

## RETHINKING OLIVE OIL PRODUCTION: PATHS TO SUSTAINABILITY

### **Isabel JOAQUINA RAMOS**

Assistant Professor, Department of Landscape, Environment and Planning.  
CICS.NOVA-UÉvora-Interdisciplinary Centre of Social Sciences.  
University of Évora. Portugal.  
E-mail: iar@uevora.pt

### **Conceição REGO**

Assistant Professor, Department of Economics.  
CEFAGE-U.É.-Center for Advanced Studies in Management and Economics.  
University of Évora. Portugal.  
E-mail: mcpr@uevora.pt

### **Maria da Conceição FREIRE**

Assistant Professor, Department of Landscape, Environment and Planning.  
Researcher at CHAIA-Centre for Art History and Artistic Research.  
University of Évora. Portugal.  
E-mail: mcmf@uevora.pt

### **Lília FIDALGO**

Head of the Territorial Planning and Strategy Division,  
Alentejo Regional Coordination and Development Commission.  
Évora. Portugal  
E-mail: lilia.fidalgo@ccdr-a.gov.pt

### **Abstract**

Olive groves and olive oil production have been part of rural landscapes in Portugal since ancient times. While their social and cultural relevance are rooted in the past, their economic role stands out today. However, the intensification of production has been putting at risk the balance between territory, landscape and production. The challenge is to revitalise rural areas without pressure on natural resources, ecosystems and their inevitable relation to local communities, meaning to improve agricultural practices and quality of life. Sustainability programs have emerged to address these concerns. This article reflects on some impacts of the intensification of olive groves and shares insights from the Olive Oil of Alentejo Sustainability Program (OASP), focusing on Human Communities, Landscape Management, and Biodiversity. It presents suggestions for improvements in these areas and concludes that initiatives like OASP are important complements to public policy instruments. Also highlights the importance of involving public and private actors, researchers, and communities to develop innovative and responsible solutions that values and respects landscapes, ecosystems, and communities.

**Keywords:** Landscape, Biodiversity, Communities, Sustainable Management, Olive Oil Production

**JEL Classification:** Q01, Q15, R11, R52

**Citation:** Ramos J.I., Rego C., Freire C.M., Fidalgo L., 2026. "Rethinking olive oil production: paths to sustainability", Sustainable Regional Development Scientific Journal, Vol III. (1), pp.87-101

## **1. Introduction**

The development of activities linked to olive growing is, among agricultural and agro-industrial production, one that requires the greatest analysis associated with environmental preservation and sustainability. In the Portuguese case, the emergence of large-scale intensive olive grove production, especially in the area benefiting from the Alqueva Dam's perimeter, requires a debate about the need to reconcile agricultural production with the preservation of ecosystems. Both the restriction of environmental preservation and the demand for sustainability imply that the activities carried out today do not contribute to the further destruction of the ecological balance necessary for the continuation of quality life, but also that they allow future generations to benefit from a set of resources that will enable them to have at least the same level of quality of life and availability of resources as today. In this case, the productive activities under analysis have in their favour, from this perspective, the fact that they have historically been in communion with the environment, making landscapes evolve in a dynamic, interactive, balanced way, rebuilding the natural habitats where they are installed. However, the changes resulting from the installation of intensive olive groves, the consequences for the ecological balance of the regions where these crops are located, and the change in the form of production (for example, family farms have given way to financial companies that exploit this crop in the same way as any other economic and financial asset) mean that the effects of this form of production on territorial sustainability and the balance of the landscape need to be studied in depth.

As stated before, this is currently gaining a more significant dimension in the southern part of the country, specifically in the Alentejo region, where the Alqueva dam is located. Alentejo region is, until our days, a territory and landscape with strong rural identity. The rural world, could be defined as “a complex and multi-dimensional phenomenon, referring to a set of distinct communities and territories - albeit overlapping, articulated and interconnected - characterised by diverse activities such as agriculture, handicrafts, small and medium-sized manufacturing companies, commerce, personal and collective services (public and private), non-profit organisations, based not only in small villages, towns and county seats, but also in natural spaces and cultivated areas” (Diniz & Gerry, 2009: 526-527).

Alentejo, Portugal's largest region, represents 1/3 of the country's territory, around 50% of the Utilised Agricultural Area (UAA) in mainland Portugal (Eurostat, 2022) and is the main producing region at national level. The region excels particularly in the production of cereals, olive groves, vineyards, cork and extensive livestock farming (INE, 2021). In Alentejo, 13% of employment is concentrated in the primary sector (agriculture, forestry and fishing) and this sector accounts for around 8.8% of the region's Gross Domestic Product (GDP) (INE, 2021).

In recent years, there has been sustained growth in vegetable and fruit production, particularly in areas covered by modern irrigation systems such as the Alqueva dam project (EDIA, 2022). The olive-growing sector is of strategic importance to the Alentejo economy. Olive oil production reached, in 2024, 180,000 tonnes, representing an increase of 12% over the previous year. The Alentejo region accounts for more than 80% of Portuguese olive oil production, mainly due to its 66,000 hectares of intensive hedge olive groves (with more than 1,500 olive trees per hectare), of which more than 50,000 have been planted in the last 10 years (INE, 2025).

The growing appreciation of the Mediterranean diet, recognised as Intangible Cultural Heritage of Humanity by UNESCO, has contributed to increasing exports and strengthening the competitiveness of olive oil produced in the region (UNESCO, 2013; DGAV, 2023). Alentejo's agri-food exports have shown sustained growth, with the main products exported being wine, olive oil, cork and nuts (INE, 2023). Agricultural producers have endeavoured to make farming practices more sustainable, which has contributed to access to more demanding and environmentally conscious markets, promoting the external competitiveness of the Alentejo agri-food sector.

