



**SEMINARIO INTERNACIONAL  
PLANIFICACIÓN Y PREVENCIÓN DE  
INCENDIOS DE PAISAJE Y EL ROL DE LA  
RESTAURACIÓN POST INCENDIOS**

Santiago, Chile, 20 y 21 de junio 2019



**Chile**  
en marcha



**Initiative  
20x20**

# Wildfire Risk Governance in Portugal

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Portugal



**AGIF**

AGÊNCIA PARA A  
GESTÃO INTEGRADA  
DE FOGOS RURAIS



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# **Riesgo de incendios forestales: Gobernanza y legislación en Portugal**

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# Agenda

1. Country Overview
2. Forest transition and Risk governance
3. In the aftermath of 2017
4. Integrated Fire Management

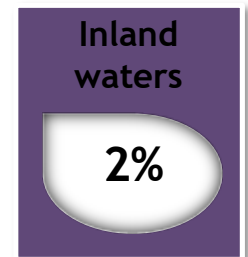
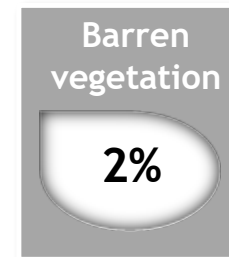
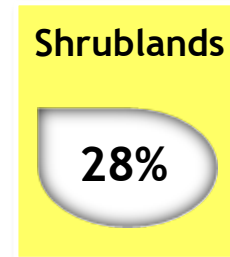
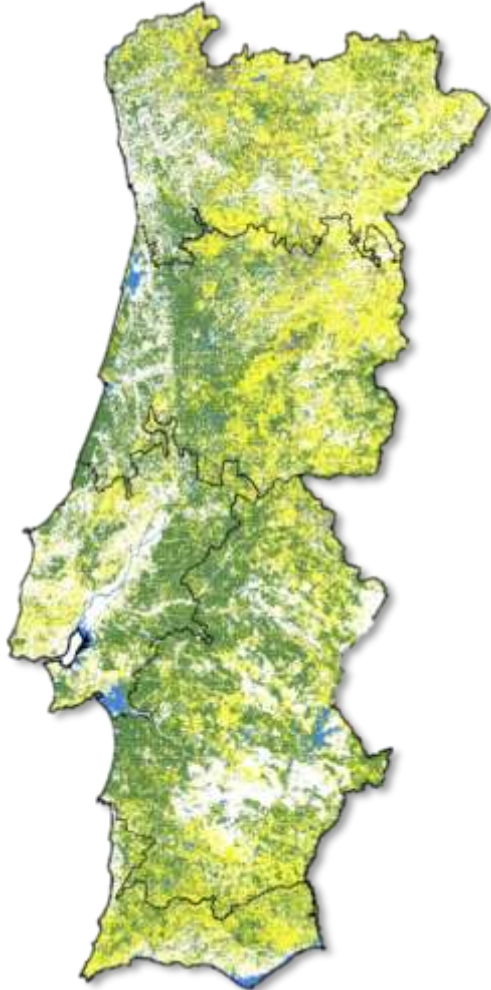


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# 1. Country Overview – major landcover



