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Extended abstract

EXTENDED ABSTRACT

Title: Olive groves in Alqueva – new territories, old challenges

Authors and e-mail: Ana Firmino (am.firmino@fcs.unl.pt) Francesca Poggi (f.poggi@fcs.unl.pt)

Department: Department of Geography and Regional Planning

University: NOVA de Lisboa, NOVA Fcsh

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1. Introduction:

Olive groves have been an important element in the Portuguese landscape, culture, gastronomy and economy. The country is particularly dependent on this crop, since olive oil is the main fat used in the Mediterranean diet. Besides olive trees are resistant to severe edaphic-climatic conditions (stony soils, some varieties are resistant to drought). They can be found in remote areas along the border, occupying marginal soils in small farms, eventually combined with wine production and rural tourism. They resisted the abandon during the 60's and 70's, period during which many Portuguese migrated. These traditional olive groves present a lower productivity, but they are diversified in varieties and they play an important role for carbon sequestration.

Alqueva is the largest artificial water reservoir in Western Europe (4150 Hm³). It is located at the border with Spain and receives water from Guadiana river. This multifunctional project has been contested since the beginning due to the negative impacts either environmental or social and heavy capital investment. Notwithstanding the rainfall decline its irrigated area keeps being extended, and new intensive and super intensive olive plantations occupy new areas in Alentejo, challenging the most negative perspectives.

The paper draws mainly on the intensive and super intensive olive groves, which together with other crops have been planted in the Alqueva region and discusses the sustainability of these plantations located in an area highly susceptible to desertification, when scenarios for 2080-2100 point to a large increase in temperatures and drop in rainfall. Episodically some owners of olive groves express doubts about the possibility to continue with their super intensive plantations, due to the long periods of



drought, and face the possibility to go back to less intensive techniques, not so dependent on irrigation.

There is an ongoing campaign against the super intensive olive groves, blamed by left parties such as “The Green”, for endangering the populations due to the high use of agrochemicals, which also contaminate soils and watersheds. They demand a buffer zone to protect villages and schools. Nevertheless, as it so often happens, the conclusions of different research studies are contradictory, and this kind of projects keep being supported by the European Union. Landgrabbing also threatens the sustainability of the plantations, since many owners are foreigners and not always deal with agriculture (building societies, for instance). In 2018, 35% of the investment in olive orchards in the irrigated perimeter of Alqueva, belonged to Spaniards.

This research is based on literature review and interviews with local stakeholders such as olive grove owners, technicians, workers, local population and politicians.

Finally, it will be argued that urgent measures need to be implemented to avoid the depletion of Alentejo’s fertility fund, which was highly affected in the thirties with the Wheat Campaign. In this vein, best agricultural practices will be presented to illustrate projects which promote the local heritage, contribute to an added-value of the production and mitigate the effects of climate change, being simultaneously economically feasible and more human friendly.

2. Climate Change and Irrigation sprawl:

Most authors project decreases in rainfall in Iberia due to climate change (Ekström et al., 2007; Guerreiro et al., 2017; Hingray et al., 2007; Kilsby et al., 2007). According to IPCC (2018) seventeen of the eighteen hottest years ever recorded have occurred since the year 2000. These studies are in line with the previsions made by the European Union, which pointed out for less water availability, higher risk of drought, heat spells, higher risk of soil erosion and decrease in the growing season and crop yields in the Southern countries of Europe, which may cause a decrease up to 50% by 2050 in non-irrigated crops like wheat, corn and sugar beet. For the European Environmental Agency (EEA, 2019) this could result in substantial drop in farm income by 2050 and consequent land abandonment until the end of the century.

Studies carried out by Santos (2001) previewed an increase in the temperatures for the period between 2080-2100, which are already happening today. In what concerns rainfall Santos speaks about a reduction of 40mm per decade in South Portugal, since the 60’s, accounting for less 200mm rain/year today (Santos, 2017). Schulp et al (2008) quoting Bergkamp et al (1997) reinforce these studies, reporting annual rainfall decline in Alentejo (South Portugal) since the 30’s.