Intensive agriculture has arisen due to the need to increase food production to answer to the growing world population, using technologies and a set of resources to maximize income per cultivated area. This approach aims to meet the demand for food, particularly in regions with high population density and limited resources. However, it is very clear today that

agricultural production must endeavour to be compatible with the promotion of sustainability, due to the need to respect the planet's limits and preserve resources. It is well known that the intensification of agricultural production leads to soil degradation, water contamination, loss of biodiversity and an increase in greenhouse gas emissions, among others (e.g. Gómez-Limón & Riesgo. 2012). The definition of sustainability is commonly accepted as the ability of current communities to carry out their activities using resources in a way that does not compromise the availability of resources or the quality of life of future generations (WCED, 1987). Furthermore, given that the use of resources is not uniform across all regions/continents, with major asymmetries between developed and developing countries and regions, it is also important to bear in mind that the use of resources must take care not only of future generations, but also of current generations who still need to increase their quality of life and their levels of development (Simões Lopes, 1984).

Considering the urgency of reconciling the efficiency of agricultural production, especially olive growing, with environmental preservation and the quality of life, and noting also that legislation in the field of land use planning is insufficient to promote the desired balance, this research intends to reflect on some of the effects of the intensification of agricultural practices, particularly in the case of olive groves, and share the knowledge acquired through the development of various sustainability criteria developed under the Olive Oil of Alentejo Sustainability Programme (OASP), related to Human Communities, Landscape Management, and Biodiversity, in the context of contemporary challenges. Under this Programme, criteria were developed both for the planning and implementation of new olive groves as for the management of existing olive groves. The aim was to increase biodiversity, achieve more appropriate management of landscapes and ecosystems, promote greater local and regional retention of the economic value created, and foster a fruitful relationship with the surrounding communities. It is a tool that identifies a set of mechanisms to mitigate the negative territorial effects of intensive agriculture and promotes sustainability, in a holistic manner, in the areas of production, society and the environment. For this, after this introduction the paper continues with a reflection about instruments for land use planning and management and territorial governance for sustainable development. The third section discusses the contribution of sustainability plans and programs as instruments for promoting territorial development. In the fourth section an overview about the Olive oil of Alentejo Sustainability Program is presented, as a more detailed description about the criteria related to the issues of regional development and landscape, namely, ecological infrastructure, biodiversity and identity. The paper concludes with a brief section of final remarks.

## **2. Instruments for Land Use Planning and Management and Territorial Governance for Sustainable Development**

Territory is now a critical dimension of economic, social, and environmental development. The life and quality of life of local communities depend on a balanced territorial organization. The approval of the Law on Spatial Planning and Urbanism (in 1998; modified in 2014 by the Law 31/2014, 30<sup>th</sup> May) granted this area of public policy – spatial planning – the appropriate normative status, resulting from its definition as a Fundamental National Task.

Furthermore, Spatial Planning, as a public policy, is no longer limited to the physical organization of the territory (the organization of infrastructure networks and the delimitation of urban and rural areas) and now integrates a dimension of development and territorial economic and social cohesion, thus merging Spatial Planning with Territorial Development.

This planning policy is implemented through the territorial management planning system, organized within a framework of coherent and coordinated interaction, that includes four class of territorial management instruments: territorial development instruments, territorial planning instruments, sectoral policy instruments, and, finally, special instruments. These are also organized at four levels: national, regional, intermunicipal and municipal (DL 80/2015, 14<sup>th</sup> May).

The National spatial planning policy program establishes strategic options relevant to the organization of the national territory, constitutes the reference framework to be considered in the preparation of other territorial programs and plans, and it is an instrument for cooperation with other Member States in view of the organization of the European Union's territory.

Regional programs define the regional strategy for territorial development, integrating the options established at the national level and considering sub-regional and municipal local development strategies, constituting the reference framework for the development of inter-municipal programs and plans and municipal plans.

In Alentejo, this regional spatial planning program – PROTA (CCDRA, 2010) establishes a link with the national and regional planning dynamics carried out under QREN 2007-2013 – National Strategic Reference Framework (RCM 86/2007, 3rd July) and PRODER 2007-2013 – Rural Development Program (MAMAOT, 2011). The latter specifically for the agricultural and forestry sectors and rural development.

This link seeks to integrate and coordinate territorial policies with the programming policies for interventions co-financed by the European Union's Structural and Cohesion Funds, with a view to ensuring greater sustainability of the desired development trajectory and greater efficiency and effectiveness of action measures. Strengthening social, territorial, and environmental cohesion as factors of competitiveness and sustainable development.

Among other strategic territorial directives, PROTA (CCDRA, 2010) points out:

- the strategic role of agriculture and rural development and the qualification of the transformation processes associated with them, particularly those driven by the Alqueva multi-purpose project and other hydro-agricultural developments;
- that agriculture plays an important role in soil and biodiversity conservation. Many of the most characteristic natural values of Mediterranean ecosystems have remained in a favourable state of conservation, benefiting from cultural practices associated with traditional agro-forestry-pastoral use;
- however, certain more intensive forms of agriculture have had a negative impact on the conservation of soil, water, and wild flora and fauna.

Recent developments in both infrastructure supporting agricultural activity, with a considerable increase in irrigated land in Alentejo, and the global situation, with a significant increase in raw material prices and the resulting global food crisis, as said before having significantly altered the regional production framework and created conditions for the evolution of Alentejo agriculture as a leading economic activity.

From this perspective, the regional program establishes guidelines for municipal plans to accommodate the new reality of the agricultural sector, without forgetting the responsibility to guarantee the protection of resources and natural heritage, associated with the importance of ecosystem services, in their multiple dimensions:

