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TERRITORY AND SOCIETY IN TOURIST AREAS OF RISK: FOREST FIRES

Ignacio SOTELO PÉREZ
Universidad Rey Juan Carlos (URJC).
Grupo de investigación consolidado "DITMA. Dimensiones Humanas, Jurídicas y Socioeconómicas de las Actividades Turísticas y del Medio Ambiente" (URJC).
Instituto Universitario de Ciencias Ambientales.
Grupo de Investigación "Desarrollo y Gestión Ambiental del Territorio"
i.sotelo.2022@alumnos.urjc.es

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ABSTRACT

The management of forest fires in Spain is configured as a territorial intervention process that recognizes the systemic and multicausal nature of the risk, integrating natural, anthropic and technological factors in an adaptive governance framework. The analysis of these risks reveals that these interactions force us to rethink public policies and planning instruments, which find in Royal Decree 716/2025 a regulatory axis that harmonizes criteria and requires an annual update based on scientific evidence. In this context, the instruments (regulatory and economic), as well as the management tools (from fire behaviour modelling to remote surveillance systems, including ground and air operational devices), are articulated as an integrated system oriented towards anticipation, early detection and coordinated response. The action actions, which combine tactical management maneuvers and real-time decision-making, are complemented by structural prevention strategies and territorial regeneration measures aimed at restoring ecological functionality and reducing future vulnerability. Altogether, the work shows that forest fire management cannot be understood as a mere operational response, but as a complex territorial policy that requires integrating science, technology, territorial planning and social participation to face an increasingly intense and transformative phenomenon. All of this, highlighting the importance of specifying new realities of action, articulated in a solid political basis of planning, as well as a regulatory and economic instrumentation, through which, articulate the territorial intervention actions with which to face the market failures emanating from the forest fires.

Keywords: Forest fires, environmental risks, tourist areas at risk, territorial planning.

TERRITORIO Y SOCIEDAD EN ESPACIOS TURÍSTICOS DE RIESGO: LOS INCENDIOS FORESTALES

RESUMEN

La gestión de los incendios forestales en España se configura como un proceso de intervención territorial que reconoce el carácter sistémico y multicausal del riesgo, integrando factores naturales, antrópicos y tecnológicos en un marco de gobernanza adaptativa. El análisis de estos riesgos revela que estas interacciones obligan a replantear las políticas públicas y los instrumentos de planificación, que encuentran en el Real Decreto 716/2025 un eje normativo que armoniza criterios y exige una actualización anual basada en evidencia científica. En este contexto, los instrumentos (normativos y económicos), así como las herramientas de gestión (desde la modelización del comportamiento del fuego hasta los sistemas de vigilancia remota, pasando por los dispositivos operativos terrestres y aéreos), se articulan como un sistema integrado orientado a la anticipación, la detección temprana y la respuesta coordinada. Las acciones de actuación, que combinan maniobras tácticas de gestión y toma de decisiones en tiempo real, se complementan con estrategias de prevención estructural y con medidas de regeneración territorial destinadas a restaurar la funcionalidad ecológica y reducir la vulnerabilidad futura. En conjunto, el trabajo muestra que la gestión de incendios forestales no puede entenderse como una mera respuesta operativa, sino como una política territorial compleja que requiere integrar ciencia, tecnología, ordenación del territorio y participación social para afrontar un fenómeno cada vez más intenso y transformador. Todo ello, poniendo de relieve la importancia de concretar nuevas realidades de actuación, articuladas en una sólida base política de ordenación, así como de una instrumentación normativa y económica, a través de la cual, articular las actuaciones de intervención territorial con la que afrontar los fallos de mercado emanados de los incendios forestales.

Palabras clave: Incendios forestales, riesgos ambientales, espacios turísticos de riesgo, ordenación del territorio.

