CASE STUDY

"INTENSIVE OLIVE GROVES" (PORTUGAL)

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1 Introduction: What is the case study about?

The olive trees are well adapted to the Mediterranean climate of Portugal, being even part of a traditional and identity crop. Nevertheless, they used to be cultivated in dryland areas and managed as non-irrigated systems. In the late 80s, after Portugal joined the EEC, started to be under a set of programs and regulations which, in conjunction with national regulations driven by the European ones, promoted olive production, as expressed in WP3 report. Even though, the major driver for the intensification of olive grove was the availability of water carried by the Alqueva dam irrigation project and partially by the decoupling of direct payments from production (Council Regulation (EC) n.º 1782/2003 of 29 September 2003 – CAP reform of 2003, referred to as Luxembourg agreement or Fischler reform).

The expansion of the Alqueva irrigation area, with linkages to other supply and water storage systems, is being carried out mainly in Baixo Alentejo (NUT III, see Annex 7.2 A). Therefore, this case study was conducted at regional level (NUTS III), in the NUT III of Baixo Alentejo (figure 1), which comprises 854,292.44 hectares, representing 9.59% of the Portuguese mainland area and 30.03% of the Alentejo region (NUT II). This area was selected for the occurrence of a faster intensification of land use related to olive production (Figure 1). However this growth is spatially unbalanced and it can be observed essentially in the north and west of this NUT.

Figure 1: Localization of the study area and evolution of the monocultural olive groves between 1990 and 2012.

The morphology of the territory in Baixo Alentejo (i.e. flat land), the size of properties (i.e. mostly large property) and the availability of water generated by Alqueva, transformed this region almost unique in Portugal for the intensification of the production. The intensification
of production, which occurred mostly in the last 10 years, but at a very fast rate (following somehow the implementation of the irrigation network associated with the Alqueva dam) is also related to the low profitability of the traditional low-input systems, making them very dependent on subsidies as explored in WP3 report. Furthermore, the production in low intensity systems is more susceptible to plagues and diseases that arise with greater intensity when there are changes in the pattern of meteorological parameters (e.g. high precipitation and temperature in late summer/early autumn). In intensive olive groves, the use of more resistant varieties, lower load of the inoculum, and adequate phytosanitary treatments, the negative effects on the production were much lower (INE, 2015).

The ESBO this case study addresses is rural vitality. As other peripheral territories, Baixo Alentejo municipalities have deal for long time with rural exodus and land abandonment. The Alqueva irrigation project brought the promise of more jobs, attracting investments and settling population in the region. In addition, olive groves for being an identity and profitable crop (in the intensified system) rapidly turned out to be the face of this transition. Besides the olive groves per se, when considering the olive oil value chain the benefits increase, with the transformation industries being settled at the region. The face of this new identity for the region is the investment of some municipalities in promoting territorial marketing by labelling themselves as the «Olive oil capital» such as Ferreira do Alentejo or Moura, which organizes the «National Olive Fair» and other related congresses. There is a strong dynamic on promoting olive groves and olive oil at the region. Also at the national scale the intensification of the production have allowed a shift of the trade balance with Portugal going from an importing to an exporting (olive oil) country.

Olive growers’ associations, co-operatives and enterprises could have an important function in strengthening the local olive-oil chains. The main purpose of the collective actions is to ensure the flow of olive production, to increase the quality of the olive oil and thus the profitability of the entire production system. These chains are critical for small farmers.