- a) Promote regional coordination to improve conditions for strengthening strategic value chains associated with the exploration and transformation of various natural and endogenous resources and the positive dynamics of the emergence of new activities.
- b) Promote increased competitiveness in agricultural and forestry production through the creation and development of business practices, aiming to orient production towards the market, through innovation and the establishment of strategies from a sectoral perspective aiming at territorial, social, and economic dynamization and sustainability.
- c) Promote the sustained valorisation of natural, landscape, and heritage resources in rural areas, valuing the positive externalities created by agroforestry systems and the maintenance of natural and landscape values associated with rural areas, as well as optimising the use of natural resources to ensure the systems' durability.
- d) Contribute to the economic and social revitalisation of rural areas and to strengthening their attractiveness, through economic development and the creation of employment opportunities, in an integrated strategy of diversification of activities, accompanied by the acquisition of skills of the local populations.
- e) Promote greater levels of integration and cooperation among entities and institutions in the field of scientific research and technological development, establishing a regional network of infrastructures and institutions with the aim of promoting regional scientific development capabilities, increasing the transfer of knowledge and technology to companies, and diversifying and modernising the productive fabric towards areas of greater innovation and technological intensity.
- f) Promote regional coordination to improve conditions for strengthening strategic value chains associated with the exploration and transformation of various natural and

endogenous resources and the positive dynamics of the emergence of new activities. Strong cooperation will be needed to ensure the sustainable management of rural areas and natural resources, conceived as an objective to be achieved, whether directly involved in the area and the use of resources, or indirectly, by companies, as actors in the implementation of environmentally sustainable management. The focus must be on the conservation of the natural and landscape values associated with rural areas and the valorisation of the positive externalities created by agroforestry systems, as well as on optimizing the use of natural resources.

### **3. Sustainability plans and programs as instruments for promoting territorial development**

In recent decades – particularly the last three – the concept of sustainability has gained increasing prominence in the formulation of public policies and instruments for territorial development and planning. As highlighted in the previous section, the various legally mandatory plans and programs incorporate sustainability principles through comprehensive territorial strategies addressing environmental, social, and economic dimensions at the national, regional, subregional and local levels.

However, the specific characteristics of each territory often requires the development of complementary structural strategies that focus on concrete issues. These strategies aim to promote integrated and balanced growth, following the principles of place-based approaches (Barca, 2009, Barca et al., 2012) and are aligned with national, European, and international policy frameworks, including the United Nations Sustainable Development Goals (UN, 2015) that call for a commitment to sustainability through the promotion of innovation, the pursuit of sustainable economic growth, and the diversification of economic activities (Parrilla-González & Ortega-Alonso, 2022). Their objectives include the definition of concrete actions to address complex challenges such as climate change, social inequalities, and economic disparities, with the active involvement of diverse stakeholders (UN, 2015; Biermann et al., 2017). A defining feature of these strategies is their cross-disciplinary nature, particularly the promotion of collaborative networks among universities, research centres, and local communities. This dynamic facilitates the translation of scientific research into practical responses to territorial challenges. However, as stated by Marsden (2012:213), this comprehensive approach involves the incorporation of “a multitude of theoretical perspectives, cross-scale dynamics and approaches”, meaning “one of the largest scientific challenges of the day”.

In Portugal, beyond the legally mandated frameworks, various sustainability-related plans and programs have been implemented at different governance levels. These include local and regional climate action plans, Local Agenda 21 initiatives, municipal environmental plans, or strategic regional plans for tourism, among others such as the Action National Program Against Desertification. While their scope and content may vary, these initiatives share a common orientation toward long-term outcomes, seeking to provide strategic guidance for short and medium-term action. Participation from stakeholders, decision-makers, and civil society is actively encouraged to ensure legitimacy and effectiveness.

Sustainability plans or programs, though generally non-mandatory, establish sets of goals, indicators, and actions aimed at fostering continuous improvement in the performance of specific sectors or territories. They follow the core principles of sustainable development and frequently act as catalysts for structural change by creating synergies among local actors and promoting inclusive, participatory, and forward-looking territorial development (Ningrum et al. 2024). Their successful integration into broader development strategies is critical to promote sustainability.

By accounting for the identity and specificity of each territory, these plans or programs aim to generate economic value based on endogenous resources and to reinforce territorial cohesion. In doing so, they also contribute to improved quality of life through focused attention on environmental integrity and social equity. The overarching goal is to reduce regional disparities and ensure equitable access to opportunities and services (Coronato, 2020).

The assumptions of theory of endogenous development (Melo, 2009: 501) points out “the

importance of factors such as the involvement of local players in the analysis and decision-making processes, the local mobilisation of the territory's productive resources, the valorisation of factors and locally produced goods and services, the processes of creating or spreading innovations, the emerging gains from better local coordination of initiatives, the increase in locally retained added value and the territorial “internalisation” of the positive spill-over effects of public and private initiatives”. These conditions emphasise the importance of local decision-makers, public, private and associative, as well as factors endogenous to the territory.

In the Alentejo region of Portugal, the growing pressure on natural resources and the intensification of agricultural systems have underscored the need to apply sustainability principles across different territorial contexts and sectors (Silveira et al., 2018).

One such example is the **OASP - Olive oil of Alentejo Sustainability Program**, a sustainability plan dedicated to the olive oil agricultural sector. Structured around the three pillars of sustainability - environmental, economic, and social - OASP brings together farmers, technicians, and public authorities in a joint effort to foster a culture of continuous improvement and shared responsibility (Lucas, 2023).

#### **4. Olive oil of Alentejo Sustainability Program**

##### **4.1 An overview of the Program**

**Olive oil of Alentejo Sustainability Program** (Lucas, 2023) is an innovative program aiming to promote and integrate sustainable agricultural practices into all phases of olive oil production, from the cultivation of olive trees to the extraction and marketing process. The aim is to increase and ensure quality and environmental responsibility in olive oil production in the Alentejo region, providing solutions to improve sustainability and competitiveness through more adequate practices. The focus is to reduce the environmental impacts of olive oil production and promote the responsible use of natural resources, while improving the profitability and competitiveness of production.

OASP was developed by a consortium between academia and the private sector - an added value for the program - in a continuous and mutual process of learning, bringing findings of recent research and technological subjects from academia to the business sector. The program follows the methodology adopted in a similar program for wine sustainability in Alentejo - Wine Alentejo Sustainability Program (<https://sustentabilidade.vinhosdoalentejo.pt/en/wines-of-alentejo-sustainability-programme>), both pioneer programs in Portugal.

