juliana (Eds.), *Tourism and Climate Change in the 21st Century. Advances in Spatial Science.* Cham (Switzerland), Springer, 143-173. https://doi.org/10.1007/978-3-031-59431-1_7

EDIA. 2020: *Olival em Alqueva. Caracterização e Perspectivas.* Beja (Portugal), DGADR. https://www.edia.pt/wp-content/uploads/2021/03/olival_digital-1.pdf

EDIA. 2023: *Anuário Agrícola de Alqueva 2022.* Beja (Portugal), DEA. https://www.edia.pt/pt/o-que-fazemos/apoio-ao-agricultor/anuario-agricola/

Faísca, Carlos Manuel. 2023: De la retórica a la aplicación: ideas, expectativas e impactos del regadío en el Alentejo (siglos XVIII a XXI), in Matés-Barco, Juan; Matos, Ana; Bernardo, Maria (Eds.), *Control y usos del agua en la Península Ibérica: Perspectivas diversificadas a largo plazo.* Madrid (España), Sílex, 227-236.

Faria, Manuel Severim. 1740: *Noticias de Portugal.* Lisboa (Portugal), Oficina de António Isidoro da Fonseca.

Fazendeiro, Luís. 2023: Tróia, Comporta, Melides: o império do golfe à beira-mar. *Le Monde diplomatique*, março. https://pt.mondediplo.com/2023/03/troia-comporta-melides-o-imperio-do-golfe-a-beira-mar.html

Ferreira, José; Sereno, Amparo. 2023: Águas, in Schmidt, Luísa (Org.), *50 anos de Políticas Ambientais em Portugal. Da Conferência de Estocolmo à atualidade.* Porto (Portugal), Afrontamento, 157-184.

Flor, Aline. 2024: Espanha não paga 40 milhões de euros por água do Alqueva. 'Pusemos uma pedra sobre o assunto'. *Público*, 27 September. https://www.publico.pt/2024/09/27/azul/noticia/agua-alqueva-usada-espanha-nao-possivel-pagar-tras-minis-tra-2105682

Gertel, Jörg; Sippel, Sarah (Eds.). 2014: *Seasonal workers in Mediterranean agriculture. The social costs of eating fresh.* London (UK), Routledge.

Gomes, Eliana; Antunes, Isabel; Leitão, Bruno. 2023: Groundwater management: Effectiveness of mitigation measures in nitrate vulnerable zones – a Portuguese case study. *Groundwater for Sustainable Development*, 21, 100899. https://doi.org/10.1016/j.gsd.2022.100899

Hoggart, Keith; Mendoza, Cristóbal. 2002: African immigrant workers in Spanish agriculture. *Sociologia Ruralis*, 39(4), 538-562. https://doi.org/10.1111/1467-9523.00123

Horstink, Lanka; Schwemmlein, Kaya; Encarnação, Miguel. 2023: Food systems in depressed and contested agro-territories: Participatory Rural Appraisal in Odemira, Portugal. *Frontiers in Sustainable Food Systems*, 6, 1046549. https://doi.org/10.3389/fsufs.2022.1046549

IEFP. 2024: *Desemprego Registado por Concelho.* Lisboa (Portugal), DPG. https://www.iefp.pt/estatisticas

Khalip, Andrei; Landauro, Inti. 2024: What caused deadly floods in Spain? The impact of DANA explained. *Reuters*, 4 November. https://www.reuters.com/business/environment/spains-deadly-dana-weather-phenomenon-its-links-climate-change-2024-10-30/

Lusa. 2024a: Inspeção do Ambiente identifica 3790 captações de águas fora da lei, Ministra do Ambiente pede reposição em 'seis meses'. *Expresso*, 6 July. https://expresso.pt/sociedade/2024-07-06-inspecao-do-ambiente-identifica-3790-captacoes-de-aguas-fora-da-lei-ministra-do-ambiente-pede-reposicao-em-seis-meses-1af97196

Lusa. 2024b: Milhares desfilam em Barcelona contra o excesso de turismo. *Sapo*, 6 July. https://www.sapo.pt/noticias/atualidade/milhares-desfilam-em-barcelona-contra-o_6689ac80803e740a0024760d

Lusa. 2024c: Municípios do Baixo Alentejo contra o projeto para abastecer Algarve a partir do Guadiana. *O Digital*, 9 July. https://odigital.sapo.pt/municipios-do-baixo-alentejo-contra-o-projeto-para-abastecer-algarve-a-partir-do-guadiana/

Madureira, Lívia; Mansinho, Maria Inês de Abrunhosa. 2018: Externalidades e bens públicos: valoração económica, in Mansinho, Maria Inês de Abrunhosa (Coord.), *A Empresa Agrícola. Das folhas do feitor à gestão ambiental.* Lisboa (Portugal), ICS, 585-592.

Madureira, Lívia; Mansinho, Maria Inês de Abrunhosa; Fontes, Magda. 2018: Emergência e consolidação da política agro-ambiental na União Europeia, in Mansinho, Maria Inês de Abrunhosa (Coord.), *A Empresa Agrícola. Das folhas do feitor à gestão ambiental.* Lisboa (Portugal), ICS, 593-602.