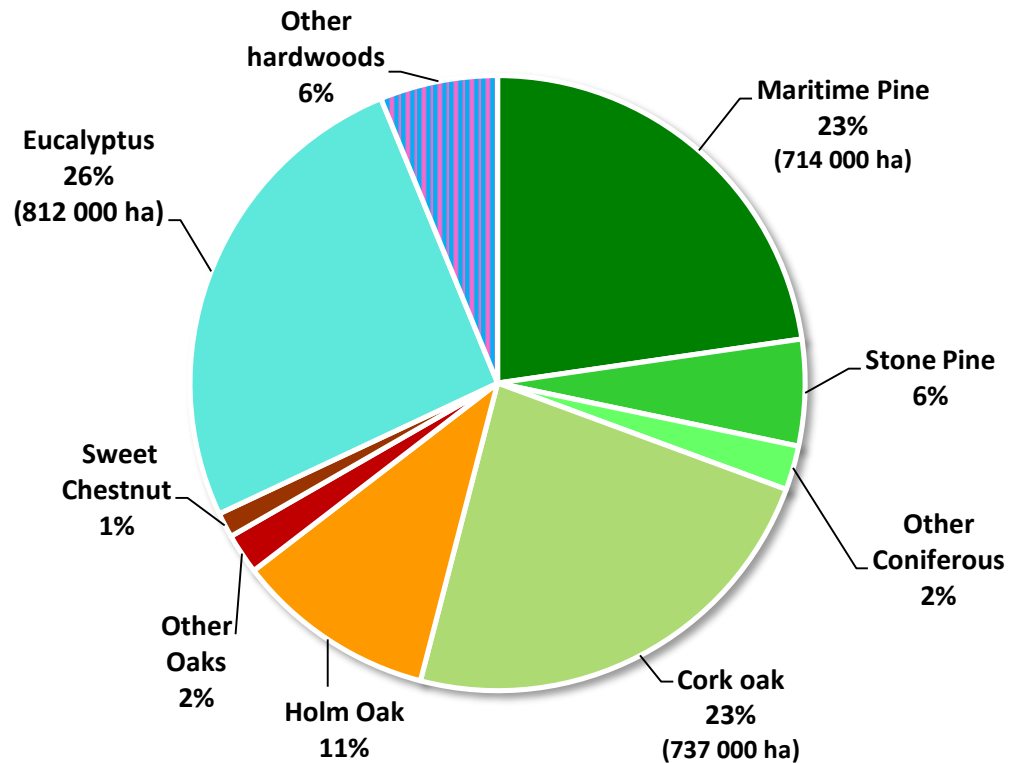
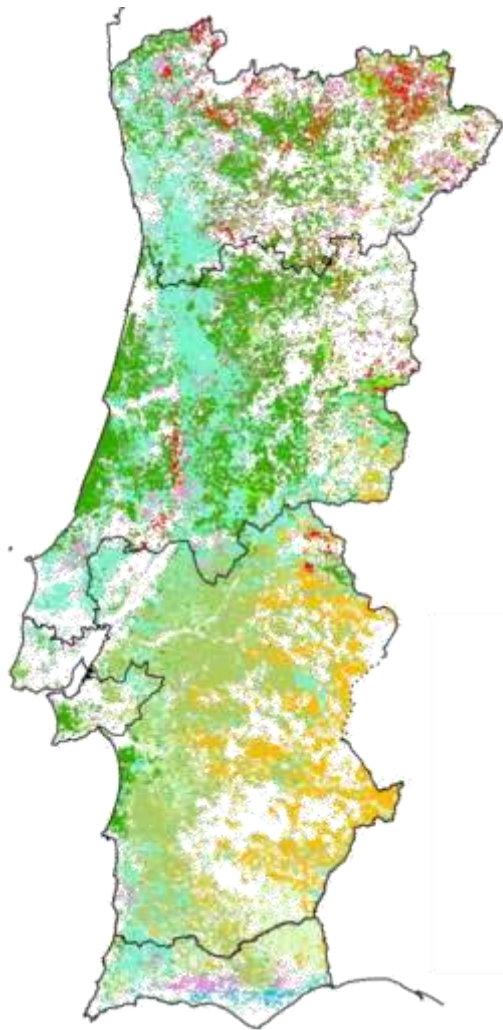
**Forests : 3,2 million hectares**

