

Forest Fire Prevention Plans in National Parks: Ordesa Nacional Park and Monte Perdido¹

Basilio Rada,² Luis Marquina³

Summary

Protected natural spaces contribute to the well being of society in various ways such as maintaining biological diversity and quality of the landscape, regulation of water sources and nutrient cycles, production of soil, protection against natural catastrophes and the provision of recreation areas, education, science and culture, aspects which attain maximum relevance in the lands under the protection of the National Park.

The singular nature and the high degree of protection to a large extent limit management, since the principles of conservation and natural processes prevail in these areas. Nevertheless the inevitable responsibility to ensure now and in future, the ecological economic and social functions of these spaces goes on to assume a management model on the lines of compliance with the Pan European Criteria for Sustainable Forest Management.

In 2000 management of the Ordesa and Monte Perdido Park, in the Spanish Pyrenees which was declared a natural park in 1918, took the initiative to devise a Plan for the Prevention of Forest Fires in the park and its surroundings which may be a reference for the other parks comprising the network of Spanish National Parks.

The Plan analyses the effectiveness of current protection resources, supported by cartography which aids decision making, fuel maps, fire risk, visibility, territorial isochrones and areas which at the same time plan the necessary measures to guarantee the protection of this space, which in many areas is inaccessible due to the steep landscape.

The possibility of counting on this planning indubitably constitutes an important technical support tool, which will assist management, not only in terms of fire prevention, but in respect of the conservation of the park, since it provides a cartographic and alphanumeric base for consultation and analysis within the framework of GIS (Graphic Information System) –DINAORDESA-, with the possibility of extending or creating new information using the data contained therein.

Introduction

The various climatic and altitudinal conditions determine the great diversity of ecosystem in the Ordesa and Monte Perdido Natural Parks, which includes an enormous range of plant and animal communities and the entire area provides an astonishing landscape of tremendous contrasts which represents the systems linked to

¹ An abbreviated version of this paper was presented at the second international symposium on fire economics, policy, and planning: a global view, 19–22 April, Córdoba, Spain.

² Autonomous Organisation of Nacional Parks. Ministry of Environment, Gran Vía de San Francisco, 4. Madrid. CP 28005.

³ Autonomous Organisation of Nacional Parks. Ministry of Environment, Ordesa and Monte Perdido Nacional Park. Paseo de las Autonomías, Pasaje Baleares, 3. Huesca. CP 22071.

erosion formations and sedimentary rocks. For this reason in 1918 the area was declared a National Park with a protected area of 2.100 ha. extended in 1982 to more than 15.000 ha. today.



Figure 1—Map indicating National Parks which belong to the Park Network

The network of National Parks is an integrated system for protecting and managing the most valuable and representative areas of Spanish natural heritage. The purpose is to ensure the conservation of National Parks and make them available to the public and also to improve scientific knowledge regarding their natural and cultural values in addition to promoting a conservationist social conscience interchange of knowledge and experience in terms of sustainable development, training and qualification professionals working in the sector and their incorporation participation in international networks and programmes. (*fig. 1*).

The Ordesa and Monte Perdido national park is in the province of Huesca, which belongs to the Autonomous Community of Aragón, and it is the ideal territory for maintaining various species of flora and fauna which due to their rarity and unusual nature give this open space a high biodiversity value.

The threat of forest fires on our forest areas is even more relevant in the case of Ordesa since the effect of a fire in this area would cause damage in environmental terms but also to people and assets which would be difficult to quantify. Given this fact, together with public use of the park, it would be advisable to have a Forest Fire Prevention and Protection Plan for the Ordesa and Monte Perdido National Park which would provide the park with sufficient means of self protection as well as measures which would be taken from other plans on a wider scale.

The Ordesa National Park was a pioneer in devising a Forest Fire prevention plan which covers not only the area defined as national park but also a surrounding area which has been determined Peripheral Prevention Zone which covers a total of approximately 35,000 ha.

The principal goal of the plan is to define and quantify the protection measures required to optimise and reinforce present prevention resources, vigilance and suppression which the park already has available and to establish guidelines which will guarantee coordination of the resources and organisation involved in the prevention and protection against fires.

