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FOREST MANAGEMENT IN PORTUGAL

Introduction

The legal framework that regulates and manages forestry in Portugal is very varied and has involved many changes over time. The first legislative action took place in 1996, with the creation of the basic law for forestry policy. This policy was important not only for better sustainable management of national forests, outlining essential guidelines for their preservation and forest conservation, but it also marked the consecration of the forest in the Constitution of the Republic. Thanks to changes in socioeconomic and environmental dynamics, it is normal that there would be significant changes in forest ecosystems on the exploitation of the Portuguese forest. For this reason, it was necessary to redefine and adjust forestry policies to make better use of resources and better forestry management and planning practices.

In 2009, Decree-Law n° 254/2009 was published, which from the beginning presented problems in terms of simplification and organization desired for forestry legislation and was therefore later replaced by Law n° 12/2012.

In 2016, a new era began in terms of reform in Portugal, aggravated by the large fires that occurred in 2017 and 2018. This implementation drastically changed the diversity of forest legislation, such as forest planning and management, as well as protection of the forest against fires, the latter now unprecedented. After these laws were created, as they were still very relative and comprehensive, consultation became problematic, and strategies were created to facilitate access to this information and directives. To overcome these problems, a collection was launched that covers all forestry legislation. This collection covers laws and directives, from December 24, 1901, to February 16, 2018, and is now organized by relevant themes, such as the basic law of forestry policy, forestry finances, afforestation and tree protection, forest exploitation, forest fires and

forest administrative organization. This document has simplified the search and understanding for those interested in forest management in Portugal.

The IFN6 report (6th National Forest Inventory) presents many important statistics and data on various topics related to Portuguese forests. This report is carried out every 10 years, the last being IFN6, covering the period from 2005 to 2015.

Aim and method

The main objective of this work is to portray the evolution of the forestry situation in Portugal, analyzing the main weaknesses and how to solve them and on the other hand, the main advantages. As previously stated, Portuguese legislation on forests has progressively changed over time, with measures being created that take the Portuguese panorama and problems into account. The country is in a phase of change that is accompanied by technological innovation and a greater awareness of how important it is to preserve these precious assets. A large part of the country is occupied by forests, further increasing the importance of preserving and managing Portuguese forests more competently. Data and legislation from the main documents and reports that exist to this day in Portugal will be presented. Among these (6th National Forest Inventory), 2018 Land Use Charter and data from INE (Nacional Institute of Statistics), considered the most important.

Results

In 2015, (36%) of the Portuguese national land was occupied by forest areas, (31%) woodland and pastures, (24%) agricultural land, (5%) urban land, (2%) inland waters. These data report a positive trend in the area covered by the forest, with an increase of around 8.3 thousand hectares, which represents an increase at a statistical level (+0.6%), compared to 2005 in which IFN5 was in force (5th National Forest Inventory) (COS18, 2018).

In view of the 2018 Land Use Charter, the forest represents 38.8% or 3460 thousand hectares. Between 2015 and 2018 there was a negative trend in terms of forest area (592 hectares), contradicting the positive trend that had taken place in Portugal since 1995 (COS18, 2018).

Due to their geographical location and several other factors, Portuguese forests present several advantages at a humanitarian, economic and social level.

Contribution To The National Economy

According to the values calculated by the National Strategy for Forests (EFN, 2006), the forest and associated spaces contribute EUR 982 million annually to the economy, without the value relating to recreation and enhancement of the landscape being taken into account (however, it is indicated in the graph the most recently calculated value for recreation and landscape, only for the RA of

Madeira). EUR 876 million (corresponding to 63% of the gross value) is associated with the production function, EUR 136 million (10%) with the protection function, EUR 66 million (5%) with the conservation function and the silvospatorícia support function, hunting and fishing in inland waters EUR 312 million (22%) (ICNF, Jan 2021).