**Shrublands: 2,2 million hectares**





# 1. Country Overview – forest cover



Source: 6<sup>th</sup> National Forest Inventory – 2010 data

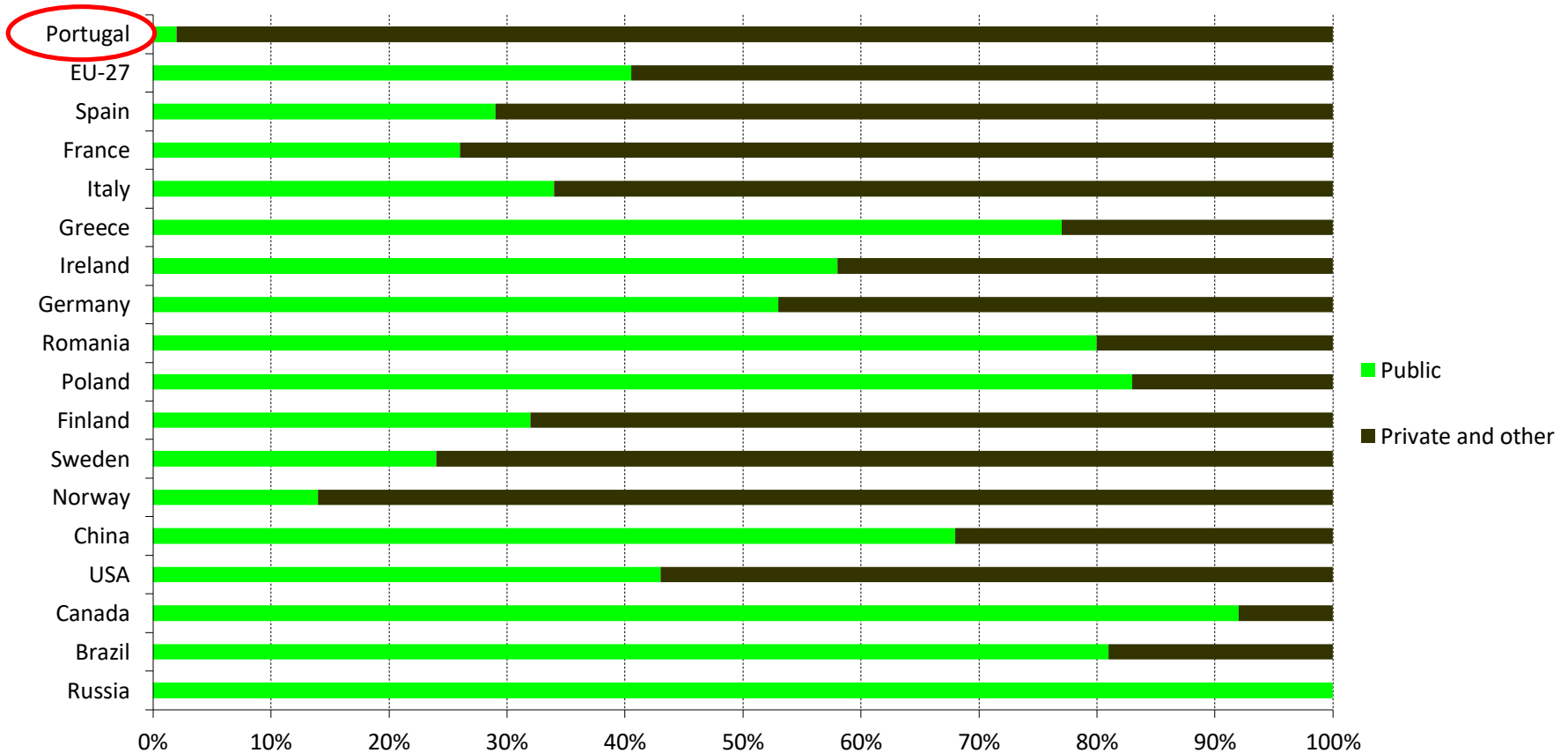


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# 1. Country Overview – Property ownership