Development of the Plan

Description of the territory

The Ordesa and Monte Perdido National park is in the district of Sobrarbe, in northern Huesca. It covers 15,687 ha., which belong to five municipal districts: Bielsa, Fanlo, Puértolas, Tella-Sin and Torla. The territorial area of the plan also extends to the Peripheral Protection Zone (ZPP), which covers a further 19,245 ha. which belong to the aforementioned townships and in addition the municipality of Broto (*fig.2*).



Figure 2—Map of Ordesa and Monte Perdido National Park..

The complex geological and morphological history of this area together with extreme climate conditions have made this area a landscape of tremendous contrast comprising four valleys: the Cañón de Añisclo which runs north to south, the Valle de Ordesa running east to west, and running south-east to north-east the Garganta de Escuaín and the Valle de Pineta. In the Peripheral Zone three more valleys mark the boundaries of those mentioned above: Bujaruelo, Vió and Airés (*fig.3*).



Figure 3—Valle de Ordesa.

Forest systems are amply represented with beech woods, firs and pines and box in chalky areas, in addition to high mountain pastures which were once used extensively for livestock.

There is also an abundant diversity of protected species of flora and fauna which led to the park being declared a Biosphere and Human Heritage site in 1977, Special Protection Zone for Birds in 1988 and Diploma from the Council of Europe in 1989, as well as being named Nature Reserve (Valle de Bujaruelo) and various protected landscapes (*fig.4*).



Figure 4— Flora and Fauna of the Park.

Risk of fire and priorities for prevention

An analysis of the most characteristic elements of the area in which fire could break out and spread provides the required information for planning means of protection and prioritising the land so that there is a guaranteed protection of the valuable ecosystems in the Park itself and the surrounding area.

The plan analyses the risk of fire as shown in the following diagram (*fig.5*).



Figure 5— Methodological diagram of fire risk analysis

The physical characteristics of the Park and its surroundings make fire propagation the most relevant aspect in the risk of fire. (fig 6).

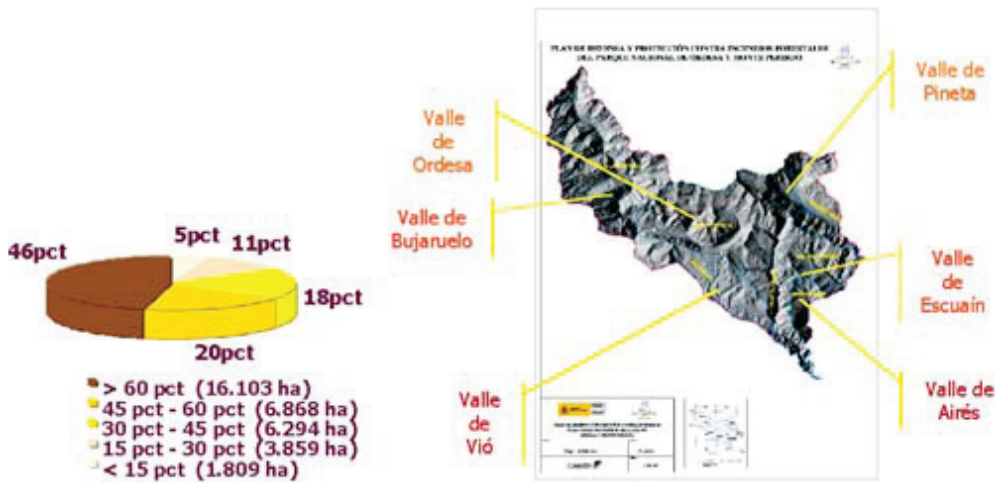


Figure 6—Map of digital model of the land with distribution through valleys and surface distribution of the gradient

Stratification of the territory in areas of homogeneous gradient shows the abrupt relief of the Park, where 66 % of the surface shows gradients of 45 % and 46 % is situated on gradients of more than 60 %. In these conditions propagation of fire would reach extremely high risk levels, if it were not for the fact that the combustibility of those zones is moderate since this is alpine pasture. (fig. 7).

Nevertheless, in the sunny areas of Ordesa, Escuaín, Pineta and the valley of

Vió, the risk increases due to the reduced humidity caused by continuous sunshine on the fuels.