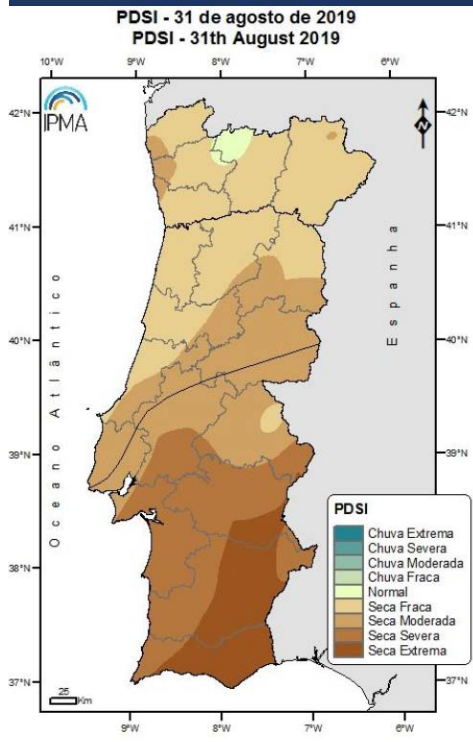


Fig. 1 – Climate Summary September 2019, (IPMA, 2019)

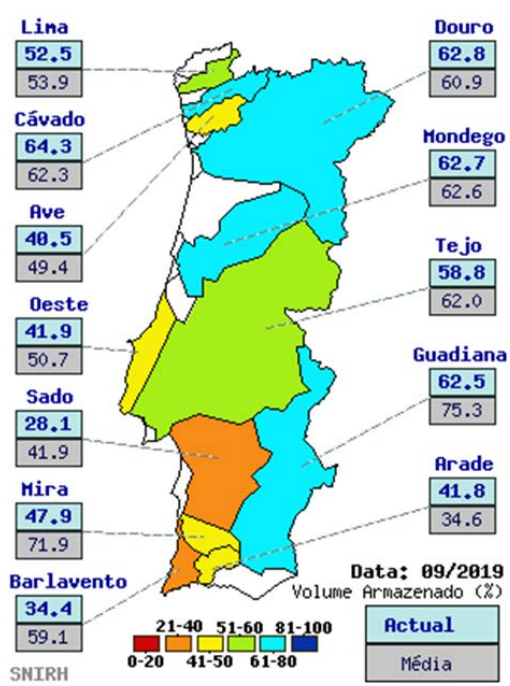


Fig. 2 – National water stockage in September 2019, (SNIRH, 2019)

The situation of extreme and severe drought in some river basins in Portugal, in August 2019, confirms these results, as shown in figure 1 (brown colors correspond to extreme, severe, moderate and weak drought). The Alqueva irrigated perimeter is in an area affected by extreme and severe drought.

The national water stockage in September 2019 (in blue), by hydrographic basin, presents averages below those registered in September, between 1990/91 and 2017/18 (in gray) except in the basins of Cávado, Douro and Mondego (in North) and Arade (in South) (figure 2). In this context, trends in the Alqueva Basin water stockage show relevant fluctuations during the period between October 2017 and September 2019. (figure 3).

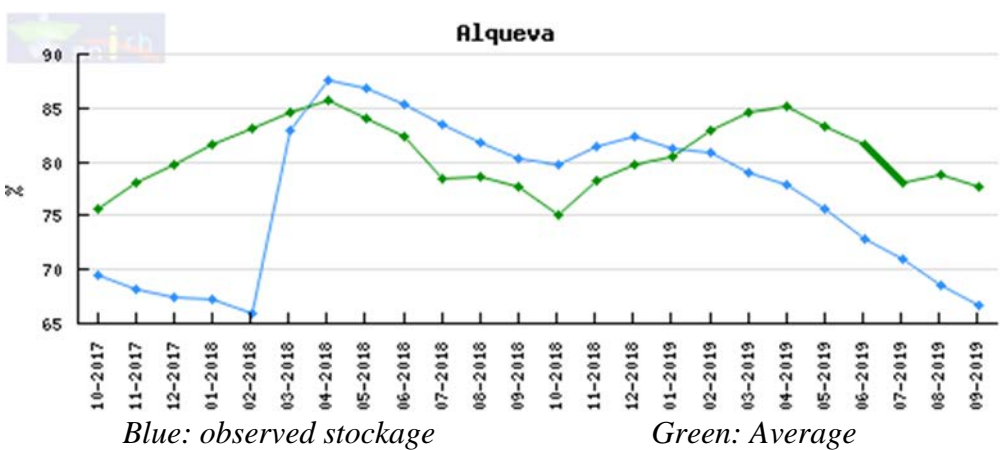


Fig. 3 – Evolution of the Alqueva Basin water storage in the Hydrological Years 2017/18 and 2018/19, (SNIRH, 2019)