The farming system intensification, allows for large increments in productivity and profitability but constraints some environmental and landscape benefits and cause more environmental concerns (e.g. Beaufoy, 2001). The increase of olive groves was held through a land-use change and cover mostly from cereal steppe or plain cereal ecosystems to intensive olive groves and therefore transforming the landscape from a yellow/ brown pallet with opened sight to large dense green areas (Figure 2).
Although, subjective, this landscape transformation can be quite shocking for the occasional visitor; still for the locals it can actually be seen as the expression of the rural vitality and a positive instead of a negative impact. Of note is that the intensive olive groves were one of the least preferred landscape in a survey conducted in Portugal by Almeida et al. (2015) mainly due to environmental quality perception, followed by aesthetic appreciation aspects. However, the previously dominant cereal steppe – a predominantly herbaceous ecosystem mostly made of flat areas, shaped by agriculture based on long rotations of no irrigated crops - as an extensive agriculture, resulting from the action of man and nature over time, provides a wide variety of biotopes for birds, some of those endangered species which relies solely upon these ecosystems. In Annex 7.2 B is presented the area classified as Important Bird and Biodiversity Area and as Special Protected Area under Natura 2000 network. Furthermore, these birds are very susceptible to habitat changes and climate change, which are the two main causes of biodiversity loss globally.

Noteworthy is that for being economically unprofitable (due to the liberalization of the markets and the impossibility to compete with the Asian ones) a major trend to cereal steppes, if not the conversion, is the abandonment, which will also have major impacts to these birds’ species. Although, the Natura 2000 Network, through the Birds directive, should ensure the protection of these important habitats for these important species, there are reports of Special Protection Areas converted to irrigation crops, in the current case study area, which poses a real threat to conservation efforts. An in depth study should try to characterize the portion of these areas converted to irrigation crops as also discuss the legality and policy issues behind this situation. There is no study of the percentage of extensive farmland habitat converted to irrigated and permanent crops inside steppic SPAs. But the official position of ICNF is that the percentage is very small. But might not be the case, because there are examples of areas illegally converted in several SPAs (Castro Verde, Moura/Mourão/Barrancos, Reguengos, Torre da Bolsa, Campo Maior) and conflicts between the land owners and the administration in these areas and in others (Cuba, Évora, Monforte). There was an infringement process opposing the European Commission and Portugal that last six years, between 2002 and 2008. The EC forced Portugal to designate more SPAs for steppic birds. When this conflict finished in 2008, Portugal designated 8 new SPAs, but these were much smaller than initially proposed, because during the 6 year of conflict important parts were lost for irrigation and farmland intensification.
Furthermore, also an important heritage is being jeopardized in name of profitability and rural vitality, once the endogenous varieties are being replaced by exogenous and more rentable ones as well as centenary olives, as less productive, are not exploited and are being sold for ornamental purposes.

Besides the impacts on the landscape, several environmental impacts have been identified as a result of the intensification of olive groves – which results from the type of management - in particular with regard to specific public goods such as water quality, soil fertility, biodiversity and cultural services (de Graaf and Eppink, 1999; Metzidakis et al., 2008; Santilli et al. 2011). These were explored at WP3 report and respects namely to negative externalities associated with effects on public goods such as water quality, soil quality (e.g. salinization), biodiversity and cultural services provided by the landscape (e.g. landscape aesthetics). However the interviewed stakeholders are unanimous in arguing that this impacts are minimum, that the landscape transformation is positive and, in opposition, that the professionalization of the activity, driven by cost-efficiency promote sustainable practices.

This is a paradigmatic and controversial case study as it implies hard trade-offs between rural vitality and sustainability. Besides literature and report review, this report was based on 5 interviews to key stakeholders (see Annex 7.1).
2 Definition of the social-ecological system (SES) studied

Figure of the SES, using the SES Framework

RESOURCES
Intensive olive grove systems in Baixa Alentejo

RESOURCES UNITS
Intensive production of olive (mostly through exogenous varieties) for olive oil production (value chain)

ACTORS
Direct Producers Cooperatives Manufacturing industry

Indirect Municipalities EDIA (Alqueva manager) Researchers Entrepreneurs Local communities

GOVERNANCE SYSTEM
Regulatory: EU (CAP) & PT (PRODER/PDR)
Municipalities define spatial planning
Private property systems with well-defined property rights, region dominated by large property and flexibility regarding production and transformation. Restrictions (to habitat conversion) imposed by Natura 2000 area.

MACRO-ISSUES
Market drivers: increase of international competition (production) and consumption. Increase of profitability by intensification and exogenous varieties. Quality standards and cost effectiveness’ promotes sustainability.