TERRITOIRE ET SOCIÉTÉ DANS LES ESPACIOS TURÍSTICOS DE RIESGO: INCENDIES DE FORÊT

RÉSUMÉ

La gestion des incendies de forêt en Espagne est configurée comme un processus d'intervention territoriale qui reconnaît la nature systémique et multicausale du risque, intégrant les facteurs naturels, anthropiques et technologiques dans un cadre de gouvernance adaptative. L'analyse de ces risques révèle que ces interactions nous obligent à repenser les politiques publiques et les instruments de planification, qui trouvent dans le décret royal 716/2025 un axe réglementaire qui harmonise les critères et nécessite une mise à jour annuelle basée sur des preuves scientifiques. Dans ce contexte, les instruments (réglementaires et économiques), ainsi que les outils de gestion (depuis la modélisation du comportement des incendies jusqu'aux systèmes de télésurveillance, en passant par les dispositifs opérationnels terrestres et aériens), s'articulent comme un système intégré orienté vers l'anticipation, la détection précoce et la réponse coordonnée. Les actions d'action, qui combinent des manœuvres de gestion tactique et des prises de décision en temps réel, sont complétées par des stratégies structurelles de prévention et des mesures de régénération territoriale visant à restaurer la fonctionnalité écologique et à réduire la vulnérabilité future. Dans l'ensemble, le travail montre que la gestion des incendies de forêt ne peut pas être comprise comme une simple réponse opérationnelle, mais comme une politique territoriale

complexe qui nécessite d'intégrer la science, la technologie, la planification territoriale et la participation sociale pour faire face à un phénomène de plus en plus intense et transformateur. Tout cela, en soulignant l'importance de préciser de nouvelles réalités d'action, articulées dans une base politique solide de planification, ainsi qu'une instrumentation réglementaire et économique, à travers laquelle articuler les actions d'intervention territoriale pour faire face aux défaillances du marché émanant des incendies de forêt.

Mots-clés: Feux de forêts, risques environnementaux, zones touristiques à risque, aménagement du territoire.

1. INTRODUCTION

Contemporary reality shows that models of regional organization and development, including those linked to environmental strategies, clearly demonstrate that the territorial reality of the 21st century (characterized by digitalization, innovation, and the pursuit of collective well-being), must be understood as the accumulated result of historical, human, and, cultural processes that have shaped its structure. From this perspective, regional development is closely linked to urban growth and urbanization processes (including rururbanization), which can be interpreted as spaces whose scale and functioning are conditioned by the physical and energy limits imposed by mobility, revealing a close relationship between economic growth, connectivity and connection (transport, telecommunications, internet, etc.), energy consumption and sustainability, in its triple dimension. In this way, the constant increase in travel, the intensive use of the environment and the dependence on resource-intensive transport systems, among other issues, have become determining factors of the current environmental reality, as well as of the risks, impacts, damages and threats, both natural and anthropogenic and technological.

All of this has sparked interest, as well as the need, for intervention by public and private authorities to address market failures stemming from human actions and the natural world. However, despite decades of implementing environmental policies (both in Spain and in Europe), progress in effectively improving the environment has been limited. The pressure from economic activities continues to generate significant impacts, demonstrating that isolated environmental policies do not in themselves guarantee the achievement of a sustainable development model. This situation takes on special relevance in a context where risks of human origin (such as pollution, soil degradation or alteration of ecosystems) have intensified and have become a growing threat to the stability of natural systems.

The progressive deterioration of natural spaces entails material, ecological, and social losses for both current and future generations. Once certain critical thresholds are exceeded, the environment's capacity for regeneration is compromised, jeopardizing the continuity of essential ecological processes. Human presence has historically transformed the landscape, but currently, the magnitude and speed of these transformations have reached levels that exceed the resilience of many ecosystems.

Figure 1. The environmental risks of forest fires, a territorial reality (Antequera, Málaga).

Source: Ignacio Sotelo Pérez (2024).

In the Spanish case, risks of anthropogenic origin directly affect Protected Natural Spaces (both National and Regional Parks,…), as well as Protected Areas integrated into the Natura 2000 Network (such as Sites of Community Importance and Special Protection Areas for Birds), so the selection and management of these spaces requires rigorous coordination between administrations and coherent territorial planning, especially in a context in which development processes and human activities generate constant pressures on the environment.