Forest Production And Foreign Trade

Trees in the Portuguese forest have a total volume of 188 million m³, and on average they produce 11.5 million m³ of wood annually, mainly eucalyptus and wild pine logs and logs, and 100 kton of cork, which represents 50% of world production. The production of resin (8 kt), pine cones (70 kt) and chestnuts (25 kt) are also relevant, in addition to numerous other wild products, which supply various forestry industries. The GVA of Silviculture and Forestry Exploration is 800 million euros; the main ranks represent 1.7% of the national GVA (2018), while as a whole the forestry sector is worth 1.5% of the national GDP. Forest products guarantee, on average, 9% of exports (in value), with a high rate of incorporation of national value (71%) and cover almost the entire deficit in the Portuguese food trade balance (ICNF, Jan 2021).

Forests And Energy

Forest biomass is one of the main sources of energy currently used in Portugal and is, among renewable sources, the most easily usable at any time of the year. In a recent assessment, the potential availability of biomass for energy production (forest origins and manufacturing industry) was estimated at up to 8.3 Mt/year. According to DGEG (2020), around 41% of renewable energy production comes from forestry biomass [2.48 ktoe], which corresponds to 12% of the country's total final energy consumption. Regarding the electrical production system, the installed power is 709 MW (≈5% of total renewables), of which 242 MW without cogeneration (10 dedicated plants). Firewood and charcoal are very relevant for industrial and domestic consumption, with charcoal production reaching 16.8 thousand tons per year in the last decade. Portuguese production of pellets is also significant, with 800 kton annually, 80% of which is for export (ICNF, Jan 2021).

Forest, Recreational And Tourism

Forests are among the most important national tourist resources, sometimes associated with built monuments (eg. Mata Nacional do Buçaco or Parque da Pena). Some case studies give a dimension of this value: Madeira's Laurissilva Forest provides a tourist offer worth more than EUR 140 million annually (Rego, 2012); an economic study carried out for Mata Nacional de Leiria estimated the value associated with recreational activities in the Mata by residents of neighboring municipalities at EUR 4.1 million per year (Oliveira, 2012). In the

Azores there is a network of recreational forest reserves (26, with 375 ha) and in Madeira a network of forest parks (7) and recreation and leisure areas (23). On the Continent, in areas subject to the forestry regime (forest perimeters and national forests) there are 231 recreational forestry facilities, in addition to 14 (peri) urban forestry parks under ICNF jurisdiction (ICNF, Jan 2021).

Portugal presents some weaknesses when it comes to conserving and protecting its forest resources, among these problems are: forest fires, droughts, storms, pests and exotic invasive species.

In the Portuguese context, fires are the biggest problem that Portugal faces today, and there have been several measures adopted to counter this problem.

The causes of forest fires are numerous and of a very variable nature. It is necessary, for statistical purposes, to establish a standard of these causes, to be used throughout the country: (Mauro, Eleandro, Francine, 2005).

Rays, Arsonists, Burning for cleaning, Smokers, Country fires

These are fires caused directly or indirectly by electrical discharges. They are the only ones that do not constitute human responsibility and, for this reason, their prevention is practically impossible; this group includes fires caused intentionally, by people, on other people's property. Two types of arsonists can be distinguished: those who act out of revenge and those who act unconsciously, due to some mental imbalance, becoming a "pyromaniac"; includes forest fires originating from fires used to clear land, for any purpose (agriculture, pasture, reforestation) which, due to negligence or carelessness, have escaped control and reached forest areas; this item includes fires caused by matches and lit cigarette butts, which are carelessly thrown by careless smokers; this class includes forest fires originating from bonfires made by people camping, hunting or fishing in or near the forest. (Mauro, Eleandro, Francine, 2005).

Damage caused

There is a relationship between fire and forestry that is of vital importance for the Forestry Engineer. Commercial forestry is directly aimed at the production of wood fiber and the creation and maintenance of a green cover. Basically, forestry consists of managing photosynthesis, chemical process on which all life depends and through which carbon dioxide, water, and solar energy are combined to produce cellulose and other carbohydrates. The process is slow and continuous. Fire, in turn, quickly reverses the process and releases energy, in the form of heat, stored by photosynthesis. Fire, therefore, is the reverse process of photosynthesis, that is, it is a process of decomposition. (Mauro, Eleandro, Francine, 2005).