The program establishes a certified system based on sustainability criteria, a holistic and comprehensive sustainable evaluation framework that encompasses the different and complementary aspects of environmental, social and economic dimensions. A total of 20 Chapters (141 criteria), including thematics such as olive production, landscape, biodiversity and ecosystem management, soil management, pests and diseases, irrigation, human resources, waste and surplus, quality of oil, water and air, packaging and components, cultural heritage, socioeconomic and regional development issues and connection with local communities, among others. This sustainability evaluation framework is based on four incremental levels of sustainability – pre-initial, initial, middle and developed – following a model of continuous improvement (Lucas, 2023).

Producers’ participation in the program is voluntary. The evaluation is carried out by the producers themselves and validated by an external certified entity. The first step is to evaluate the current practices of olive grove and olive oil production, to answer the question “At which level am I for each criterion?”; next question is “What should I do to reach the next level of sustainability”. Each level of each criterion provides guidance on more appropriate practices that producers can adopt to improve their performance, contributing in each criterion to an overall global level of performance required for certification.

In the next section, as an example, criteria related to **Socioeconomic, Regional Development and Connection with Surrounding Communities** and **Landscape, Biodiversity and Ecosystem Management** are highlighted.

##### **4.2 About the contributions for regional development**

The activity of agricultural companies has a wide variety of effects on the territory where

they are located. Identifying these effects and defining criteria to measure them, aiming at promoting the sustainability of olive-growing companies, is one of the components of the sustainability program presented in the previous section. The history of places shows that the installation of a company (or an activity) in a territory means that both are subject to mutual effects, both positive and negative. It is therefore a two-way relationship that creates mutual 'dependencies': the company influences the characteristics, rhythms and experiences of the local community and the latter, in turn, also conditions the company to an equal extent. Today's agricultural companies, in order to improve their patterns of sustainability, intends to adopt higher levels of awareness of the characteristics of the surrounding areas, seeking to make better use of the region's resources and fostering strong relations with communities, for example by creating jobs that are taken up by local residents, caring for the environment or establishing links with other companies and institutions. Thus, the framework for analysing the effects of these companies on the surrounding territory involves theoretical consideration based on the theory of endogenous development and considering the fundamental characteristics of the rural world.

Among the effects that are considered most relevant to promote higher levels of regional development are economic effects. These economic effects, where the impacts on production, income and employment stand out, the local contribution of companies can be very relevant. First and foremost because the realisation of production processes (mainly olive harvesting and oil production) leads to the use of local resources: for example, the land used to plant the olive groves, mills installations, among others. These are local resources that already exist or have been realised for this purpose, which increase the creation of economic value. The production of value takes the form of the result of sales of the products produced by the companies. These results are higher the greater the quantity produced and/or the greater the notoriety of the products. The income obtained in this way is distributed among the various participants in the production process (owners of land or other rented facilities, workers, suppliers, investors and/or company owners). From this distribution of income, the local community will receive more or less depending on the 'functional' links that exist with the company: for example, if the suppliers, workers, or entrepreneurs, landowners, inhabit in the local community, the distributed income will be (at least partially) retained and redistributed to the other activities, through the well-known Keynesian multiplier mechanism, that make up the life of the community.

Another very important local effect is job creation and labour qualification. In this case, the effect is greater the more workers live in the community surrounding the company. Job creation is the key to retaining (and/or attracting) the population in the territories. In the specific case of olive oil production, which takes place predominantly in the interior south of the country, where depopulation and ageing are strong characteristics, the possibility of settling and attracting an active population that helps to rejuvenate the population is a very important effect to consider in all the local impacts. Because of these characteristics, which means that the availability of labour is small, places with the greatest demand for agricultural workers have seen very significant migratory flows, especially of workers from the Indian sub-continent, which has posed very significant challenges in terms of the inclusion of these workers in local communities.

The effects of the presence of companies in these places are not limited to strictly economic issues. The way in which companies and other economic agents and communities relate and get to know each other is also very important. The nature and intensity of existing relationships depend on the way in which companies and other community institutions communicate with each other and are aware of their respective realities. Communication can be stimulated by companies or other institutions in the surrounding community and can take place, among other initiatives, through various actions such as open days, company outings/visits, informal talks or other participation in local organisations. The existence of efficient forms of communication leads to greater awareness of the characteristics and needs of companies and local communities. Some of the relevant issues in this area are related to the effect on the surrounding environment of the activities carried out by companies, such as the changes caused to local traffic (dust, speed, infrastructure, equipment, noise, etc.), the application of chemicals in production, soil erosion control and air quality, among others. The existence of (some) of these effects means that, either on their own initiative, by legal

imposition or by suggestion/negotiation with other local institutions, companies take some action to mitigate the local effects, specifically in terms of the effects of light (with measures to protect against the effects of lighting by reducing their incidence to the minimum necessary), noise (sound insulation, specific hours for certain activities, including 'idling') and traffic (limited speed, parking attendants at events, directional signs towards the company car park).

Another fundamental relation that can be established between olive-growing companies and other community institutions is through the joint development of socio-cultural activities. In this case, interactions between companies and other institutions in the local community can take different forms. For example, through school field trips to olive groves and mills, social work carried out by company employees in other institutions, support for activities in the areas of arts, culture and sport, promoted by Non-Governmental Organisations (NGO), Private Social Solidarity Institutions (IPSS) or local authorities, through financial or other support, which make possible to enrich the daily lives of the communities in the areas surrounding the companies.

Within this set of effects, it is also to highlight those that are felt in the field of environmental protection and enhancement, namely through the development of activities, collaboration with environmental organisations, habitat recovery, cleaning up forests, reservoirs and beaches, planting native trees, among others. This support can be financial or in terms of working time.