Contrarily to what would be expected under these conditions the sprawl of new plantations has not stopped, and the irrigated perimeter will even be enlarged with 50 000 new hectares (project to be concluded in 2022, EDIA, 2018). Besides protocols signed on the 17.2.2018, between EDIA and Waters of Portugal, foresee that in the framework of the Project “Water Supply from Alqueva to Sines”, more water will be needed to supply the population and the important industrial pole of Sines, on the western coastline of Alentejo.

3. Olive groves in Alqueva Irrigation Perimeter:

Olive groves are the most important crop in the 120,000 ha irrigated perimeters of Alqueva (figure 4). In 2018 it occupied about 52,000 ha, i. e. 59% of this area. This crop represented almost 1/3 of the total olive production area in Alentejo (177,543 ha, producing 602,577 Ton) and 1/7 of the area in Portugal (358,886 ha, totalizing 876,215 Ton) (EDIA, 2018).

The intensive (200 trees/ha) and super intensive (1.975 trees/ha) plantations were introduced by the Spaniards, who found in Alqueva the ideal edaphoclimatic conditions, abundant water at a cheap price and large farms (latifundia) with adequate soils and much cheaper than in Spain (in 2008 prices in Alentejo were around 6000€/ha; in Spain 24.678€/ha). Besides, in 2010-2011, the rural workers in Alentejo got a wage of 32 € for 8 hours of work; in the province of Jaén, Spain, the rural worker would get 50€ for a journey of 6 hours and 30 minutes. Other factors that attracted the Spaniards investors were the similar culture and idiom, the proximity without borders and the support given by the Portuguese government, using the funds offered by the European Union for programs dealing with rural development. Sánchez Martínez, J. D. et al (2012) who present these data, talk about the neo-landscapes of olive groves in Alentejo.

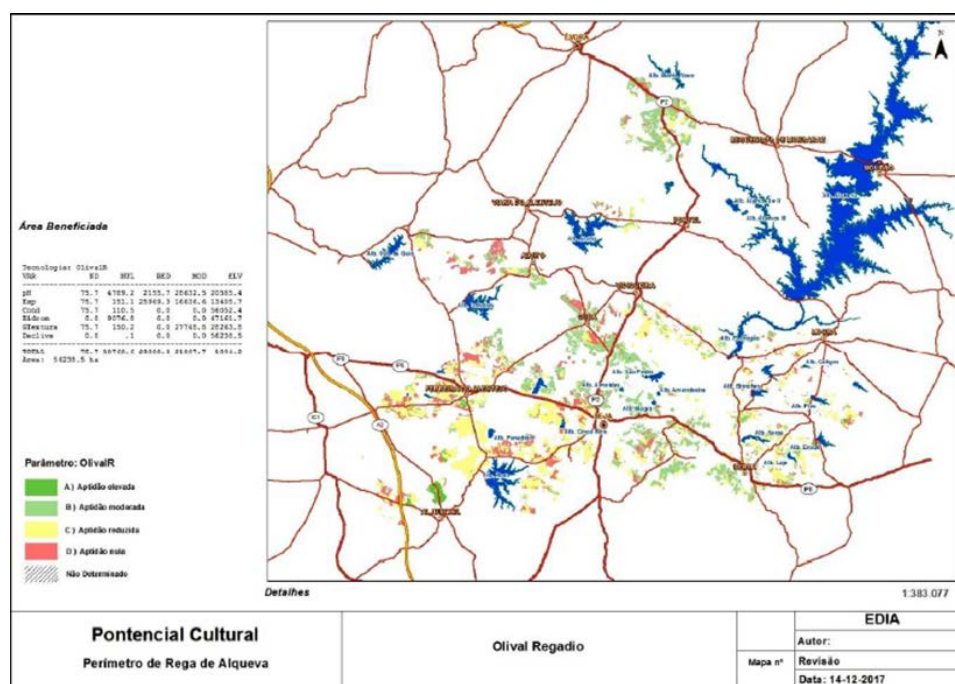


Fig.4 – Alqueva Irrigation perimeter (EDIA, 2018:106)