In recent decades, international research has increasingly focused on the risks arising from human activity, addressing them from perspectives that combine physical-environmental analyses with territorial and socioeconomic approaches. Although these studies have allowed for the description of specific phenomena and advanced the understanding of risk processes, a unified theoretical framework that comprehensively integrates the multiple variables involved is still lacking. However, it has been highlighted how, in the contemporary environmental context of Spain, forest fires have become one of the most significant risks due to the combination of climatic, territorial, and socioeconomic factors that favor their recurrence and intensity. The progressive aridification of the land, heat waves, rising average temperatures, and prolonged periods of drought have created conditions highly conducive to the spread of fire. Furthermore, from an anthropogenic and technological perspective, the structure of the Spanish landscape, characterized by extensive forest areas, the abandonment of traditional agricultural practices, the accumulation of biomass, intensive land use for sprawling urban expansion, and other factors, along with criminal intent, has substantially increased its vulnerability to fire. For their

part, rural depopulation and the decline in land management practices have reduced the natural capacity to control vegetation fuel, facilitating the outbreak of high-intensity fires that are difficult to extinguish. From a socioeconomic perspective, the expansion of urbanized areas into forest environments has created increasingly complex urban-forest interfaces, where the risk to the population and infrastructure is multiplied. This phenomenon not only increases exposure but also complicates prevention and firefighting efforts.

Figure 2. Vulnerability to risk: fires due to negligence (burning of "cigarette butts"), burning in the ditch (Lucena, Córdoba).

Source: Ignacio Sotelo Pérez (2024).

All of this results in a scenario where forest fires not only represent an ecological threat -due to the loss of biodiversity, soil degradation, and disruption of hydrological cycles-, but also a major social and economic risk. The magnitude of the potential damage makes this phenomenon a priority challenge for land management policies, climate adaptation, and civil protection.

2. FOREST FIRES: THE PROCESSES OF INTERVENTION IN THE TERRITORY

Interventionist processes, both at the national level in Spain and in parallel with the evolution of European policies, have highlighted the need to strengthen the role of the territory as a strategic space for sustainability. Activities such as agriculture, livestock farming, and forestry management remain fundamental to the rural economy, requiring effective coordination between administrations and territorial planning that establishes uniform

criteria at the national level. The absence of a common regulatory framework hinders the integration of policies and the adoption of coherent intervention strategies.

Figure 3. Land degradation: environmental risks and forest fires (Bélmez, Córdoba).

Source: Ignacio Sotelo Pérez (2024).

For their part, the boundary between urban and rural areas has been profoundly transformed, giving rise to hybrid spaces that combine dynamics, functions, and lifestyles characteristic of both. This phenomenon, sometimes conceptualized as "rural urbanism," reflects the growing interdependence between urban demands and the supply of services and resources in rural areas. Although multifunctionality has always been an inherent characteristic of rural territories, it is currently acquiring new dimensions linked to risk management and environmental conservation. In fact, several studies have shown that the social perception of risk differs significantly from the technical or institutional view. Local communities interpret hazards and mitigation strategies from their own cultural, economic, and social frameworks, making citizen participation an essential element for any effective risk management policy. Decisions made in this area inevitably have political implications, as they affect diverse interests and can generate tensions among the affected groups.

From a geographical research perspective, the study of human-caused risks is still in its early stages of development, focused on identifying variables and constructing analytical methodologies. Nevertheless, these studies have proven useful in addressing contemporary problems and contributing significantly to the formulation of territorial and environmental solutions. This is achieved through the use of techniques, instruments, methods, and methodologies that address not only the consequences but

