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Policy Brief

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Land-use strategies for climate change and biodiversity loss

CHALLENGES AND PROPOSPECTS FOR THE ALENTEJO REGION

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- **Rise in global temperatures due to human activities,** needs urgent and stronger actions to limit the increase to 2°C;
- **Trends in temperature increases, droughts and more frequent climate extremes,** are projected in the Mediterranean Basin;
- **Scenarios for 2100 in the Alentejo region point to a global warming scenario of 4.3°C,** with significant impacts on desertification, land degradation and food security;
- **Land-use strategies for Alentejo must promote sustainable land use and biodiversity protection**, requiring simultaneous and coordinated actions by different local and regional land-use decision-makers.

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Introduction

Climate change and land use transformations are closely interconnected and have complex interactions. Uncertainty is the common narrative in this discourse that involves natural resources and multiple human development drivers.

Land use changes associated with urbanization, deforestation or intensive agriculture impact local to global scale climate by altering ecosystems, hydrologic and carbon sequestration cycles and biodiversity. Land use, for instance, contributes about one-quarter of global greenhouse gas emissions, such as CO2 emissions from deforestation, CH4 emissions from rice and ruminant livestock and N2O emissions from fertilizer use (IPCC, 2020). In 2005, land use changes and related pressures also reduced local species richness by an average of 14% (IPBES, 2018).

To face global change effects on a local scale, a rapid and radical transformation in land-use management is thus necessary, following the objectives set out by international agreements such as the European Green Deal, the Glasgow Climate Pact and the forthcoming post-2020 global biodiversity framework.

Decisions about land use, cover, and management can help determine society's ability to mitigate and adapt to climate change (USGCRP, 2018).

Here, urgent and concerted action can stop and reverse land degradation and the over-exploitation of land resources and buffer the negative impacts on our society due to climate change and biodiversity loss.

This will, however, require the simultaneous and coordinated use of diverse instruments responding to barriers and leverages at institutional, governance, community and individual level. To achieve this, it is necessary to understand the factors behind land-use decisions and how they can be best oriented towards the efficient and socially responsible pursuit of multiple sustainability objectives, such as biodiversity restoration, climate adaptation and mitigation and the production of renewable energy. We can only reverse land degradation and scale up sustainable land-use practices through instruments that target and fulfil the motivations behind land-use decisions.

To tackle climate change and biodiversity loss, it is thus necessary to have a comprehensive understanding of the key motivations and drivers (economic, regulatory, legal, cultural, environmental, etc.) behind land-use-related decisions in Europe at levels ranging from land owners to public authorities at the local, regional and national level.

Due to anthropogenic emissions of greenhouse gases, the climate is changing in the Mediterranean Basin, historically and projected by climate models, faster than global trends (UNEP/MAP, 2020). Within this context, Alentejo region in Portugal is classified as having high vulnerability to climate change with an intensification of desertification due to its aridity index, low quality of soils, reduced precipitation and increasing temperatures.

This Policy Brief highlights how the elaboration of land-use strategies for climate change and biodiversity loss is an urgent priority to protect natural landscapes, local communities' well-being, food and water security and economic development.

Case study: Alentejo region

The Alentejo region (NUT II) comprises 58 municipalities with a total area of 31.551 km², and it is divided according to 4 Sub-regions (NUT III): Upper Alentejo | Lower Alentejo | Central Alentejo | Litoral Alentejo.