Public

Private and other



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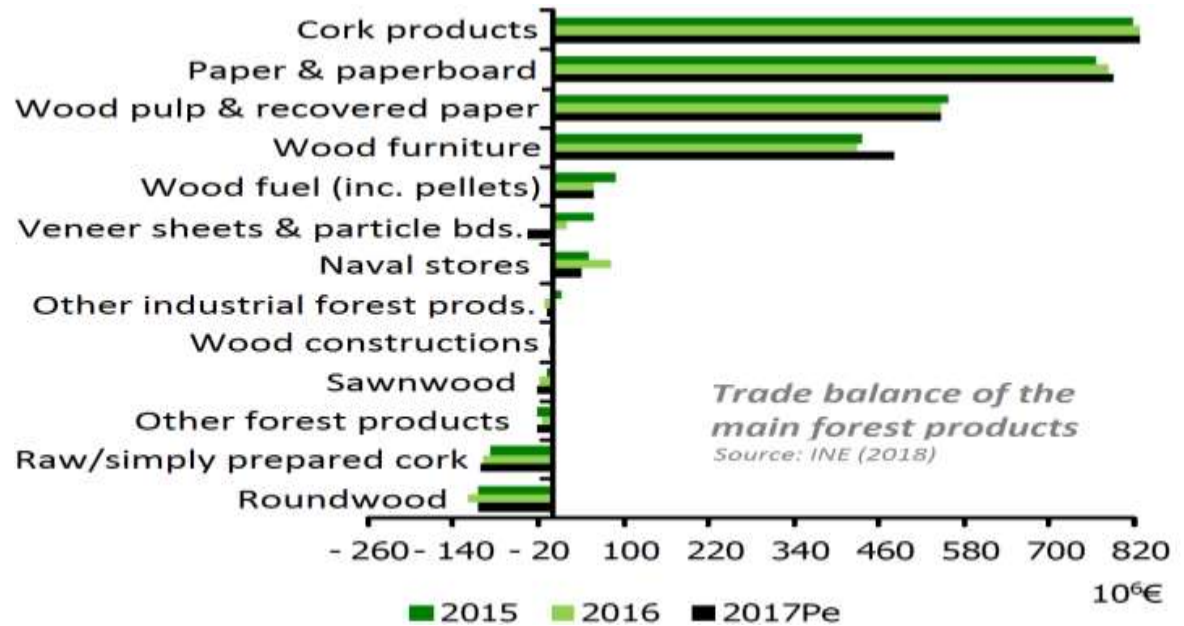
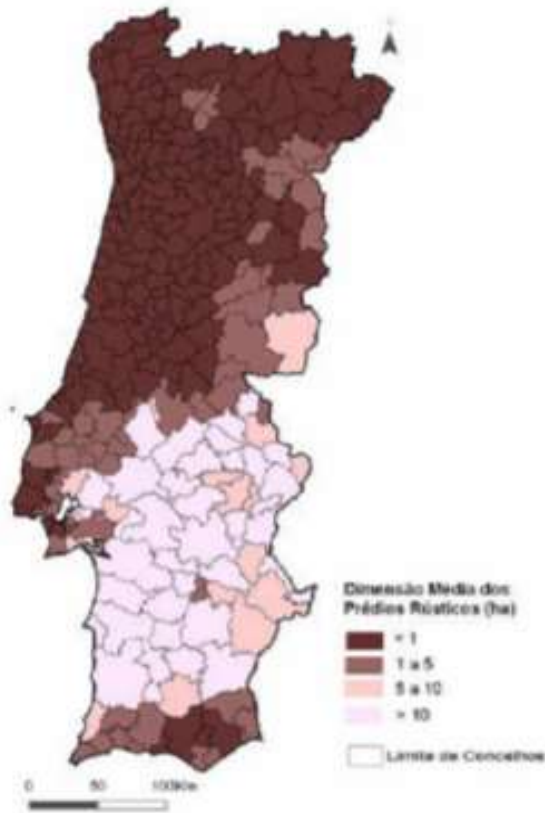




# 1. Country Overview – pros & cons



- Very small property in the central and north



- 1,2B€ /yr
- 80 000 direct jobs
- 7% electric consumption is from bioenergy
- 2,5% do GNP