In the case of the Alentejo olive oil sustainability program (Lucas, 2023), the following factors were identified as relevant in the chapter on *Socio-economy, Development and Surrounding Communities*:

- Effect on direct job creation (skilled and unskilled): these criteria evolves from the situation in which the company does not directly hire human resources, to the situation in which the company does not consider the workers' place of origin, to the situation in which the company mostly hires workers from the region and grants benefits that promote their settlement in the region;
- Effects on Related Local Sectors: this is a criterion aimed at measuring links with local companies, which evolves from the absence of commercial relations with other companies in the region to the situation in which local companies are favoured by buying at least 50% of the current goods and services they need from them.
- Proportion of Production Exported: in this case, the company must evolve from the case in which the proportion of exports is low (less than 10 %) to the case in which the proportion of production exported is predominant (more than 50 %).
- Innovation and/or Knowledge Transfer: in this case the company is assessed from the situation in which the company does not carry out R&D activities or has relations with the scientific and technological system to the case in which the company uses specialised consultancy services, has relations with entities in the scientific and technological system and carries out R&D activities.
- Productive Efficiency: in this case the company is assessed to see if it fulfils all its financial and tax obligations, grows above the interest rate on passive operations, grows above the annual inflation rate and has the capacity to reinvest and distribute dividends.
- Communication and relations with communities and stakeholders: this criterion aims to identify the existence and operating conditions of existing communication channels between the company and members of the surrounding community, be the other companies, institutions or resident families.
- Awareness of the potential effects of 'neighbourhood' and community issues: this criterion assesses the consciousness of the attitudes and perceptions of 'neighbours' about the main issues that concern the company, the activities that can affect "neighbours" and community stakeholders and the need to communicate with 'neighbours' and community stakeholders and discuss relevant issues.
- Mitigation of the impacts of the activity on the lives of local populations: this criterion is fundamental in the relationship with the community as it assesses the company's knowledge of the effects it has on the community (light, noise, traffic,

odours,..), the actions it takes to mitigate them and the way it interacts with the community in this regard.

- Knowledge of local characteristics that may affect the company's activity: this assesses the company's comprehension of the characteristics of the local community that influence its activity, as well as the actions it takes to enhance (or mitigate) them, depending on their nature.
- The company's contribution to, and relationship with, the community: this criterion assesses the company's collaboration (or lack thereof) (proactive or reactive) with other organisations in the surrounding community and participation in community events.

The eleven criteria that comprise the chapter on socio-economy, regional development and the surrounding community emphasise aspects related to employment, productive efficiency, the characteristics of the company's interaction with the surrounding community and its contribution to promote development and quality of life.

#### **4.3. About the landscape: ecological infrastructure, biodiversity and identity**

Intensive agricultural systems must balance agricultural productivity with biodiversity, protection, conservation or improvement of ecological infrastructure, and maintenance of ecosystem services (MEA, 2005; Bommarco et al., 2013; Muñoz-Rojas and García-Ruiz, 2024) (Figures 1 and 2). Agricultural landscapes are characterized by dynamic land-use patterns, in which natural factors such as topography, water, soil, climate, vegetation and fauna interact each other and continuously with cultural elements such as architectural heritage, memory and land-use practices (Cancela, d'Abreu et al., 2004; Antrop, 2005).

**Figure 1: Intensive and monocultural olive grove productions, Alentejo region, Portugal**



© ANDRÉ PAXIUTA

Source: Jornal "Público" (2021)

**Figure 2: Diversified land-use (olive grove, vineyards, woodlands, crops, pastures, ponds, riparian areas) including intensive and traditional production systems, Alentejo region Portugal.**



© MARIA FREIRE

Source: own source

To ensure the appropriate installation and sustainable management of olive groves, an integrated landscape approach is essential to identify such links, to minimize landscape degradation, but also to increase its ecological and cultural value.

In the case of the Alentejo olive oil sustainability program (Lucas, 2023), the following eleven factors were identified as relevant in the chapter *Landscape, Biodiversity and Ecosystem Management*. These domains reflect natural and socio-cultural components (CE, 2000), in line with international agricultural practices (FAO, 2014) and Mediterranean agriculture and ecological knowledge (Freire, 2014; DGADR, 2022; Castiço & Cardoso, 2023; Muñoz-Rojas & García-Ruiz, 2024):

- Topography and water systems: this assessment identifies critical slopes, groundwater infiltration and recharge areas, natural drainage patterns, and watersheds. Management plans should maintain and/or introduce river corridors, respect and/or create buffer zones along watercourses (minimum 10 meters), and avoid altering basic terrain contours, such as ridges and drainage lines.
- Soils: this assessment identifies areas of high fertility, degraded soils, and land covered by reserve areas (National Agricultural Reserve - RAN and National Ecological Reserve - REN). Sustainable planting prioritizes soils with pedological characteristics suitable for olive groves, minimizing the risk of erosion, compaction, and contamination.
- Vegetation: this assessment identifies native, exotic, and invasive plant species and the ecological context in which they are found. The management plan should protect natural habitats and control invasive species, aiming to increase biodiversity and ecological connectivity. It should also include measures to offset/mitigate negative impacts resulting from potential vegetation destruction during olive grove establishment.
- Topoclimate: this assessment identifies the influence of topography on microclimates (e.g., low-lying, humid areas, north-facing slopes, and wind-

exposed areas). Management strategies adapted to these climatic conditions are encouraged, including avoiding olive groves in unfavourable areas, planting native species in wetter conditions, or installing hedges to reduce wind impacts.

- Protected natural and semi-natural habitats: this assessment identifies, and maps, protected habitats with protected status (e.g., Natura 2000 areas) to be preserved. Ecological compensation is a prerequisite for any intervention, through measures to create similar habitats and/or restore habitats to mitigate biodiversity loss (EEA, 2020).
- Wildlife habitats: this assessment identifies habitats to be preserved (e.g., rocky outcrops, riparian and lagoonal areas, nesting areas), but also those that should be improved through the creation of new habitats and ecological connectivity.
- Increasing biodiversity in olive groves: the strategy includes agricultural practices (e.g., maintaining existing and/or well-adapted native vegetation, establishing cover crops, pastures, and diversified hedgerows, mulching with shredded pruning material, and using animals such as sheep, chickens, or geese to control weeds or manage cover crops) that provide habitats for beneficial insects and reduce chemical treatment practices.
- Diversified landscape matrix: the strategy is based on the diversity of land use, the existence of ecological corridors, and the spatial configuration of olive groves, including natural habitat areas. The objective is to ensure that the landscape is resilient to heterogeneity and biodiversity (EC, 2020).
- Increasing areas of ecological interest: this assessment includes the conservation and improvement of soil, water and air, and the promotion of biodiversity (e.g., by protecting watercourses and surrounding protected areas, wetlands, ponds and agricultural ponds, woodlands, native oaks, monumental trees, hedgerows, stone walls, fallow land, areas with honey plants, and unproductive trees). These are essential for ensuring ecosystem services such as pollination, water regulation, and soil protection, but also for contributing to improved nature protection and restoration (EC, 2020).
- Potential for recreational tourism in rural areas: the strategy is based on the cultural, symbolic, and aesthetic value of olive grove landscapes as an important resource for nature tourism and environmental education. Activities such as observing/participating in parts of the olive cultivation process, trail networks, and visits to heritage areas and/or features diversify agricultural production.
- Landscape identity and character: the strategy consists of preserving the values resulting from the unique combination of natural and cultural characteristics associated with each specific place. Preserving these characteristics promotes local development and encourages local pride.