Economic drivers: unemployment, depopulation and land abandonment.
Territorial drivers: morphology, access to irrigation, latifundia (scale economy)

ACTION SITUATIONS
CAP (pre reform) targeting the production. Alqueva dam construction and associated irrigation project. Promotion of a Mediterranean diet (increase on the demand side). Increase of a traditional permanent crop through intensification mostly by conversion of low profitability cereals crops.
Short characterization of key drivers/motivations

The public policies (European and national level) along with the availability of water brought by Alqueva dam irrigation project were the main drivers for the intensification of olive grove systems in the case study area. In addition, also the promotion of the Mediterranean diet, through international campaigns, was a key driver which boosted the olive oil market and increased the demand in countries with lower consumption tradition, opening new opportunities to the production countries. At the same time, also other countries have entered the market as producers, increasing the competition. The low profitability, dependency of subsidies and lower resiliency of the traditional extensive productions drove the intensification towards tackling the growing market demand and competition.

At the national level, the intensification allowed the increase of competitiveness and the shift from an importing to exporting country (olive oil), with the current production exceeding the internal (high) consumption. When taking into account all the value chain of the olive oil production it brought new investments and the settlement of enterprises for the region, what is seen by the local authority’s distinctive features for the region and as strategic in terms of national agriculture policy.

Description of other important variables chosen

In economic terms, the maintenance or promotion of the traditional olive groves in an extensive manner is viewed by the interviewers, unanimously, as a non-sense. The intensification and the capacity to attract and settle in the region investment along the value chain is seen as a promise to tackle the region trends to depopulation, population ageing and land abandonment. Although, this intensification is dependent on technology under the current management regime, namely due to the need of mechanization and large irrigation systems and therefore dependent on large investments from the producer. The need to call on specialized knowledge to install and manage this intensified systems is pointed out by the interviewers as a promoter of sustainability even that only for cost-effectiveness reasons. Also, all the quality criteria’s and control introduced in this systems is viewed as a guarantee of a better quality. Some of the interviewees pointed out that under the traditional systems, simple actions as not packing and deliver to cooperatives on time the olives for transformation diminishes the product quality.

To highlight is that EDIA, SA (Alqueva management public company), does not promote specifically olive groves, its profitability makes it the more desirable culture to invest on with controlled risks when compared with other. Also EDIA assures four years of water supply under a drought crises, which is particular attractive for investors.

This dependence on technology of the intensified systems - which implies certain characteristics of the territory, such as plain areas - the needed financial support alongside with the need for water availability, in Portugal, and in a certain way, controls the growth of the intensified system and restricts it to a certain area (Alqueva irrigation system, see Annex 7.2A).
**Discussion of the SES**

The target of the olive production is mainly the transformation of olives into olive oil. As discussed (see 2.3 and 2.4) there are a number of action situations and key drivers that promote olive groves. To respond to the market demand - and under a favourable context and conditions – we have been assisting, at the case study area, to an intensification of olive grove systems. The existent governance system does not restrict this system of production. The only restrictions relates to the impediment of converting habitat under protection regimes, at least without approved consent. Although, from an interviewed point of view «is demanded greater speed in the approval of irrigation projects to turn the investment for the region more attractive».

The main beneficiaries of the intensification of olive grove systems are the producers themselves and at a second stage the cooperatives (intermediaries) and the transformation industries and other along the olive oil value chain. The municipalities and the local habitant benefit directly and indirectly from the attractiveness and settle of investment on the region, namely by job creation and population settling. It also contributes for validate and sustain the public investment in the Alqueva irrigation project and therefore, even that indirectly, EDIA (Alqueva management enterprise) is also a key driver.

It is also important to incorporate in the SES, as stakeholders, the *losers*, and at a broader scale, of this intensification of olive groves which results from the landscape, environmental and cultural impacts that might derive from it. In this point researchers, NGOs and the civil society have a key role to play.

**Common aims, conflicting interests and goals**

All the stakeholders within the olive oil value chain, alongside with the local authorities and EDIA, SA, are aligned in the promotion of this activity in the territory and the expected trend is to growth the maximum allowed by the needed conditions (see 2.3). They strive for changing what they think to be «a mistaken or misinformed perception» against the intensive system.