There is a growing demand in the international markets for olive oil, which justifies the interest in the crop, namely by important building enterprises, avid to make profits



quickly and easily. Together with real estate firms and banks, some foreign groups have made large investments which can be considered as land grabbing. In 2018, 61% of the investments in olive groves in the Alqueva irrigation perimeter were Portuguese, 35% Spanish and 1.59% British. But there are capitals from so distant countries such as Saudi Arabia, Brazil and Chile, as well as Germany, Denmark, France, Netherlands, Ukraine and Switzerland (EDIA, 2018). The largest world player in producing and marketing olive oil is Sovena, a Portuguese Group owning 10.000 ha in Alqueva and that built in Ferreira do Alentejo one of the largest olive mills in the world.



Fig. 5 - New super intensive olive plantations near Redondo

The rewarding price of olive oil in the world market has supported the accentuated growth registered in the area occupied by olive groves in the irrigated perimeter of Alqueva, as shown in the graph below, which is supposed to continue if the government will not impose restrictions, as discussed in the last chapter.

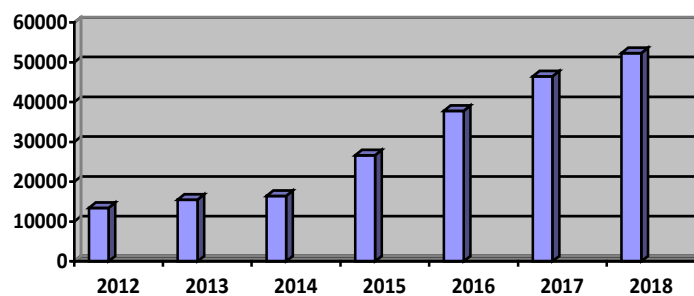


Fig. 6 - Evolution in the area occupied by olive groves in Alqueva Irrigation Perimeter (Ha)
(EDIA, 2018)



4. Sustainable Practices and Technologies

As we have seen the European agricultural sector risks to lose millions of Euros with climate change. There are around 5 million hectares of olive plantations in the European Union. Thus, it is important to invest in research to develop practices and technologies, which may contribute to the success in the sector. Next, we present some initiatives which may achieve this goal.

One of the diseases causing apprehension among the world's main producers of olive oil, such as Spain, Italy and Greece, is called XF (*Xylella fastidiosa*) and is spreading due to the milder winters, as Teresa Carrillo, coordinator of the project LIFE RESILIENCE, explains. The project aims at implementing sustainable practices and technologies “on pilot olive (and almond) plots in Spain, Italy, and Portugal, covering 250 ha in total. Measures such as cover crops and reduced tillage will help to increase resilience to XF and future climate change impacts by:

- increasing biodiversity;
- improving plant and soil health;
- optimising inputs; and
- lowering chemical exposure”.

The project is also creating new varieties of olive trees, resistant to *Xylella fastidiosa* and will deliver a Handbook of best practices, aiming at increasing the resilience of olive trees to pathogens without reducing yields. The expected outcomes by 2020 are:

- “a 30% increase in soil and plant health;
- a 20% reduction in water consumption in olive fields; and
- a 60% reduction in production costs” (EEA, 2019)(LIFE RESILIENCE, 2019).

An important contribution of the project “to reverse the trend of CO₂ losses, erosion and desertification” is achieved through the increase in the rate of “soil organic matter in the root zone of the olive trees which not only “contributes to long term storage of carbon removed, it also plays a significant role in improving tree health, and the uptake of minerals and water. These are critical factors for trees under climate change-induced stress” (EEA, 2019).

The project OLIVECLIMA points shredded pruning waste as an important practice to return organic matter from olive trees to the soil. According to Rodrigues et al (2012, 75) in a traditional dry farming orchard, a 10 years old tree may sequester 9,71 kg/tree-1, representing 2,0 t C ha⁻¹. But if the soil was improved in up to 1% more organic matter, it may sequester 14t C ha⁻¹.