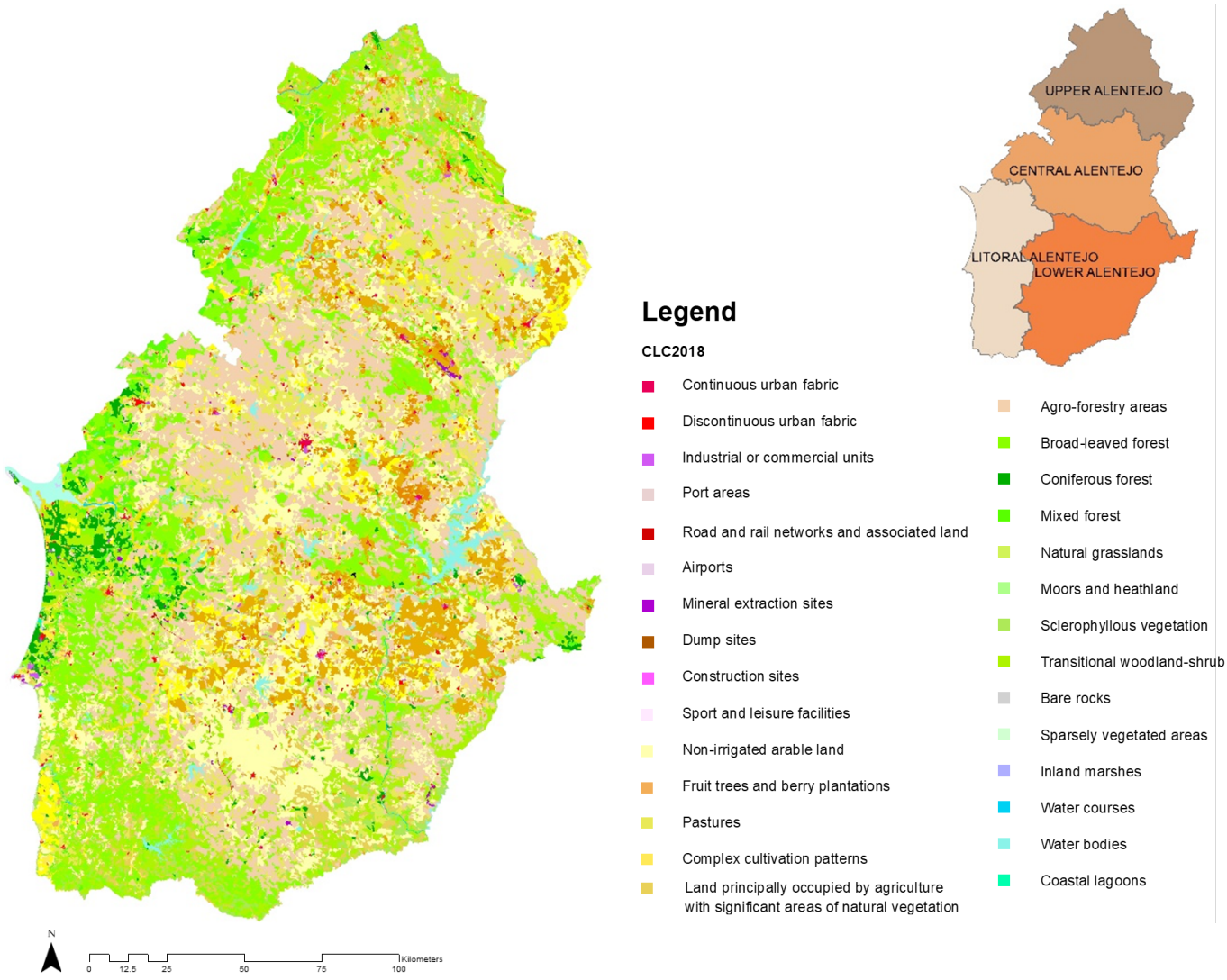

Figure 1 - Alentejo Region CORINE Land Cover 2018

The region has a relatively low density (22,3 inhab./km²), and agriculture plays a central role, especially in association with dominant crops like olives, cereals, or pastureland.

Regarding the landscape, Upper Alentejo is the unit with the highest altitude values, corresponding to the São Mamede mountain range, a more compartmentalized landscape where agro-silvo-pastoral activities coexist. The main urban settlements' surroundings are diverse cropping areas and the Caia and Guadiana irrigation areas.