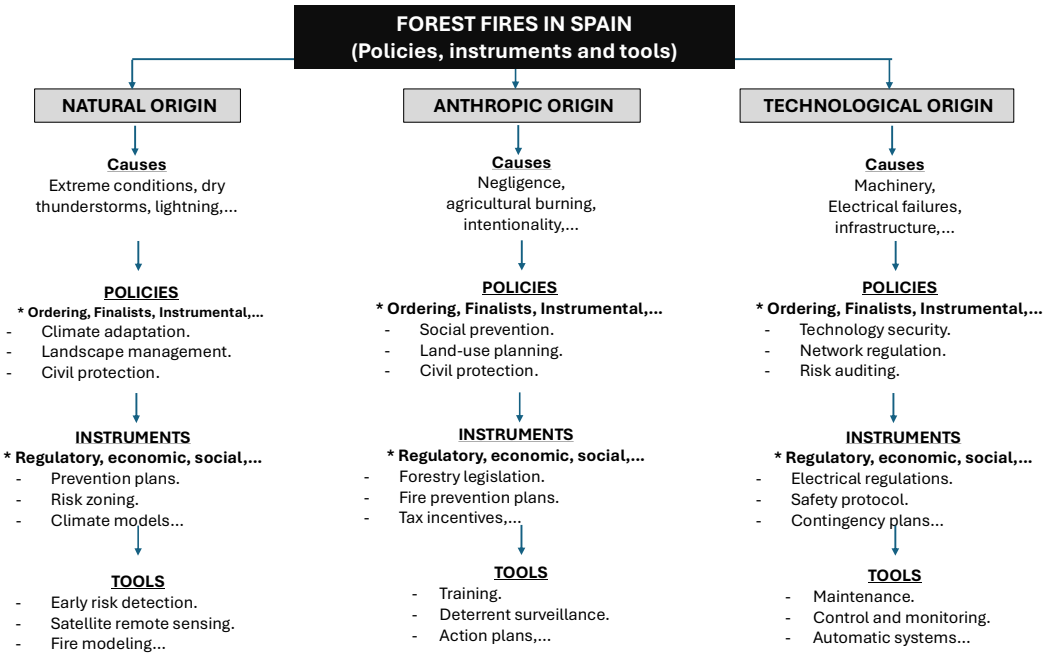
also the origins of these risks, whether natural, anthropogenic, or technological.

3. MEANS OF ACTION IN THE MANAGEMENT OF FOREST FIRES

Forest fire management in Spain is structured through a set of public policies, regulations, and operational tools aimed at preventing, detecting, extinguishing, and restoring the direct and indirect consequences of forest fires. These measures seek to reduce the vulnerability of the territory to fires of natural, human-caused, and technological origin, integrating environmental, territorial, and civil protection approaches.

In this context, prevention takes on a central role, understood not only as the reduction of ignitions, but as the structural transformation of the territory to make it less vulnerable to fire.

Figure 4. Instrumental and regulatory framework for action in Spain against the risks (natural, anthropogenic and technological) of fires.



Source: Own elaboration.

Structural fire prevention policies aim to modify landscape conditions that favor fire spread. Sustainable forest management, active biomass management, and the application of silvicultural treatments reduce the continuity of vegetation fuel, thus lowering the probability of high-intensity fires. These actions are complemented by the creation and maintenance of strategic firebreaks, such as firebreaks and auxiliary strips, and by the recovery of traditional agricultural and livestock practices that historically contributed to the natural control of fuel. Regulating the use of fire in agricultural and livestock activities is another essential pillar, especially in a context where human negligence continues to be one of the main causes of fire ignition.

Territorial planning also plays a crucial role in reducing the risk of forest fires. Planning processes such as integrating fire hazards into urban

development instruments allow for limiting the expansion of buildings in forested areas and establishing design criteria that guarantee the self-protection of homes and infrastructure located in the urban-forest interface, a particularly vulnerable area due to the coexistence of residential uses and continuous vegetation. Requiring self-protection plans for housing developments, industries, and facilities located in high-risk areas helps strengthen local response capacity in emergency situations.

In parallel, civil protection policies structure the organization and coordination of resources allocated to fire suppression and emergency management. The national and regional frameworks establish resource mobilization procedures, evacuation protocols, and public communication strategies, ensuring coherent action among government agencies and operational bodies. The existence of specific plans for forest fires allows for adapting the response to the territorial and climatic characteristics of each region, reinforcing the effectiveness of interventions.