From the conservationist side, several issues are raised (as discussed) and attention - with some media support - is putted on the cost, at long term, of promoting this intensified systems and at what risk from the heritage and ecological point of view. From this side, the fight is to change the perception that traditional (but sustainable) or even biological systems of production cannot be profitable. Although, to the consumer - the ones that could promote by their choices the courses of actions – do not get enough information on the products they are buying. In most cases, the cooperatives buy the olives for transformation indiscriminately of the production type (extensive or intensive) and they are mixed in the olive oil production. Even most certification schemes do not focus on the type of cultivation system but on the transformation or the region in which is produced. By no mean, this poses a wealth vs conservation issue, but instead, that other systems - more sustainable, although profitable and while responding to the community needs by assuring equitable benefit sharing - must be accounted.

**Other issues arising from SES analysis and context/case study specific aspects/issues**

The life quality of populations living near olive oil mills and olive pomace treatment units.
3 Status of the SES and potentials

Description of the SES

As discussed in the WP3 report, the identified negatives externalities that derived from the intensification of olive grove systems seems to be in conflict with other policies and strategies and territorial policies, namely the EU-Water Framework Directive, control of diffuse pollution, Regional Strategy for Smart Specialisation, and even the Operational Program for the Alentejo Region, and also the European Biodiversity Strategy as well as it is putting at risks the protection status brought by the birds directive. In relation to a threat to montado system, by the conversion of habitat to intensive olive grove, at this point, this fact could not be validated and none of the interviewed considered this fact relevant, assuming that «if it occurred was punctual situations of isolated tree-cutting». As discussed, and pointed by all the interviewed, the conversion of habitat was mostly related with cereal crops, also with a set of biodiversity and landscape concerns argued before.

Relationships between farming and forestry, and the quantity and quality of ESBOs

Intensive olive grove systems are monoculture systems with a high density of trees. When analysed through the whole value chain - when considering olive oil production as the resource unit – the key ESBO is rural vitality. If only considering the provision of olive, the intensification system, for being more mechanized, it actually decreases the number of jobs and they are most of all temporary and related to the harvesting phase. When taking into account the resource unit (olive oil production along the value chain), the intensified production brought a scale economy which allows the investment and settle of a set of transforming industries and services enterprises which then significantly contributes to boost the region. Even one interviewee revealed that «it is astonished that today he can watch business meetings related to the olive oil in the region hotels instead of happening in the capital as it used to be».

Although controversial when comparing with the previous land-use and culture systems, mostly due to the environmental externalities discussed, also one interviewee pointed out some environmental benefits of these systems related with climate regulation through the increase of CO$_2$ sequestration and also the increase of the humidity on the region contributing to tackle desertification risk. Therefore, pointing out some positive externalities that contrast with the negative already pointed out. It has also pointed out the risk associated with the land abandonment as a situation opposite to the conversion of non-profitable cultures or systems to the one in analysis. In opposition it can be argued that by the characteristics of the intensive production - related for instance with a faster replacement of the olive trees and also with the increase mechanization – and when considering the whole life cycle olive oil production this system, regarding carbon, is inefficient. However, in the case of an in depth analysis data to support this argument should be looked for.

Key motivational, institutional and socio-economic factors

It was not clear the existence of a lobby related with the SES under analysis. Although, the existence of a public manager infrastructure (Alqueva Dam and irrigation systems) promotes
the increasing of irrigation projects at the area in order to validate and economically sustain this investment.