Direct damage and Indirect damage

Direct damages are those that are visible and easy to assess, such as the amount of wood burned, buildings destroyed in a forest fire; these are those damages that will only be visible over time, such as the silting of rivers, floods, erosion, losses in tourism and recreational aspects, etc. Forest fires can cause different types of damage to forests, depending on the conditions existing areas, mainly forest types, fuel and climate. (Mauro, Eleandro, Francine, 2005).

Solutions

As is known, forest fires correspond to uncontrolled combustion that uses oxygen as its oxidizer and, as fuel, a set of natural plant substances, made up of both dead vegetation and living species, whether herbaceous, shrubby or arboreal. (Messias, Luciano, 2006).

As is also known, the conditions necessary for combustion to occur can be described, in a very simple way, through the fire triangle, that is, for combustion to occur, the simultaneous presence of the three sides of the triangle must be registered, in this case, represented by oxidizer, fuel and activation energy (Carvalho, 2006).

Therefore, since it is not possible to eliminate the oxidant from the forestry space, the action effort must be concentrated on the other two sides of the triangle, that is, on the fuel and the activation energy. Now, if the fuel is reduced, the fire will have great difficulty in developing and progressing (Lourenco, 2007), which is why this should be one of the priority areas of action so that forest fires can have a solution. (Messias, Luciano, 2006).

Fuel Reduction In Strategic Locations

One of the main problems in our forest results from excess fuel, which accumulates over the years, without, in many cases, any management of this accumulated biomass.

As we all know, if fuel is reduced, fires will have great difficulty developing and progressing, so we don't understand why it takes so long to implement this simple measure that involves managing fuel in strategic locations. (Messias, Luciano, 2006).

We know that it will not be easy to carry out this transformation in a short space of time, since changing mentalities requires a long journey. For it to work, the prevention structure will have to be articulated vertically, in a pyramid, the apex of which will naturally be occupied by the person responsible for the organization that manages the forests. Each side of the pyramid must correspond to one of the main components of prevention, each of them with a national responsible, who manages the coordinators of that area in each of the districts and these, in turn, coordinate the municipal responsible, in charge of carrying out the respective action at local level, with forest owners, a model that has already been tested and produced good results while it worked. (Messias, Luciano, 2006).

Changes In Behaviors By The Population

It has long been known that the overwhelming majority of forest fires in Portugal are caused by causes of a human nature, to the point that a team from the Instituto Superior da Policia Judiciária (PJ) traced the profile of the Portuguese arsonist (Gabinete de Psicologia e EPJ Selection, 2008) which basically consists of the following:

- the majority are men, since the majority of fires with criminal origins were set by men;
- they are generally aged 20 to 35, single or widowed, with low levels of education and unemployed;
- only in ten percent of cases are women involved. Generally, there are two reasons: unresolved love problems and fascination with the show;
- in some cases, arsonists suffer from depression, mental retardation or hyperdependence on alcohol;
- finally, it is very common for criminals to return to the scene of the fire after the firefighters arrive and even help them fight the flames. (Messias, Luciano, 2006).

Table 1. Distribution of values corresponding to each of the categories of forest fire causes in Portugal, between 1996 and 2010

Order	Cause category	Occurrences investigated	Annual average	%
1°	Undetermined	34 638	2309	50,71
2°	Incendiarism	13 277	885	19,44
3°	Use of Fire	12 992	866	19,02
4°	Relights	4 243	283	6,22
5°	Accidental	2 060	137	3,01
6°	Natural	550	37	0,81
7°	Structural	538	36	0,79
Total causes investigated		68 298	4553	100,00

Source: Based on: Lourenco et al., 2012, p. 69.

This subject ends up being a bit subjective when it comes to the solution as this could be the result of the most varied reasons. Generally, people who carry out such acts are not well, due to health problems, psychological problems that may have come from their parents or even the way the country regulates education and the support that the state provides to people. Therefore, it is difficult to understand the origin of this problem as clearly as other issues.

The Evolution Of Forest Fires In Southern European Countries

When we make a comparative analysis of statistical data relating to forest fires in southern European countries, the differences between Portugal and the other countries are notable and clearly show that forest fires have a solution.