Figure 5. Territorial action policies in the field of forest fires.

CATEGORY	FUNDAMENTALS	PURPOSE
Structural prevention policies	Sustainable forest management, silvicultural treatments, biomass reduction, firebreak maintenance, restoration of agricultural and livestock uses, and regulation of fire use.	Reduce the continuity of vegetation fuel and decrease the likelihood of high-intensity fires.
Land-use planning policies	Integrating risk into urban planning, regulating the urban-forest interface, limiting construction in risk zones, and self-protection plans for urban developments and infrastructure.	Minimize the exposure of the population and infrastructure to fire risk.
Civil protection policies	National and regional/municipal plans, evacuation protocols, inter-administrative coordination, and alert and communication systems.	Organize emergency response and ensure public safety.
Climate change adaptation policies	Climate modelling, ecological restoration, creating resilient landscapes, and sectoral adaptation strategies.	Anticipate extreme scenarios and reduce the vulnerability of the territory to adverse weather conditions.

Source: Own elaboration.

Adaptation to climate change has become an essential component of risk management policies. The increase in temperatures, the prolongation of droughts and the greater frequency of extreme weather events have intensified the conditions conducive to the ignition and spread of fire. Therefore, adaptation strategies incorporate climate modeling, ecological restoration and the promotion of more resilient landscapes, capable of withstanding disturbances without losing ecological functionality.

The regulatory framework that supports these policies includes forestry and environmental legislation, the regulation of the use of fire and the rules that affect energy and transportation infrastructure located in forest areas, as well as the prevention, surveillance and extinction of forest fires. For their part, the prevention and defense plans against forest fires, prepared at the regional and local level, constitute essential instruments for operational planning, since they establish the zoning of the territory according to risk levels, identify critical infrastructures and determine priority actions in terms of prevention and extinction. Added to this are economic instruments, which allow incentivizing active forest management and penalizing negligent behavior or activities that increase the vulnerability of the territory.

In this way, Spanish planning for forest fires is articulated through a regulatory and operational framework that recognizes the complex, multi-causal and dynamic nature of this phenomenon. Royal Decree 716/2025, which establishes common guidelines for annual prevention, surveillance and extinction plans, constitutes the backbone of this strategy. Its function is not only to homogenize criteria between autonomous communities, but also to incorporate an updated scientific understanding of fires as processes that emerge from the interaction between biophysical factors, socioeconomic transformations and contemporary technological developments.

In this framework, forest fires are no longer interpreted as isolated episodes and are instead understood as manifestations of a stressed socio-ecological system. The increasing recurrence of prolonged droughts, the alteration of thermal regimes and the accumulation of biomass (all phenomena associated with climate change), configure a scenario in which the flammability of the territory increases structurally. State regulations require that regional plans integrate this new reality through annual risk assessments based on advanced meteorological models, fuel mapping and analysis of propagation scenarios, recognizing that danger no longer responds to traditional seasonal patterns. However, the biophysical dimension of risk cannot be understood without attending to the human processes that modulate it, therefore, Royal Decree 716/2025 explicitly incorporates this perspective by requiring that regional plans contemplate territorial management measures, restoration of agroforestry mosaics and regulation of recreational uses, recognizing that social and economic vulnerability is inseparable from the dynamics of fire.

Adding to this complexity is the technological dimension, which operates simultaneously as a potential source of ignition and as an indispensable tool for risk management. The presence of energy infrastructure, heavy machinery or transportation networks introduces new fire starting vectors, especially in contexts of water stress and high temperatures. In parallel, advances in remote sensing, thermal sensors, geographic information systems and command platforms allow for more precise surveillance and a faster response. State regulations require that regional plans integrate these technological capabilities, including coordination protocols with the Military Emergency Unit and real-time information systems that facilitate decision-making in highly uncertain scenarios.