Levels of provision, trends and determinants

According to Mariana Vilhena de Matos - Secretary General of the Portuguese Association of olive oil – the olive sector in Portugal met in the last decade a remarkable growth through its value chain, driven by massive investment that led to an enormous revival of this traditional sector of the Portuguese agriculture, which is not only reflected on the production, but also in what regards the product quality, their presentation and marketing. According to the data available at the Portuguese Association of olive oil website\textsuperscript{1}, in Portugal, there has been a recent and certain recovery in production after the sharp decrease seen especially from the 60's until the late 80's, with a transition on production from 90,000 tonnes (in the 50s) to an average value of around 35,000 tons in the 80s. According to the same source, the campaigns of the last two years are estimated to be the most productive of the last decade. The exportation data also show a significant increase of 19% between 2005 and 2014. Also, as presented in WP3 report, Alentejo is the region that contributes most to the olive production (69.58% of the national production) and to the olive oil production (68.55% of the national production of olive oil) (INE, 2015). In this region, the contribution to the overall national production doubled in the period 2008-2014 in both of the production indicators. The evolution of the olive grove area at Alentejo, between 1999 and 2009, represented an increase of 24.4%. According to the SIAS2 (Information System on Olive Oil and Table Olives) data, in 2013, 22% of olive oil production was through irrigated systems.

According to Alqueva 2015 Agricultural Yearbook, the potential growth of the olive culture remains stable and it is expected that global consumption continues to increase at the same rate of previous years. In addition, it is also pointed out that the soil, climate and market conditions create a favourable environment to the continued growth of the olive grove areas in the irrigation perimeter of Alqueva. Noteworthy is that one of the major global players in the production and marketing of olive oil, Sovena Group, has its largest production area in Alqueva, about 10,000 ha and that the group also built in Ferreira do Alentejo (case study area) one of the largest olive mills in the world (EDIA, 2015).

In 2001, 13% of Baixo Alentejo population worked on the primary sector in contrast with the national average, in mainland, that is 2% (INE, 2012). It will be relevant to obtain data specifically on the evolution of the employment in the region regarding the olive sector as well as the evolution of related enterprises/industries settled, before and after irrigation, in order to estimate the significance of the positive impact of this activity over its value chain. Furthermore, in an in depth analysis, would be relevant to try to obtain relevant data which allow to assess the impact of the sector towards rural vitality, which will require the development of indicators or proxies which can support this argument, namely by comparison with the tradition olive cultures.

\textsuperscript{1} \url{http://www.casadoazeite.pt/Profissionais/Dados-sector/Produ%C3%A7%C3%A3o}
\textsuperscript{2} \url{http://www.gpp.pt/estatistica/SIAZ/}
Relevant governance arrangements and institutional frameworks

Due to the existence of promotion drivers of intensive olive grove systems, and its potential consequential environmental impacts, the existence of areas classified under Natura 2000 network (see Annex 7.2B) it is of extremely importance. A strong effort at governance level is to assure that no damage or irregularity can occur in these areas and that they are conserved and properly managed for its purposes, which unfortunately has not been the rule.

Other context/case study specific aspects/issues

None.

4 Conclusions derived from analysis in Steps 1 and 2

Key findings on the particular SES and its potentials

The intensive olive groves systems in Baixo Alentejo were allowed by a set of territorial drivers, as the morphology of the land (plain), access to irrigation and characterized mainly by large properties. Focusing on the increase on the profitability of the olive oil, were driven by the increase on the international demand as well as on the competition of the sector. In the following years, with the expansion of the Alqueva irrigation system to its limits, the production through intensive systems is tend to growth.

This system brought the promise of boosting the local and national economy but its most visible transformations regards landscape patterns. Although, it is also pointed out as a system with a set of discussed negative environmental externalities which should be safeguarded.

At the end, what should be the repercussions to the society of this course of action? Would this production system enables synergies between economic and environmental benefits for the society?

This case study seems to poses hard trade-offs between rural vitality and environmental externalities but an in depth analyses should focus on measure how effective this rural vitality is, the winners and losers of this system and the comparison with the socioeconomic benefits of other production systems. Also, for a clear understanding of the environmental and socioeconomic impacts of the system (positive and negative) they must be analysed along the whole life cycle of the olive oil production.