The adoption of these integrated management criteria promotes the multifunctionality of agricultural landscapes, combining production, conservation, and recreation (Freire et.al, 2021). This approach aligns with agriculture and ecological principles and the broader framework of sustainable agriculture (Altieri, 1999; Boller et al., 2004; Muñoz-Rojas & García-Ruiz, 2024).

The proposed measures go beyond mitigation. They value and promote ecological restoration, appropriate land use and resilience to climate change and socio-economic pressures. Progressive monitoring and management ensure the continuous improvement of productive, environmental and landscape results.

In conclusion, integrated landscape management, with emphasis on increasing the protection of resources and biodiversity, adequate diversity of agricultural uses associated with production and the valorisation of recreation, is seen as a promising strategy for reconciling agricultural productivity with environmental sustainability and rural development.

The scientific construction of this practical tool (for farmers, land managers and policy makers) is based on the objective of creating resilient and multifunctional Mediterranean landscapes, in addition to being considered a pedagogical tool, fundamental in this period of rapid transformation of this agricultural sector in Portugal.

## **5. Final Remarks**

The intensification of olive groves and olive oil production is a reality that cannot be dismissed or ignored. The reasons outlined throughout this article for this fact are well-known and valid, especially considering territories like the Alentejo, which has a rural identity, a very low population density, and a very aging population. Valuing these territories from an economic perspective is a huge asset. However, it also means a huge pressure on natural resources and has had a negative impact on ecosystem preservation and territorial identity. Strategies aiming to promote sustainable production models must therefore be strengthened, where the economic component cannot override the environmental and social components - fundamental not only for environmental preservation, but also for the long-term economic viability of producers.

Despite the multiple international, European and national declarations, directives, regulations and laws (to name a few) related to sustainability and sustainable agriculture practices and the obligation to accomplish their requirements, most of them are developed in a sectoral way and place-neutral approaches. Its effectiveness depends on coordination between levels of governance, civil society involvement, and the ability to transform strategic objectives into concrete, monitorable actions.

In Alentejo, some producers are very aware of the issues posed by the intensification of the agriculture olive oil sector and have already put some efforts to minimise some of the negative impacts. However, isolated initiatives are not enough. It is necessary to engage all the producers, the communities, public and private institutions and organizations, academia and research centres, to create a well-grounded framework where everyone can contribute to a positive global outcome.

The Olive Oil of Alentejo Sustainability Program, based on a holistic and integrated approach, exemplifies and give insights, in a pedagogical way, on how the agricultural sector can move towards greater environmental, social, and economic responsibility, creating economic dynamism based on local resources and strengthening territorial identity and cohesion with respect for cultural and environmental concerns. Despite the initial costs that might occur at the beginning, for the producers, the growing demand for sustainable and certified products will pay off the initial investment. It offers benefits to producers, consumers, and the region, creating a more sustainable management for the sector. The program can be replicated in other olive oil-producing regions (inland or out) and the agricultural industry in general, as sustainability becomes one of the key criteria for long-term success. At last, lessons learned should be considered in the definition and implementation of public policies and informed decision-making.

## **6. Acknowledgements**

This work is financed by national funds through FCT - Foundation for Science and Technology, I.P., within the scope of the Project UID/04647/2025 – CICS.NOVA-Interdisciplinary Centre of Social Sciences of NOVA University Lisbon, Project UID/04007/2025/CEFAGE and Project CHAIA BASE UIDB/00112/2025.

## **References**

- Altieri, M. A. 1999. "The Ecological Role of Biodiversity in Agroecosystems." *Agriculture, Ecosystems & Environment* 74 (1-3): 19-31. [https://doi.org/10.1016/S0167-8809\(99\)00028-6](https://doi.org/10.1016/S0167-8809(99)00028-6).
- Antrop, M. 2005. "Why Landscapes of the Past Are Important for the Future." *Landscape and Urban Planning* 70 (1-2): 21-34. <https://doi.org/10.1016/j.landurbplan.2003.10.002>.
- Almalioti S., Tsiotas D., 2025. "Structural characteristics of the OECD international trade network and their association with economic development", Sustainable Regional Development Scientific Journal, Vol II. (2), pp.21-32
- Barca, F. 2009. *An Agenda for a Reformed Cohesion Policy: A Place-Based Approach to Meeting European Union Challenges and Expectations*. Independent report prepared at the request of Danuta Hübner, European Commissioner for Regional Policy. European Commission.
- Barca, F., P. McCann, and A. Rodríguez-Pose. 2012. "The Case for Regional Development Intervention: Place-Based versus Place-Neutral Approaches." *Journal of Regional Science* 52: 134-152. <https://doi.org/10.1111/j.1467-9787.2011.00756.x>.
- Biermann, F., N. Kanie, and R. E. Kim. 2017. "Global Governance by Goal-Setting: The Novel Approach of the UN Sustainable Development Goals." *Current Opinion in Environmental*