Spanish planning, therefore, is configured as an adaptive system that recognizes the interdependence between the different factors that make up risk. Regional plans (such as INFOCA in Andalusia, INFOCAT in Catalonia or INFOGA in Galicia) must be updated annually to incorporate changes in environmental conditions, transformations of the territory and available technological innovations. This continuous updating reflects a conception of risk as a dynamic phenomenon, in which prevention, surveillance and extinction cannot be addressed in isolation, but as parts of an integrated cycle that also includes post-fire recovery and ecological restoration.

As a whole, the Spanish forest fire planning system is based on a scientific vision that understands fire as an emerging process of the interaction between climate, territory and society. State regulations and regional plans seek to anticipate this complexity through strategies that combine technical analysis, landscape management, regulation of human activities and deployment of advanced technologies. The result is a multi-scalar, multi-component approach that aims to reduce the probability of ignition, limit spread and minimize impacts, recognizing that risk

management requires an integrated understanding of the natural, anthropogenic and technological factors that shape it.

Figure 6. Territorial planning instruments for forest fires.

CATEGORY	FUNDAMENTALS	PURPOSE
Regulatory instruments	Forestry and environmental legislation, regulation of the use of fire, rules on energy infrastructure, protection of natural spaces.	Establish obligations, powers and limits of action to prevent and manage fires.
Planning instruments	Forest fire prevention plans (PPIF), defense plans for areas of high ecological value, risk zoning, inventories of critical infrastructures.	Organize prevention and operational response according to the characteristics of the territory.
Economic instruments	Subsidies for forest management, agricultural aid, European funds for restoration, sanctioning regime for negligence.	Encourage active prevention and penalize behaviors that increase risk.

Source: Own elaboration.

Likewise, operational and technological tools play a fundamental role in detecting, monitoring and extinguishing fires. Surveillance systems, which combine observation towers, thermal cameras, automatic sensors and remote sensing platforms, make it possible to identify ignition sources in their initial phases, which is crucial to prevent the evolution of large-scale fires. The incorporation of satellites, drones and artificial intelligence systems has expanded monitoring capacity, facilitating the interpretation of risk patterns and the anticipation of critical scenarios. The extinguishing means, both ground and aerial, are organized depending on the danger of the fire and the characteristics of the terrain, while the communication and logistics systems guarantee the coordination of the teams during operations.

Figure 7. Environmental management tools, in the field of forest fires.

CATEGORY	FUNDAMENTALS	PURPOSE
Surveillance and detection tools	Surveillance towers, thermal cameras, sensors, satellites, drones, artificial intelligence, meteorological networks.	Detect early ignitions and anticipate risk scenarios.
Extinguishing tools	Land brigades, helicarried equipment, aircraft, fire engines, heavy machinery, communication and logistics systems.	Control and extinguish fires in an effective and coordinated manner.
Analysis and modeling tools	Fire spread models, GIS, simulators, historical databases, vulnerability analysis.	Understand fire behaviour and optimize decision making.

Source: Own elaboration.

Modelling fire behaviour, and the use of geographic information systems make it possible to analyse the potential spread of a fire based on meteorological, topographical and fuel variables. These tools are essential

for real-time decision making and preventive planning. After extinction, restoration becomes a critical phase, aimed at the ecological recovery of the territory, soil stabilization and prevention of erosive processes that could aggravate environmental impacts. In this way, we can affirm that the contemporary management of forest fires in Spain is based on a set of tools that, far from functioning in isolation, make up a complex operating system in which advanced technologies, land management practices, organizational devices and risk analysis methodologies come together. These tools are integrated into regional and state plans, especially in the regulatory framework established by Royal Decree 716/2025, which requires annual planning based on scientific criteria and the continuous updating of available means. The logic underlying this framework is that of an adaptive system capable of anticipating, detecting, containing and recovering, recognizing that fire is a socio-ecological phenomenon that emerges from the interaction between climate, landscape and human activity.

Firstly, planning incorporates analysis and modeling tools, essential to understand risk dynamics in a climate change context. Propagation models, weather prediction systems and fuel mapping make it possible to characterize the flammability of the territory and anticipate fire behavior scenarios. These tools not only inform strategic decision-making, but also guide the allocation of resources, the delineation of high-risk areas, and the programming of preventive interventions. The integration of climatic, topographical and plant data into digital platforms facilitates a multi-scalar reading of the territory, essential for managing fires that can quickly evolve into extreme behaviour.