Granites and similar dominate the geology of Central Alentejo, generally corresponding to the plains occupied by agro-silvo-pastoral or silvopastoral systems (montado). The limestones are associated with olive groves, and the schist, drier and with limited production capacity, are covered with bushes or eucalyptus forests (and also cork oak forests). Inert exploitation is a very important economic driver. However, it significantly impacts this landscape unit, concentrated in the Limestone Massif of Estremoz, Borba, and Vila Viçosa with the exploitation of very high-quality marble. Although the relief is generally gentle, there are erosive processes resulting from the torrential rainfall, the high erodibility of the soils, and the land exploitation system.

The Alqueva dam constitutes an important transformation in the landscape, whose reservoir allows the hydro-agricultural use of 110,000 ha (with an expected expansion of 131 000 ha), most of which are located in the southernmost Unit, Baixo Alentejo. It is in this area where most of the intensive and super-intensive olive and almond groves are located.

The landscape of the Lower Alentejo is strongly associated with the vast plains, with concentrated settlements, traditionally with large extensions of cereal crops (wheat) and little woodland, associated with large landholdings. This landscape has been modified to include extensive areas of pasture and new woodland due to soil degradation and the abandonment of farming. Despite the existence of a slightly rugged relief where flat areas dominate (peneplain), some landforms can be identified that break this homogeneity, the largest of which refers to the Guadiana Valley. The vegetation cover is diversified, and the areas of vines and olive groves are close to the villages.

In the last three decades, extensive areas of stone pine trees have been planted, promoted by Common Agriculture Policy incentives, with very low productivity, accelerating the degradation of natural resources.

There is a major trend toward population ageing and desertification of the landscape (on a Mediterranean scale): a consequence of the destruction of tree cover and cereal production.

The Coastal Alentejo landscape unit consists of a coastal plain bordered by cliffs alongside the Atlantic Ocean, also including Mira Valley, where its alluvial soils are occupied by intensive agriculture and wetlands. There is a trend of intensive agriculture expansion, putting important natural values at risk. This landscape unit is the most threatened by urban expansion of a predominantly touristic nature.

What are contemporary land uses changes in the Alentejo Region?

In the last three decades, the Alentejo region has witnessed critical change trends in land use and production systems, impacting biodiversity, landscapes and ecosystems. Moreover, the region is highly susceptible to desertification, erosion, degradation and land exhaustion due to loss of fertility, with scenarios for 2080-2100 that point to a large increase in temperatures and a drop in rainfall. Here, the protective effect of the arable land and oak forest combination – known as “montado”, a traditional landscape in the region – strongly depends on land management practices.

Nevertheless, neither the locals, some of them too old to care about their properties or mostly absent, nor the municipalities and the Government have proved to be more rigorous in applying climate change adaptation and mitigation measures.

Indeed, due to political options and market opportunities, new land-use trends that are not only associated with agriculture or forest but also with energy transition have emerged, transforming landscapes and affecting biodiversity.

One example is the introduction of intensive and super-intensive olive groves, which, together with other crops, have been planted in the Central and Lower Alentejo regions, challenging the most negative perspectives across many domains.

Figure 2 - Intensive olive groves in Arraiolos municipality, Central Alentejo (Poggi, 2021)

Other big concerns of sustainability practices are related to greenhouses and intensive agriculture expansion within the Costa Vicentina Natural Park in the Litoral Alentejo region, which is considered a process almost out of control.

Figure 3 – Greenhouses near to Zambujeira do Mar, Litoral Altenejo (Image from Google Earth)

Furthermore, focusing on trends related to the energy transition, it is to refer that due to the high levels of solar radiation, the whole region presents an excellent condition for implementing photovoltaic power plants on a large scale. This could be a critical threat as it leads to the complete loss of land and agricultural activity, which is a rather important consequence concerning local development.

Figure 4 – Photovoltaic power plant in Ferreia do Alentejo, Lower Alentejo (TOTAL Eren, w2022)

On the other hand, there is an important and meaningful potential for the generation of biomass residues capable of being used for energy purposes, in particular, the availability of agricultural and forest residues in Alto Alentejo that could be an opportunity to implement small-scale bioenergy projects.