It is crucial the delivery of a strong work focus on informing and aware the consumer to exercising its power to influence the market towards more sustainable practices along with the role expected from policies which must drive effective sustainable agriculture practices (see 4.2)

Governance arrangements and institutional frameworks

In this particular case study the governance arrangement and institutional frameworks were not the key driver for the ESBO provision through the intensive olive groves. This is due to the fact that we are dealing with private property systems, with well-defined property rights, in a region dominated by latifundia and flexibility regarding production and transformation, with the municipalities having the main role in defining spatial planning. Although, it was a public
investment, behind a national strategic development goal for the region, that allowed this system growth and the ESBO provision. Due to the existence of important and discussed trade-offs regarding this SES, it is crucial that the governance arrangements and institutional frameworks assure the sustainability of these systems and the protection of the areas under conservation status through appropriated conservation and management. Of note, as argued on WP3 report, is the lack of knowledge regarding the lifespan of these new olive groves as production systems and, therefore, land use conversion processes when they lose their viability are not being equated. Nevertheless policies may have an important role in promoting sustainable agricultural systems which might be compatible with development goals, namely by stimulating new financial mechanisms as payment for the public goods provided by the traditional olive groves or the cereal steps - which are crucial for the conservation of endangered species – that would help to fulfil the gap of profitability between this several systems. Unfortunately, UE and Portuguese decision makers have failed systematically on rewarding public goods with public money. That actual Common Agriculture Policy, for example, failed on both direct payments and on Rural Development funds. For one side Greening was supposed to top with extra 30% payment the farmers that do more sustainable and diverse farmers. But greening measures are so shallow that completely ineffective. On the rural development side, things are also desperately bad. In Portugal Natura 2000 covers 20% of territory, but receives less than 3% of the rural development program funds. Natura 2000 payments and special designed measures farmers to manage Natura 2000 are paralysing insufficient. It is obviously that decision makers from agriculture sector don’t see nature and natural resources as public services were public money should be invested.

**Other enabling or limiting factors**

As pointed out (by one interviewed), a limiting factor for the increase of ESBOs provision is the still deficient road network within the region to keep up with the growing dynamism of the region and to assist the settlement of new industries. Another potential limiting factor already mentioned is the need for faster processes on approving irrigation projects related with bureaucracy.

**Reflections on the case study methodology used and potential improvements**

The SES approach and diagram showed to be an effective way of systematizing and representing the dynamics under ESBO provision. Also, the engagement of stakeholders revealed to be a crucial step to assure that all the key components of the SES are effectively addressed, even more when the existence information is sometimes not enough to provide a broader picture of the system. The interviewed showed quite happy to participate and to an open way share their perspectives. Although, and for this particular case study, the methodology lacks guidance on performing and discussing the trade-offs occurring from the ESBO provision.
5 Research and action mandate for Steps 3 and 4

Agreed objectives of activities to be undertaken with initiative/stakeholders

The engaged stakeholders so far are available to collaborate further in this study and to provide further documentation that sustains their vision of sustainability of the intensive olive grove systems. In line with is, an in depth analysis for this case study should focus on broader engagement processes (i.e. workshops and focus groups) which would allow to explore the identified trade-offs and solutions to address, namely the role of the governance framework and institutions.

Innovations, impact, transferability, potential risks and research bias

Due to the different interests among stakeholders - as a result of the existence of hard trade-offs – there is a willingness and interest in deepening this case study but with different goals and expectations. Specifically, a deeper study should explore the threat behind this olive oil market miracle, which allows to realize alternative systems of production, while profitable and equitable regarding benefit sharing. Also, it should be explored the role of the consumer, and the impact of a deeper conscience of the production system in the demand patterns and prices.

Although, the existence of this hard trade-offs and how to solve them turns this case-study peculiar and of extreme relevance for future transferability.

6 References

7. PEGASUS WP3 Report
9. SIAS - Information System on Olive Oil and Table Olives data http://www.gpp.pt/estatistica/SIAZ/
10. Portuguese Association of olive oil data http://www.casadoazeite.pt/Profissionais/Dados-sector/Produ%C3%A7%C3%A3o
7 ANNEX

Documentation of research and action progress

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This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
Supporting data and statistics

A. *Alqueva* irrigation infrastructure (adapted from Edia, SA)
B. Special Protected Area (Natura 2000 Network) and Important Bird and Biodiversity Area for Beja District.

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