Along with these analytical tools, fire management is supported by a set of surveillance and early detection technologies that have transformed the response capacity. Traditional observation towers coexist with thermal cameras, remote sensors, satellites and automatic warning systems that allow smoke columns or thermal anomalies to be identified in real time. The digitalization of the territory and the interconnection of these systems with regional and state command centers have significantly reduced detection times, a critical factor in a context in which fires can reach great intensity in their early phases. These technological tools not only improve surveillance, but also allow continuous monitoring of the evolution of the fire during extinguishing operations.

The operational phase of fire management is articulated through tactical and logistical tools that include ground and air means and specialized units. The forestry brigades, checkpoints, firefighters and the Military Emergency Unit make up a device that combines human capabilities, heavy machinery, rapid intervention vehicles and aircraft of different types. The coordination between these means is supported by advanced communication systems, real-time digital mapping and unified command protocols that allow the integration of information from the terrain, sensors and propagation models. The effectiveness of these tools depends largely on the adaptive capacity of the operation, which must adjust its strategies to the evolution of the fire and changing environmental conditions.

Preventive management of the territory constitutes another essential dimension of the system, supported by forest management and landscape planning tools. Prescribed burning, the opening and maintenance of firebreaks, biomass management and the restoration of agroforestry mosaics are practices that seek to reduce fuel continuity and increase the resilience of the territory. These tools not only have a technical component, but also a social one, since they require the participation of owners, city

councils and rural communities. State planning recognizes that prevention is inseparable from territorial management and that technical tools must be complemented with governance instruments that promote co-responsibility and the recovery of traditional uses.

Finally, post-fire management incorporates damage assessment and ecological restoration tools, which allow analyzing the impacts on the soil, vegetation and infrastructure, as well as planning the recovery of the ecosystem. Remote sensing, severity indices and post-fire erosion studies are essential to design interventions that avoid irreversible degradation processes. These tools complete the management cycle, closing a process that does not end with extinction, but continues in the reconstruction of the affected territory.

On the whole, the tools used in the management of forest fires in Spain make up an integrated system that combines science, technology, organization and management of the territory. Their effectiveness depends on the ability to articulate them in a coherent, adaptive and continuous manner, recognizing that fire is a phenomenon that cannot be addressed from a single dimension. State and regional planning seeks precisely this integration, understanding that risk management requires a systemic approach in which each tool contributes to a common objective: reducing the probability of ignition, limiting the spread and guaranteeing the resilience of the territory in the face of an increasingly complex phenomenon.La gestión del riesgo debe adaptarse al origen del incendio, por ello, en el caso de los incendios naturales, generalmente asociados a rayos o condiciones meteorológicas extremas, la vigilancia reforzada durante episodios de tormentas secas y la modelización del riesgo por sequía resultan fundamentales. Los incendios de origen antrópico requieren estrategias centradas en la educación ambiental, la regulación estricta de actividades de riesgo y la vigilancia disuasoria, mientras que los incendios de origen tecnológico exigen un mantenimiento riguroso de infraestructuras eléctricas, maquinaria y sistemas energéticos, así como auditorías periódicas que permitan identificar vulnerabilidades.

Figure 8. Environmental management tools, in the field of forest fires.

CATEGORY	FUNDAMENTALS	PURPOSE
Restoration Actions	Damage assessment, soil stabilization, reforestation, habitat recovery, ecological monitoring. Recover the ecological functionality of the territory and prevent secondary impacts.	Recover the ecological functionality of the territory and prevent secondary impacts.
Actions against natural fires	Dry storm monitoring, drought modeling, media reinforcement in extreme episodes, landscape management. Reduce the impact of inevitable ignitions associated with natural phenomena.	Reduce the impact of inevitable ignitions associated with natural phenomena.
Actions against anthropogenic fires	Environmental education, control of burning, regulation of recreational activities, deterrent surveillance, recovery of agroforestry practices. Minimize ignitions caused by negligence, recklessness or intentionality.	Minimize ignitions caused by negligence, recklessness or intentionality.