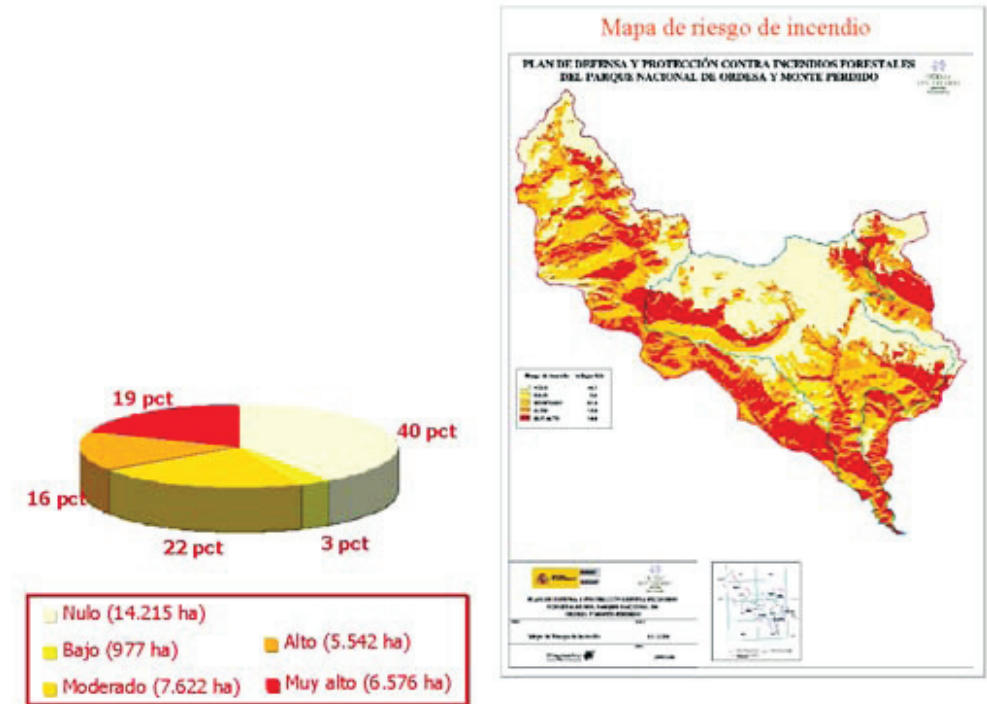


Figure 7— Spatial distribution of the risk of fire and map of fire risk

The Map of Fire Risk was the result of all the factors integrated which lead to the conclusion that Ordesa presents a very high fire risk in 19 % of its surface and priority should be given to these particular points of land (fig. 8).

Protective Measures

Once fire hazard zones in the area have been analysed, in addition to statistical analysis to ascertain the periods of greatest danger, the Plan makes an inventory of the Park’s protection resources in order to carry out an analysis and diagnosis of the situation to establish that the measures are adequate for the level of risk.

The Plan makes a detailed analysis of the effectiveness of the current resources using cartography as support which is particularly important, visibility maps which facilitate information regarding the visible surface from the location of lookout point, land and air isochrones, with which it is possible to discover the arrival times and the suppression resources in any point of the territory, given its locations and the ADP map in which each point of the territory is classified according to whether or not it is accessible, within reach and penetrable, depending on the series of conditions. (fig. 9, fig. 10).

The results of this analysis indicated the need to reinforce some aspects of the fire prevention measures in the park and its surroundings.

The protection measures proposed in the plan were structured in three main sectors: prevention, vigilance and suppression.

Nevertheless, it should be pointed out that the particular nature of this area and the high level of protection it enjoys, limits management of the area to the terms of the Plan Rector de Uso y Gestión (PRUG 1995 – Use and Management Plan-) guided by the Conservation Principle and has to respect natural processes, therefore **prevention** from the classic and most efficient perspective oriented towards dealing with large scale forest fuel, does not fit the model in Ordesa. However the Plan considers the need to develop preventive activities reinforcing the **water supply infrastructure** in those points of the area where the Plan has detected a shortage, maintaining the existing **road infrastructure** to facilitate use of suppression resources and by preventing the outbreak of fire through measures to increase **public awareness**.

Detection and suppression are of supreme importance in the prevention of fires in the Park and surrounding area, since a rapid alert considerably diminishes the extent of the effects of fire which is translated to a reduction in the normally elevated cost of putting out the fire.

El Plan was created within the framework of GSI (Geographic Information System) which facilitated incorporation of cartographic and alphanumeric information obtained from analyses carried out for integration in DINAORDESA, a system conceived to facilitate management of the Park by providing extremely detailed territorial information.