Composting, weed management, non-soil tillage and new pruning methods are also encouraged. OLIVECLIMA is a project aiming at developing a certification for the net carbon balance, enhancing an eco-label for climate-friendly olive oil, which can be an added-value for the farmers (EEA, 2019) (Olive Clima, 2019).

LIFE DESERT-ADAPT is developing a ‘desertification adaptation model’ (DAM) in some areas of Italy, Spain and Portugal.

DAM is based on three pillars: Economic Adaptation (diversifying, using mainly local species suitable to climate extremes, avoiding methods that cause land degradation, and avoiding intensive agriculture in the most fragile areas); Environmental Adaptation (holistic approach combining methods such as inter-planting, reforestation, water-saving technologies and soil protection to increase resilience. As well as improved biodiversity, the beneficiary expects to achieve an average net carbon removal of one



tonne of CO₂ per hectare using the new model); and Social Adaptation (local population might work part time on DAM development or on a voluntary basis in exchange for some of the produced income, for example, or organise and lead guided eco-tourism) (adapted from EEA, 2019).

This project is running until 2022 and intends to develop “eight new sources of income for farmers: sustainable agro-products and ecosystem services adapted to projected changes in climate. These are expected to generate an extra €100 per hectare per year” (EEA, 2019). Professor Castaldi is responsible for this project which aims at showing “the effectiveness of a sustainable and holistic framework of land management that can at the same time preserve land integrity and quality, generate income and support social inclusion”, as well as making “farmers less dependent on CAP funding as the sole solution to low productivity in areas under desertification risk (EEA, 2019, 21)(DESERT ADAPT, 2019).

Finally, in order to achieve a circular economy and fight back some of the environmental impacts related to the olive processing, such as the organic residues, several bioproducts might be produced (biogas for example) through the co-digestion of organic leftovers (olive mill wastewaters and olive pomace) (SAFA et al, 2017).

5. Discussion and conclusions

The intensive and super intensive olive plantations in the Alqueva irrigation perimeter created a neo-landscape which challenges the carrying capacity of the local ecosystems, aggravated by the long and severe drought periods. EDIA (2019), the enterprise that manages Alqueva dam, acknowledges these drought conditions, more precisely in the influence area of Alqueva and in July 2019 determined emergence measures to supply water to cattle and crops. Is this a sign of Portugal becoming in 2080 a desert in Europe, as questioned by Firmino (2018)?

The plantations are starting to be contested since it is discussible that olive groves, which have a high impact on the soil for the heavy machinery used, water consumed, despite the drip irrigation, as well as chemicals launched in the environment, might be supported by European Funds.



Fig. 7 - Green Party protests near Santa Suzana, Alentejo (April, 2019)



Some political parties, such as the “Green” also contest these kinds of plantations blaming them for being malefic for the human health and environment (figure 7).

Quercus – an environmental association, demands from the government the interdiction to create more intensive plantations and CNA – National Confederation of Agriculture, supports their position (inforCNA, 2019).

Today the intensive/superintensive olive plantations represent 20.000 ha in the whole country and are to be found mainly in Alentejo. Their presence not only changed the landscape but also introduced varieties that are not traditional. Besides approximately each 10 years all the trees must be pulled out so that new might be replanted, to guarantee the high productivity of the olive groves. This all plays against the guidelines produced for an ecological production, as defended in projects such as Oliveclima and LIFE Desert-Adapt, presented above. Many new plantations have emerged in recent years, which are not yet producing in full. Some farmers also fear that a surplus in the production may affect negatively the price in the market.

In a recent debate in the Portuguese Parliament some measures were announced in order to eliminate supports to the intensive and superintensive plantations and delimitate the areas aiming at protecting the biodiversity; it was also decided to study the impact of the olive groves sprawl.

Nevertheless, as Covas et al (2008:3) wrote, we are facing a procedure of “asymmetric globalization” where the global is developing faster than the local, “deterritorialization” is faster than “reterritorialization” and “delocalization” goes faster than “relocalization”.

In this complex framework, associated with climate change and a lack of place-based policy making, our final remark appoints to an urgent need for good sense and sustainable interventions so that Alentejo does not become a desert under the lemma of intensive/superintensive olive plantations.

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