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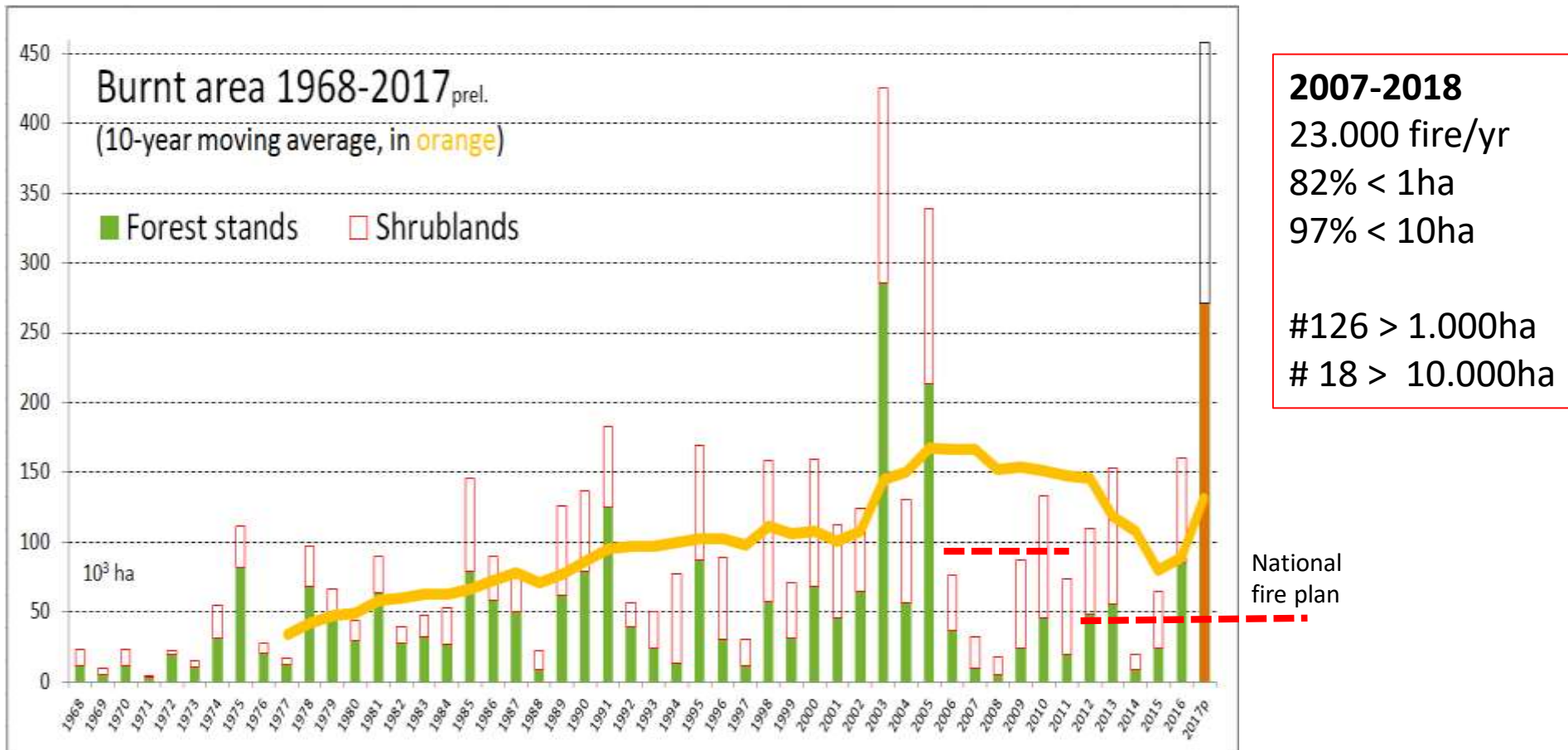