Bibliography

- Balcells, E. 1988. **Monografía 37. Ordesa-Viñamala**. Ministerio de Agricultura Pesca y Alimentación. Instituto Nacional para la Conservación de la Naturaleza
- Boletín Oficial de Aragón. **Decreto 226/1996, de 17 de agosto, por el que se aprueba el Plan Especial de Protección Civil de Emergencias por Incendios Forestales - PROCINFO.**
- Boletín Oficial de las Cortes Generales. Ministerio del Interior, 8 de marzo de 1993. **Informe de la Ponencia designada en el seno de la Comisión de Agricultura y Pesca sobre Incendios Forestales.**
- Boletín Oficial del Estado. **Ley 2/1985, de 21 de enero, sobre Protección Civil.**
- Boletín Oficial del Estado. **Real Decreto 407/1992, de 24 de abril, por el que se aprueba la Norma Básica de Protección Civil.**
- Boletín Oficial del Estado. **Orden de 2 de abril de 1993. Directriz Básica de Planificación de Protección Civil de Emergencia por Incendios Forestales.**
- Boletín Oficial del Estado. **Real Decreto 409/199, de 17 de marzo, por el que se aprueba el Plan Rector de Uso y Gestión de Ordesa y Monte Perdido.**
- Dirección General de Protección Civil. 1996. **Plan Estatal de Protección Civil para Emergencias por Incendios Forestales.** Ministerio del Interior.

- Fab Consultores S.A. 1.993. **Resumen del Estudio sobre motivaciones de incendios forestales intencionados. Instituto Nacional para la Conservación de la Naturaleza.**
- Gobierno de Aragón. Departamento de Agricultura y Medio Ambiente. Dirección General del Medio Natural. Servicio de Protección del Medio Natural. 1995 **los incendios forestales en Aragón. Memoria 1.995. Plan de prevención y lucha para 1.996**
- ICONA, 1981. **Técnicas para defensa contra incendios forestales. Monografía nº 24.** Varios autores.
- ICONA, 1991. **IV Curso Superior de Incendios Forestales.** Varios autores. Ministerio de Agricultura, Pesca y Alimentación.
- ICONA, 1993. **Manual de Operaciones contra Incendios Forestales**
- ICONA, 1997. **Partes de incendios del periodo 1979-1997.** Área de Incendios Forestales.
- Margalef, R. 1991. **Teoría de los sistemas ecológicos.** Universitat de Barcelona. Estudi General. Ciències experimentals i matemàtiques.
- Miguel, A. 1998. **Bases para la ordenación del pastoreo en el Parque Nacional de Ordesa y Monte Perdido (Huesca).** Proyecto Fin de carrera. Escuela Técnica Superior de Ingenieros de Montes. Universidad Politécnica de Madrid.
- Ministerio de Agricultura, Pesca y Alimentación. 1988. **Mapa de cultivos y aprovechamientos escala 1:50.000.** Hojas 1.083, 1.085 y 1.088.
- Moreno, J. y Aragonese, C., 1995. **La cartografía en la planificación de los Parques Nacionales.** Mapping: 23, 38-44.
- Red de Parques Nacionales. Gorría, A.J., 1992. **Los efectos de la declaración del P. N. de Ordesa y Monte Perdido en la población y el sistema socioeconómico de su entorno.** Documento de síntesis.
- Rivas-Martínez, S. 1987. **Mapa de series de vegetación de España.** Ministerio de Agricultura, Pesca y Alimentación. I.C.O.N.A.
- Rothermel, R. C. 1972. **A mathematical model for fire spread predictions in Wildland fuels.** USDA Forest Service. Int USA.
- Rothermel, R. C. 1983. **How to predict the spread and intensity of forest and range forest fires.** USDA Forest Service. Int USA.
- Ruiz de la Torre, J. 1990. **Distribución y características de las masas forestales españolas.** Ecología, Fuera de Serie, nº 1. ICONA.
- Universidad de Santiago de Compostela. Escuela Politécnica Superior. Campus Universitario. Lugo. 1997. **Ponencias sobre el estado de la investigación y el desarrollo en protección contra incendios forestales en España. I Seminario Nacional.**
- Velez, R y otros, 1982. **Manual de prevención de incendios mediante tratamiento del combustible forestal.** ICONA.