Mansinho, Maria Inês de Abrunhosa; Madureira, Lívia; Fontes, Magda Aguiar; Henriques, Pedro Damião de Sousa. 2018: Reencontro com a natureza através da sustentabilidade da agricultura, in Mansinho, Maria Inês de Abrunhosa (Coord.), *A Empresa Agrícola. Das folhas do feitor à gestão ambiental.* Lisboa (Portugal), ICS, 603-614.

Martins-Loução, Maria. 2021: *Riscos Globais e Biodiversidade.* Lisboa (Portugal), FFMS.

Meadows, Donella H.; Meadows, Dennis l.; Randers, Jørgen; Behrens III, William W. 1972: *The limits to growth: a report for the Club of Rome's project on the predicament of mankind.* New York (USA), Universe Books.

Ministério da Agricultura. 1937: Lei n.º 1949, de 15 de fevereiro. *Diário do Govêrno*, 37, 136-138. https://diariodarepublica.pt/dr/detalhe/lei/1949-1937-417388

Ministério das Obras Públicas e Comunicações. 1944: Lei n.º 2002, de 26 de dezembro. *Diário do Govêrno*, 285, 1311-1314. https://diariodarepublica.pt/dr/detalhe/lei/2002-1944-568758

Molino, Sergio. 2016: *La España vacía. Viaje por un país que nunca fue.* Madrid (España), Turner.

Moreira, Cristiana; Lopes, Tiago. 2023: A "imensidão" de habitats na costa do Sudoeste alentejano está coberta de plástico. *Público*, 13 May. https://www.publico.pt/2023/05/13/azul/noticia/imensidao-habitats-costa-sudoeste-alentejano-coberta-plastico-2049454

OECD. 2024: *Agricultural Policy Monitoring and Evaluation 2024: Innovation for Sustainable Productivity Growth. Policy Brief.* Paris (France), OECD Publishing. https://doi.org/10.1787/74da57ed-en

Pessoa, Fernando. 2023: Entre a Conferência de Estocolmo e o 25 de Abril: Contextos, Memórias e Testemunhos, in Schmidt, Luísa (Org.), *50 anos de Políticas Ambientais em Portugal. Da Conferência de Estocolmo à atualidade.* Porto (Portugal), Afrontamento, 37-41.

Pols, Ajk; Romijn, Henny. 2017: Evaluating irreversible social harms. *Policy Sciences*, 50(3), 495-518. https://doi.org/10.1007/s11077-017-9277-1

Ramos, Amélia. 2024: Tudo, Todo o ano, em Todo o lado. *Sic – Grande Reportagem*, 23 May. https://sicnoticias.pt/programas/reportagemsic/2024-05-23-video-tudo-todo-o-ano-em-todo-o-lado-ad4d256a

Reuters. 2023: Florence bans new Airbnbs and short-term rentals in historic centre. *The Guardian*, 3 October. https://www.theguardian.com/world/2023/oct/03/florence-bans-new-airbnb-shom-rentals-italian-city-homes-housing-crisis

Revez, Idálio. 2024: Dessalinizadora do Algarve avança 'sem complexos' ambientais. *Público*, 22 October. https://www.publico.pt/2024/10/22/azul/noticia/dessalinizadora-algarve-avanca-complexos-ambientais-2108993

Ribeiro, Sara. 2024: Portugal recebeu 26,5 milhões de turistas em 2023, mais 19% face a 2022. *Jornal de Negócios*, 8 July. https://www.jornaldenegocios.pt/empresas/turismo---lazer/detalhe/portugal-recebeu-265-milhoes-de-turistas-em-2023-mais-19-face-a-2022

Rosenberg, Zoe. 2024: 'Must love dogs and rude roommates': the scramble to get around New York's Airbnb crackdown. *The Guardian*, 25 April. https://www.theguardian.com/us-news/2024/apr/25/new-york-airbnb-short-term-rentals-sublets

Roxo, Maria. 2023: *Desertificação em Portugal.* Lisboa (Portugal), Fundação Francisco Manuel dos Santos.

Santos, José. 2013: Agricultura e ambiente: papel da tecnologia e das políticas públicas, in José Santos, Isabel Carmo and Pedro Graça (Coords.), *O Futuro da Alimentação: Ambiente, Saúde e Economia.* Lisboa (Portugal), Fundação Calouste Gulbenkian, 174-186.

Santos, José. 2017: Agricultura e biodiversidade: uma diversidade de temas. *Cultivar. Cadernos de Análise e Prospetiva*, 8, 13-19. Lisboa (Portugal), GPP.

Santos, Rui. 1993: A nuvem por Juno? O tema da fisiocracia na historiografia do pensamento económico português. *Análise Social*, XXVIII(121), 423-443.

Schmidt, Luísa. 2023: Enquadramento e transversalidades, in Schmidt, Luísa (Org.), *50 anos de Políticas Ambientais em Portugal.*

Da Conferência de Estocolmo à atualidade. Porto (Portugal), Afrontamento, 121-155.