But, if in the case of the number of occurrences the contrast is clearly visible, so that there is no doubt that the forest fires in Portugal can be resolved, let us now see what is happening in terms of the areas burned by forest fires in the countries of the South of Europe. (Messias, Luciano, 2006).

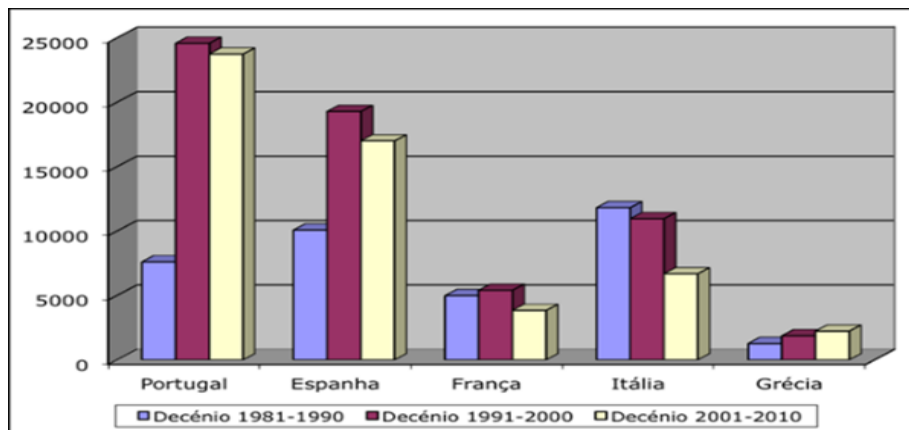


Figure 1. Evolution of the average annual number of forest fires in Southern European countries.

Source: Institute for Nature and Forest Conservation (1990-2010).

Starting with France and Greece, where the average annual values of burned area are less than 50,000 ha, it can be seen that the trend, over these three decades, was clearly towards a decrease in these average values.

Likewise, Italy, which in the first decade had average annual areas of around 150,000 ha, suffered a substantial reduction in the following decades, to the point that the average value, in the third decade, was approximately half of that recorded in the first decade.

Even more impressive was the reduction observed in Spain, which from average values close to 250,000 ha/year, in the first decade, managed to reduce almost two and a half times that value, having dropped to around 100,000ha/year in third decade.

Now, if the decrease recorded in Greece and France was important, we cannot fail to highlight the cases of Italy and Spain, as, from our point of view, they clearly demonstrate that forest fires have a solution! Incomprehensibly, in these three decades, Portugal was the only country in Southern Europe to show a trend contrary to that of the other countries, because, instead of a reduction in the

burned area, what was observed was a substantial increase, which almost doubled the first for the third decade. (Messias, Luciano, 2006).

Conclusions

The legal framework that regulates and manages forestry in Portugal is very varied and has involved many changes over time. A large part of the country (>1/3) is occupied by forests, further increasing the importance of preserving and managing Portuguese forests more competently. Due to their geographical location and several other factors, Portuguese forests present several advantages at a humanitarian, economic and social level. Portugal presents some weaknesses when it comes to conserving and protecting its forest resources, among these problems are forest fires, droughts, storms, pests, and exotic invasive species. In the Portuguese context, fires are the biggest problem that Portugal faces today, and there have been several measures adopted to counter this problem like fuel reduction in strategic locations and changes in behaviours by the population. When we compare the statistics compared to other countries, we realize that there is a solution.

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Abstract

Portugal and occupied by more than 1/3 of forests. Portuguese legislation on forests has progressively changed over time, with measures being created that take the Portuguese panorama and problems into account. Portuguese forests present several advantages at a humanitarian, economic and social level. Their contribution to the national economy forest production and foreign trade, forest energy, recreational and tourism. In the Portuguese context, fires are the biggest problem that Portugal faces today. Rays,

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Arsonists, Burning for cleaning, Smokers and Country fires are examples of the causes. There is a certain impact on time and space indirectly and directly. Fuel reduction in strategic locations and changes in behaviors by the population could be the solution for what we have been looking for.

Keywords: management, forests, economy forest

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