Urbanization in rural areas is another important development driver to involve in the analysis of land use change in the Alentejo region. Between 2014 and 2016, the proportion of building areas licensed for new constructions for tourism in rural land has increased in Alto Alentejo and Litoral Alentejo, which are experiencing an unprecedented urbanization process.

Figure 5 – Urbanization in Porto Covo between 2006-2021, Litoral Alentejo (Image from Google Earth)

Intensive agriculture, greenhouses, photovoltaics, silvopastoral systems (decrease) and urbanization in rural areas are directly and indirectly connected with climate change, affecting rural land uses, landscapes and natural resources of the Alentejo Region.

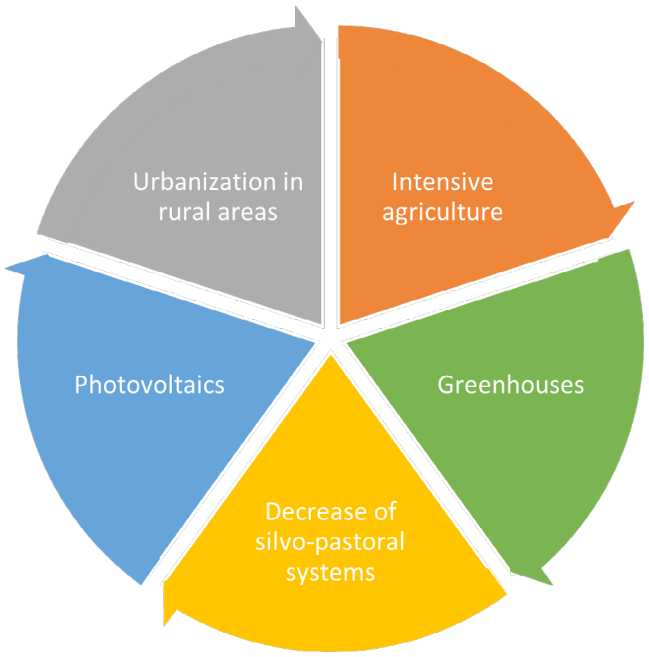

Figure 6 - Current land-use drivers affecting rural land uses, landscapes and natural resources in Alentejo Region

In this complex framework of rapid changes induced by anthropogenic and climatic processes, there is an urgent need for place-based policymaking to promote sustainable interventions so that Alentejo does not become a desert.

What should land-use decision-makers do?

Land use change results from decisions taken by people with diverse backgrounds and active at different governance levels.

These decisions are – consciously or unconsciously – motivated by a complex interplay of factors, such as economic aspirations, family traditions, cultural habits, renewable energy targets, or new agricultural technologies to cultivate the land.

The elaboration of future land-use strategies must thus be attentive to involving the right actors (e.g. landowners, farmers, policymakers, spatial planners, investors and nature conservationists) and adopting effective methodologies to effective spatial scales (municipal, inter-municipal and regional).

Policy design and implementation must recognize that rural regions have less capacity to manage climate (mitigation, adaptation) and biodiversity and often have more fragile single-resource-dependent economies.

Climate change mitigation, adaptation and biodiversity objectives are urgent processes, and linking them leads to emerging transition opportunities at the local and regional scales where rural regions can play a more significant role than the cities.

It is also necessary to understand the ecological capacity of the rural landscape to ensure different functions and land uses, providing a resilient vision for the territory and offering a sustainable transition.

Here, the development of realistic scenarios and workable models has to work through a proactive and progressive transition to a climate-neutral and resilient society and economy, with key actors (landowners, managers, local authorities, and regulatory agencies) front and centre in the process.

Thus, understanding place-based climate change and biodiversity challenges could support top-down public policymaking, creating a solid foundation for different and unique rural regions leading through behavioural transformations to move toward a climate-neutral and resilient society and economy.

The framework above permits the identification of both a policy area of mitigation and adaptation and an opportunity for social transformation through a just and inclusive transition.

The latter aspect leads to the development of practical knowledge, public participation actions and toolboxs to support key actors in managing the relationship between climate change and land use towards a more systemic view of the environment, promoting, at the same time, synergies with biodiversity and ecosystems.

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