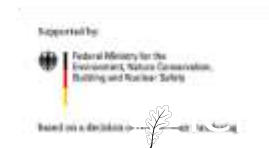
# 1. Country overview – fire statistics



## Burnt area 1968-2017 and National Forest Fire Protection Plan goals

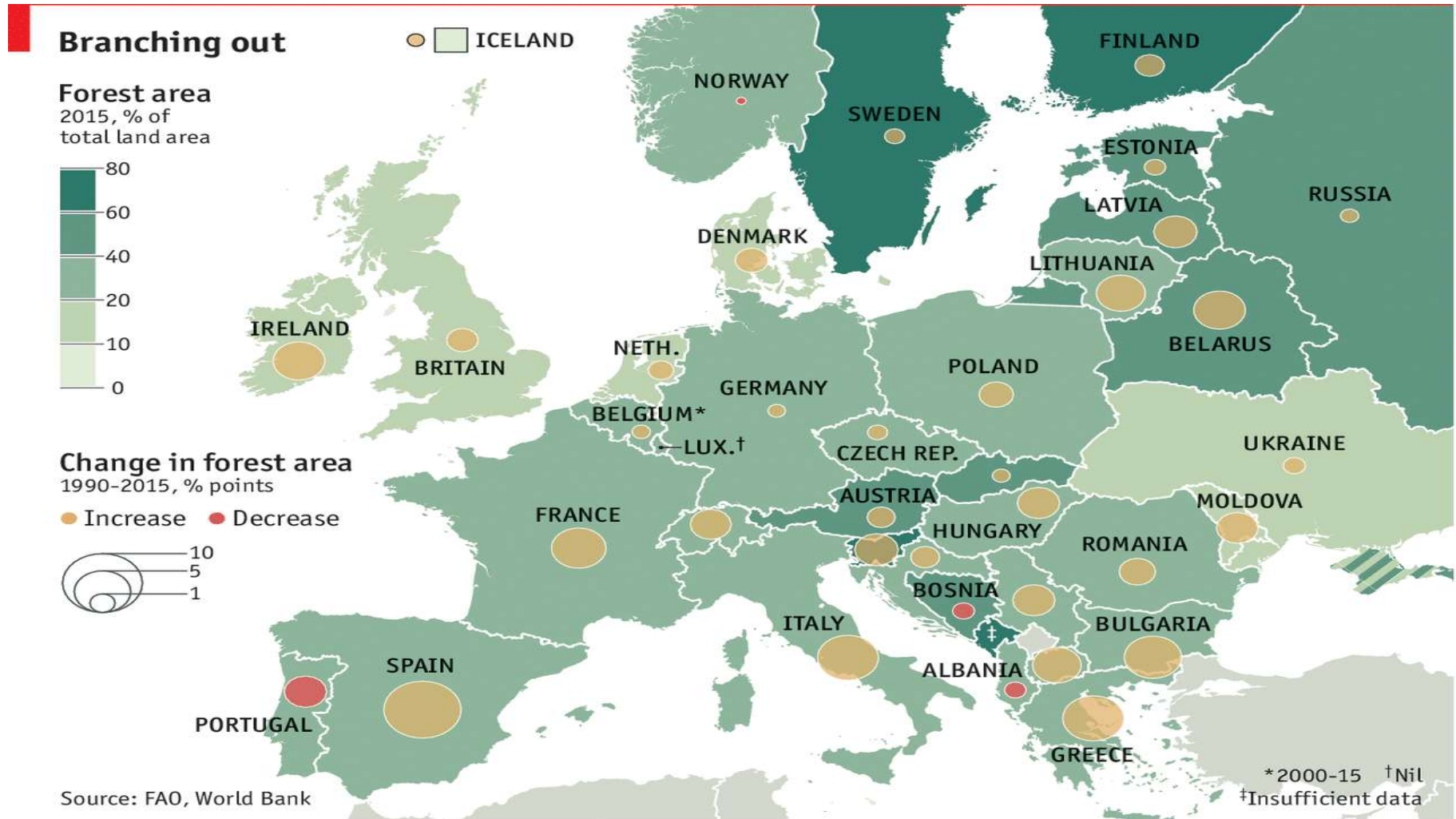


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# 1. Country overview – europe evolution of forest cover