- Sustainability* 26–27: 26–31. <https://doi.org/10.1016/j.cosust.2017.01.010>.
- Boller, E., F. Häni, and H.-M. Poehling. 2004. *Ecological Infrastructure: Ideabook on Functional Biodiversity at Farm Level – Temperate Zones of Europe*. Swiss Center for Agricultural Extension and Rural Development.
- Bommarco, R., D. Kleijn, and S. G. Potts. 2013. “Ecological Intensification: Harnessing Ecosystem Services for Food Security.” *Trends in Ecology & Evolution* 28 (4): 230–238. <https://doi.org/10.1016/j.tree.2012.10.012>.
- Cancela D’Abreu, A., T. Correia, and R. Oliveira. 2004. *Contributos para a Identificação e Caracterização da Paisagem em Portugal Continental*. Direção-Geral do Ordenamento do Território e Desenvolvimento Urbano.
- Castiço, F., and M. Cardoso. 2023. *Normas Técnicas Necessárias ao Exercício da Produção Integrada: Culturas Vegetais*. Direção de Serviços de Promoção da Atividade Agrícola, DGADR.
- Coronato, M. 2020. “The Sustainability Dimensions: A Territorialized Approach to Sustainable Development.” *Global Journal of Human-Social Science* 20 (H10): 23–32. <https://doi.org/10.34257/GJHSSHVOL20IS10PG23>.
- Dec. Law 80/2015, 14<sup>th</sup> May. *Regime Jurídico dos Instrumentos de Gestão Territorial* (Territorial Management Instruments). <https://diariodarepublica.pt/dr/legislacao-consolidada/decreto-lei/2015-105297982>
- Diniz, F., and C. Gerry. 2009. “A Problemática do Desenvolvimento Rural.” In *Compêndio de Economia Regional*, vol. 1, Teoria, Temáticas e Políticas, edited by José Silva Costa and Peter Nijkamp, 529–561. Principia.
- F Teixeira, S Pescada, F Ruxho, 2024, The efficacy of technical analysis in the foreign exchange market: a case study of the USD/JPY pair, Sustainable Regional Development Scientific Journal 1 (2), 68-75
- FJ Teixeira, SSPV Pescada, F Ruxho, C Palma, F Beha, 2024, GLAMPING IN LOW-DENSITY TERRITORIES: THE CASE OF SANTO ALEIXO DA REASTAURA?? O, Regional Science Inquiry 16 (1), 71-80
- Freire, M. 2014. “Mediterranean Landscapes: On the Ecological and Cultural Foundations Essential to the Process of Landscape Transformation.” In *The Garden as a Lab: Where Ecological and Cultural Systems Meet in the Mediterranean Context*, edited by A. Duarte, 30–42. CHAIA–Universidade de Évora.
- Freire, M. C., I. J. Ramos, E. Cabecinha, S. Faria, and N. Guiomar. 2021. “Corredores Ecológicos.” In *Ecologia da Paisagem no Contexto Luso-Brasileiro*, vol. II, edited by S. Carvalho-Ribeiro et al., 137–166. Editora Appris.
- Gómez-Limón, J. A., and L. Riesgo. 2012. “Sustainability Assessment of Olive Groves in Andalusia: A Methodological Proposal.” *New Medit* 11 (2): 39–49.
- I Voka, ADF Ruxho, Use of financial technology in Albania, 2022, ECONOMICUS No. 21/2022, 36
- Khan A., Tripathi S., Chandiramani J., 2024. “Smart city initiatives and economic growth in india: an empirical analysis”, Sustainable Regional Development Scientific Journal, Vol. I, (2): Special Issue, pp. 41-56
- Krupavicius, A., Šarkute, L., Krasniqi, A., Ladias, Christos Ap. 2024. “Perceived and desired images of society: how (un)equal is society?” *Regional Science Inquiry*, 16(1), pp. 55-70
- Ladias C.A., Ruxho F., Teixeira F., Pescada S., 2023, “The regional economic indicators and economic development of Kosovo”, *Regional Science Inquiry*, Vol. XV, (1), pp. 73-83
- Lampreia M., Teixeira F., Pescada S. P. V., 2024. “The predictive power of technical analysis: evidence from the gbp/usd exchange rate”, *Sustainable Regional Development Scientific Journal*, Vol. I, (3), pp. 67-75
- Lincaru C., Tudose G., Cosnita D., Pirciog S., Grigorescu A., Ciuca V., 2024. “Clusters as engines of sustainable employment growth in Romania1”, *Sustainable Regional Development Scientific Journal*, Vol. I, (3), pp. 10-27
- Lucas, M. R., coord. 2023. *Programa de Sustentabilidade do Azeite do Alentejo: Relatório de Sustentabilidade do Azeite do Alentejo*. Universidade de Évora.
- Marsden, T. 2012. “Sustainable Place-Making for Sustainability Science: The Contested Case of Agri-Food and Urban-Rural Relations.” *Sustainability Science* 8. <https://doi.org/10.1007/s11625-012-0186-0>.
- Melo, J. P. B. 2009. “A Problemática e as Políticas de Desenvolvimento Local.” In *Compêndio de Economia Regional*, vol. 1, edited by J. S. Costa and P. Nijkamp, 499–517. Principia.
- Muñoz-Rojas, J., and R. García-Ruiz. 2024. *The Olive Landscapes of the Mediterranean: Key Challenges and Opportunities for Their Sustainability in the Early Twenty-First Century*. Springer.
- Ningrum, D., S. Malekpour, R. Raven, E. A. Moallemi, and G. Bonar. 2024. “Three Perspectives on Enabling Local Actions for the Sustainable Development Goals (SDGs).” *Global*