Silveira, André; Ferrão, João; Muñoz-Rojas, José; Pinto-Correia, Teresa; Guimarães, Maria Helena; Schmidt, Luísa. 2018: The sustainability of agricultural intensification in the early 21st century: Insights from the olive oil production in Alentejo (Southern Portugal), in Delicado, Ana; Domingos, Nuno; Sousa, Luís (Eds.), *Changing Societies: Legacies and Challenges. Vol. III.* Lisboa (Portugal), ICS, 247-275. https://doi.org/10.31447/ics9789726715054.10

Soares, Andréia. 2023: Doñana excluída da Lista Verde da União para a Conservação da Natureza. *Público*, 27 December. https://www.publico.pt/2023/12/27/azul/noticia/donana-excluida-lista-verde-uniao-conservacao-natureza-2074990

Soromenho-Marques, Viriato. 2023: Da Conferência de Estocolmo à grande aceleração do Antropoceno. Impactos antrópicos e mudanças nos modos de conhecer, in Schmidt, Luísa (Org.), *50 anos de Políticas Ambientais em Portugal. Da Conferência de Estocolmo à atualidade*. Porto (Portugal), Afrontamento, 51-62.

Steffen, Will; Broadgate, Wendy; Deutsch, Lisa; Gaffney, Owen; Ludwig, Cornelia. 2015: The trajectory of the Anthropocene: The Great Acceleration. *The Anthropocene Review*, 2(1), 81-98. https://doi.org/10.1177/2053019614564785

Suspiro, Ana. 2025: Alqueva pagou-se a si próprio, valorizou em milhões a agricultura, mas efeitos no turismo e população são residuais. *Observador*, 25 March. https://observador.pt/especiais/alqueva-pagou-se-a-si-proprio-valorizou-em-milhoes-a-agricultura-mas-efeitos-no-turismo-e-populacao-sao-residuais/

Svampa, Maristella. 2019: *Las fronteras del neoextrativismo en America Latina. Conflictos socioambientales, giro ecoterritorial y nuevas dependencias.* Guadalajara, Universidad de Guadalajara. https://doi.org/10.14361/9783839445266

Tomás, Carla. 2024a: Plataforma Água Sustentável avança com queixa no Ministério Público contra aprovação da dessalinizadora no Algarve. *Expresso*, 9 July. https://expresso.pt/sociedade/2024-07-09-plataforma-agua-sustentavel-avanca-com-queixa-no-ministerio-publico-contra-aprovacao-da-dessalinizadora-no-algarve-ebebceac

Tomás, Carla. 2024b: Projeto de 658 hectares de abacateiros em Alcácer recebeu veredicto final: 'chumbado'. *Expresso*, 30 August. https://expresso.pt/sociedade/2024-08-30-projeto-de-658-hectares-de-abacateiros-em-alcacer-recebeu-veredicto-final--chumbado-9bae048e

Tomás, Carla. 2025: Ministra do Ambiente põe fim a restrições à captação de água no Algarve e anuncia novas regras para concessionários de praia em Grândola. *Expresso*, 4 July. https://expresso.pt/sustentabilidade/ambiente/2025-07-04-ministra-do-ambiente-poe-fim-a-restricoes-a-captacao-de-agua-no-algarve-e-anuncia-novas-regras-para-concessionarios-de-praia-em-grandola-e1d8bb29

Toro, Marc; Alcobendas, Martina; Pruna, Gerard. 2025: Catalonia will double the tourist tax and raise taxes on large investors. *Ara*, 27 February. https://en.ara.cat/business/catalonia-will-double-the-tourist-tax-and-allocate-25-to-housing_1_5298490.html

United Nations. 1973: *Report of the United Nations Conference on the Human Environment, Stockholm, 5-16 June 1972.* New York (USA), United Nations. https://digitallibrary.un.org/record/523249?ln=en&v=pdf

Velasco-Muñoz, Juan Francisco; Aznar Sánchez, José Ángel; López Felices, Belén; Bakacci, Gariella. 2022: Adopting sustainable water management practices in agriculture based on stakeholder preferences. *Agricultural Economics*, 68(9), 317-326. https://doi.org/10.17221/203/2022-AGRICECON

Vilariño Alvaredo, Lucía. 2024: *Aguas subterráneas en Portugal y España durante la segunda mitad del siglo XX.* Tesis Doctoral cotutelada por la Universidade de Évora (Portugal) y por la Universidad Autónoma de Madrid, Facultad de Filosofía y Letras, Departamento de Historia Contemporánea. http://hdl.handle.net/10486/718825

WCED. 1987: *Our Common Future.* Oxford (USA), Oxford University Press.

Whitehead, Joanna. 2025: Catalonia to double tourist tax in blow to holidaymakers. *Independent*, 28 February. https://www.independent.co.uk/travel/news-and-advice/catalonia-tourist-tax-spain-barcelona-b2706499.html

ZAP. 2024: Espanha tem um dilema hídrico para resolver. *ZAP. AEIOU*, 21 May. https://zap.aeiou.pt/espanha-tem-um-dilema-hidrico-para-resolver-603262