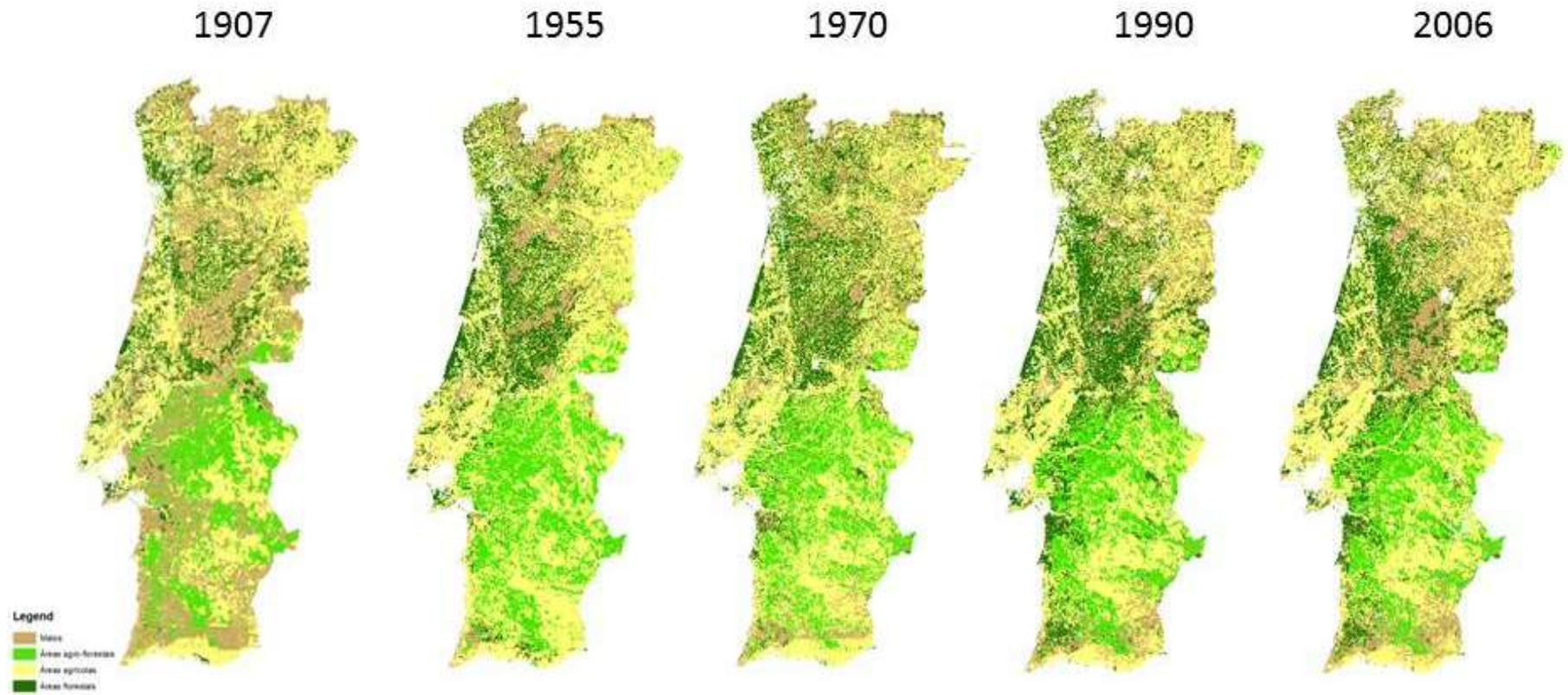


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## 2. Forest Evolution and Risk Governance



Forest cover

8%.....> 27%.....> 33%.....>35%.....> 37%.....> 33%

Oliveira TM, Guiomar N, Baptista FO, Claro J e JMC Pereira (2017) Is Portugal's forest transition going up in smoke? Land Use Policy 66: 214-226 <http://doi.org/10.1016/j.landusepol.2017.04.046>



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## 2. Forest Evolution and Risk Governance



FAO 1946  
OECE 1948  
NATO 1949  
EFTA 1960



### Endogenous socio-ecological dynamics

- State forest policy
- Forest scarcity

### Exogenous socio-economic dynamics

- State forest policy
- Forest scarcity
- Economic development



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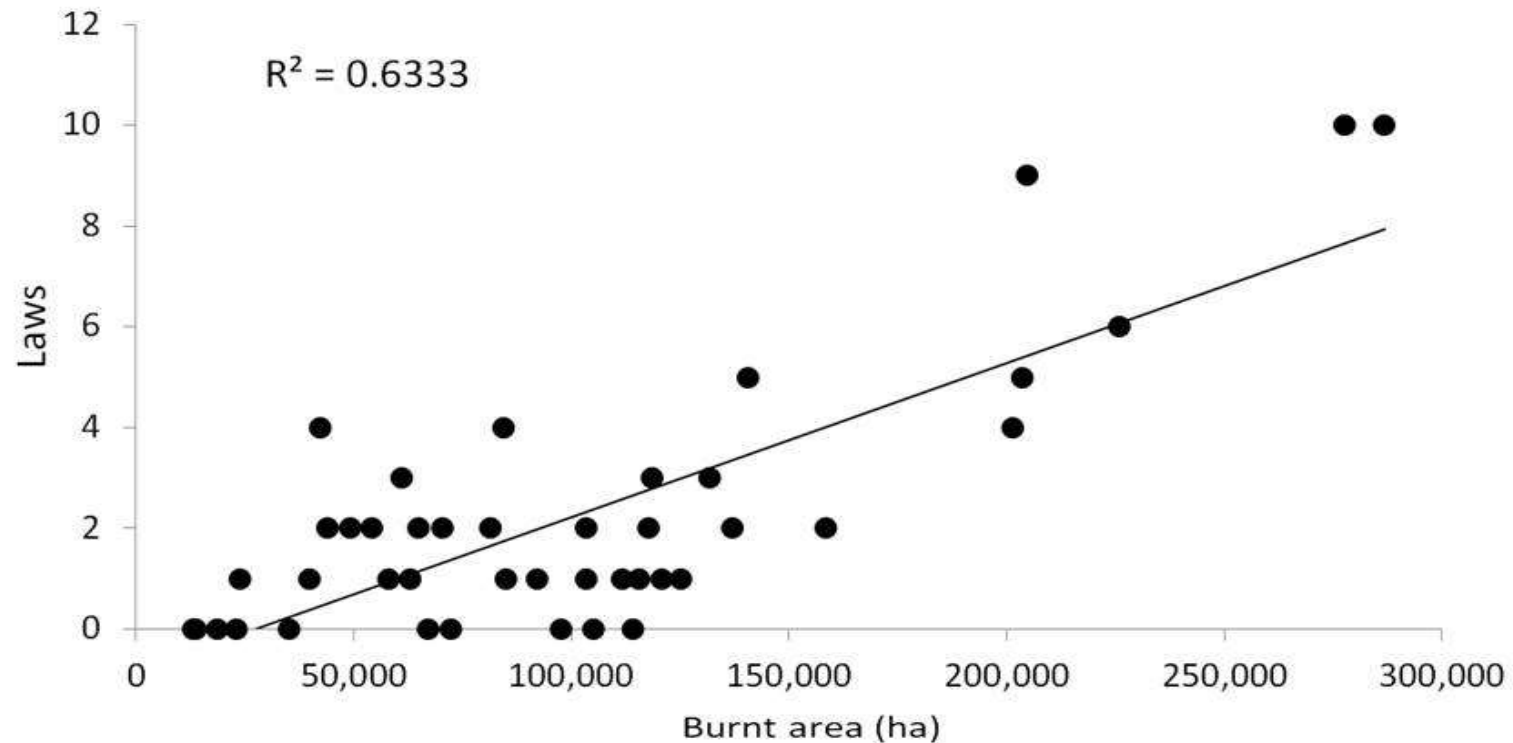