- Sustainability* 7: 1–29. <https://doi.org/10.1017/sus.2024.20>.
- Papajorgji P., Tordi A., 2024. “Using quantitative tools to understand political issues”, Sustainable Regional Development Scientific Journal, Vol. I, (3), pp. 28-35
- Parrilla-González, J., and D. Ortega-Alonso. 2022. “Sustainable Development Goals in the Andalusian Olive Oil Cooperative Sector: Heritage, Innovation, Gender Perspective and Sustainability.” *New Medit* 21 (2). <https://doi.org/10.30682/nm2202c>.
- Pescada S., Correia I., Teixeira F., Ruxho F., 2025. “Social and territorial impacts of the integrated participation programme in Bela Vista”, Sustainable Regional Development Scientific Journal, Vol II. (2), pp.67-74
- Pescada S., Serrario M., Sequeira B., Teixeira F., Ladas Ap. C. Ruxho F., 2025. “Safety culture and continuing care”, Sustainable Regional Development Scientific Journal, Vol II. (2), pp.33-44
- Polo A., Beha F., Caca E., Zyberi I., 2025. “Foreign direct investment in real estate and its impact on tourism development in Albania”, Sustainable Regional Development Scientific Journal, Vol II. (2), pp.12-20
- Polo A., Caca E., Zyberi I., Ladas C.A, Ruxho F., 2025. “Foreign direct investment in real estate in Albania and its impact on GDP”, Regional Science Inquiry, Vol. XVII, (1), 2025, pp. 135-142
- Ruxho F., 2024. “Kosovo employee’s perception of economic growth and decent work according to sustainability”, Sustainable Regional Development Scientific Journal, Vol. I, (3), pp. 53-66
- Ruxho F., Ladas C.A, 2022. “Increasing funding for the regional industry of Kosovo and impact on economic growth” Regional Science Inquiry Journal, Vol. XIV. (1), pp. 117-126
- Ruxho F., Ladas C.A, Tafarshiku A., Abazi E., 2023. “Regional employee’s perceptions on decent work and economic growth: labour market of Albania and Kosovo”, Regional Science Inquiry, Vol. XV, (2), pp.13-23.
- Ruxho F., Ladas C.A., 2022. “The logistic drivers as a powerful performance indicator in the development of regional companies of Kosovo” Regional Science Inquiry Journal, Vol. XIV. (2), pp. 95-106
- Ruxho F., Petropoulos D., Negoro D.A. 2024. “Public debt as a determinant of the economic growth in Kosovo”, Sustainable Regional Development Scientific Journal, Vol. I, (1), pp. 55-67
- Sarkute L., Sina D., Bello, K., Vercuni A., 2024. “Strategic management decisions in the context of foreign direct investment. The role of institutions and economic determinants”, Sustainable Regional Development Scientific Journal, Vol. I, (1), pp. 40-54
- Sejdini In., Sejdini Im., Todri A., Papajorgji P., Ladas C.A., Ruxho F., 2025. “Advancing a new era in higher education management: A stakeholder overview analysis from European and EU non-countries”, Regional Science Inquiry, Vol. XVII, (2), 2025, pp. 11-23 11
- Sepetis A., Krupavičius A., Ladas Ap. C. 2024 “Social protection in Greece and sustainable development leaving no one behind”, Sustainable Regional Development Scientific Journal, Vol. I, (1), pp. 83-92
- Sequeira T., Rego C., Dionisio A., 2024. “Investment and productivity in the agro-industrial sector: a case study”, Sustainable Regional Development Scientific Journal, Vol. I, (2): Special Issue, pp. 13-26
- Silveira, A., J. Ferrão, J. Muñoz-Rojas, T. Pinto-Correia, M. Guimarães, and L. Schmidt. 2018. “The Sustainability of Agricultural Intensification in the Early 21st Century: Insights from the Olive Oil Production in Alentejo (Southern Portugal).” <https://doi.org/10.31447/ics9789726715054.10>.
- Simões Lopes, A. 1984. *Desenvolvimento Regional: Problemática, Teoria e Modelos*. 2nd ed. Fundação Calouste Gulbenkian.
- SSPV PESCADA, F RUXHO, C PALMA, 2024, Glamping In Low-Density Territories: The Case Of Santo Aleixo Da Reastaura?? O, Regional Science Inquiry 16 (1), 71-80
- Stavara M., Tsiotas D., 2024. “A combined graph theoretic and transport planning framework for the economic and functional analysis of large-scale road networks”, Sustainable Regional Development Scientific Journal, Vol. I, (2): Special Issue, pp. 27-40
- T Corvo, S Pescada, A Krasniqi, J Vidal, F Ruxho, F Teixeira, 2024, The importance of organizational culture in the performance of family health units–model b in the Algarve region, Hellenic Association of Regional Scientists
- Teixeira F., Pescada, S.S.P.V., Ladas C.A., Hulaj M., Ruxho F., Machado V., 2025. “Stablecoin dp2p: innovation and sustainability in fiat currencies”, Regional Science Inquiry, Vol. XVII, (1), pp. 95-106
- Todri A. Papajorgji P. 2025. “Integrating financial and organizational drivers in SME’s debt dynamics: insights from radial basis function analysis”, Sustainable Regional Development Scientific Journal, Vol II. (2), pp. 45-58
- Tsiotas D., Giannakis E., Papadas C., 2025. “A modularity decomposition model of evolving input-output sectorial structure, Regional Science Inquiry, Vol. XVII, (1), pp. 107-133
- Tsiotas D., Polyzos S., 2024. “Analyzing the spatial interactions in the nationwide regional capitals

- network of Greece”, Sustainable Regional Development Scientific Journal, Vol. I, (3), pp. 36-52
- Tsiotas, D., Krabokoukis, T., & Polyzos, S. 2020. “Detecting interregional patterns in tourism seasonality of Greece: A principal components analysis approach”, *Regional Science Inquiry*, 12(2), 91-112.
- Tsiotas, D., Niavis, S., Polyzos, S., Papageorgiou, A., 2020. “Developing Indicators for Capturing the Airports Dynamics in Regional and Tourism Development: Evidence from Greece”, *Journal of Air Transport Studies*, 11(1), pp.31-46.
- Tsiotas, D., Polyzos, S., 2024. “Transportation networks and regional development: the conceptual and empirical framework in Greece”, *Sustainable Regional Development Scientific Journal*, Vol. I, (1), pp. 15-39
- Voka I., Dibra R., 2025. “Budget deficit - its impact on the Albanian regional economy and some factors that has influence”, *Sustainable Regional Development Scientific Journal*, Vol II. (2), pp.59-66