Source: Own elaboration.

Action against forest fires in Spain is conceived as a dynamic and adaptive process that combines technical tools, organizational capacities and scientific criteria to intervene on a phenomenon whose evolution

depends on the simultaneous interaction between climate, vegetation, territory and human activity. Operational actions are not understood as a rigid sequence, but as a network of decisions that are adjusted in real time to the conditions of the fire, the availability of resources and the information generated by the surveillance and analysis systems. This conception responds to the need to manage increasingly complex fires, characterized by extreme behavior and a high sensitivity to meteorological and topographical variations.

Action begins with early detection, but is not limited to it. The information obtained through remote sensors, thermal cameras, satellites and observers distributed throughout the territory is immediately integrated into the command centers, where the initial situation of the fire is evaluated and the intervention strategy is determined. This initial phase is critical, since the speed of spread and intensity of the fire can increase exponentially in the first minutes. The action is therefore aimed at reducing uncertainty through the rapid consolidation of an operational diagnosis that allows anticipating the behavior of the fire and allocating the most appropriate resources.

Once the means are deployed, the action is articulated through tactical maneuvers that combine ground, air and logistical support interventions. Forestry brigades and extinguishing teams carry out direct actions on the front of the fire when conditions allow, using hand tools, heavy machinery and water lines to stop the advance of the flames. In parallel, aerial means carry out strategic discharges that seek to modify the energy of the fire, cool critical areas or reinforce previously established containment lines. These actions do not operate independently: coordination between ground and air is essential to guarantee the effectiveness of the operation and avoid unnecessary risks for personnel.

The action also includes decisions aimed at managing the space surrounding the fire. The opening of defense lines, the selective removal of fuel and the creation of anchorage zones allow the landscape structure to be modified temporarily to reduce the continuity of flammable material. These interventions, although tactical, are based on knowledge of fire ecology and propagation models that allow us to anticipate how the fire will respond to changes in the configuration of the terrain. The action, therefore, is not limited to fighting the fire, but transforms the immediate environment to alter its dynamics.

As the fire evolves, action requires constant reassessment. Command centers integrate up-to-date weather data, field observations and digital simulations to adjust strategy. This continuous feedback process is essential in erratic fires, where changes in wind, topography or fuel load can create high-risk situations. The action thus becomes an exercise in permanent adaptation, in which decision-making must balance the protection of human lives, the defense of infrastructure and the conservation of the natural environment.

Once the fire is controlled, action is aimed at stabilizing the terrain and preventing secondary damage. The evaluation of the severity of the fire, the identification of areas susceptible to erosion and the implementation of emergency measures (such as the protection of channels, the installation of barriers or the removal of unstable trees), are part of a set of actions that seek to prevent the impact of the fire from being amplified after it is extinguished. This phase, although less visible, is essential to guarantee ecological recovery and reduce the vulnerability of the territory to future episodes.

Thus, the action actions in the management of forest fires in Spain constitute a complex operating system that combines science, technology and experience on the ground. The effectiveness of this system depends on the ability to integrate information in real time, coordinate diverse resources and adapt strategies to a phenomenon that evolves rapidly and non-linearly. The action is not, therefore, a set of isolated procedures, but an integrated response that reflects the contemporary understanding of forest fire as a socio-ecological process that requires flexible, informed and coherent interventions with the dynamics of the territory.

5. CONCLUSIONS

With all of the above, we can conclude that the management of forest fires in Spain is configured as a multidimensional process that combines structural prevention, social prevention, technological prevention, operational response and ecological restoration. Only through an integrated approach, capable of simultaneously addressing the natural, human and technological factors involved in risk, is it possible to reduce the vulnerability of the territory and guarantee the protection of ecosystems, infrastructure and the population, essential issues in territorial planning of tourist areas at risk.

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