## 2. Forest Evolution and Risk Governance



- Content Analysis of 101 Fire related Governmental decrees published from 1910 a 2013



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## 2. Forest Evolution and Risk Governance

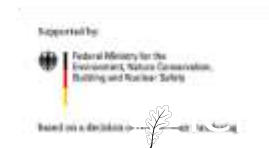


- Actors network, learning cycles and risk governance deficit

	Exiting actors	Emerging actors
up to 60s	Self-sufficiency farming and forest management  Traditional cattle, goat, and sheep herders	Forest fire prevention/suppression teams in regions with public lands
70s	Autocratic ruling	National and local democratic elections  Public environment agency and Non-Governmental organizations  National Firefighters Service and Civil Protection Service  Free media
80s	Forest Service wildfire expertise  Central planning	Pulp companies with wildfire system  Wildfire urban interface  Market economy  European Economic Common regulation and funding  Rural development program and common agriculture policy  Wildfire scientific community
90s	Forest service technical and administrative capacity towards active land management	Forest owners association  Forest prevention and suppression teams under forest owners association, local authorities and communities
2000s	Extinction of the National Forest Guards Corps	National Republican Guard



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## 2. Forest Evolution and Risk Governance



Learning loops (adapted from Pahl-Wostl)		Characteristics of change
1910 - 1962	Incremental	<ul style="list-style-type: none"> <li>Improvements in established routines and spatial expansion</li> </ul>
1963 – 1974	Reframing	<ul style="list-style-type: none"> <li>Multilevel interactions, problem reframed and new procedures established (prevention and suppression)</li> </ul>
1975 – 1980	Reframing	<ul style="list-style-type: none"> <li>Alternative views emerge but system holds change</li> </ul>
1981 - 1985	Transformation	<ul style="list-style-type: none"> <li>Emergent players dominate the core of decision making, recognize new context and set priorities and procedures (wet firefighting and civil protection)</li> </ul>
1985 – 2003	Incremental	<ul style="list-style-type: none"> <li>Vertical coordination in policêntric environment</li> <li>“More and better”</li> </ul>
2004 –2013	Reframing	<ul style="list-style-type: none"> <li>New ideas emerge but system inertia holds change</li> <li>Reinforce command and control and reset priorities</li> </ul>



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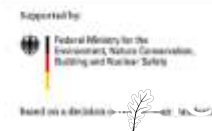
## 2. Forest Evolution and Risk Governance



Time	1910 - 1962	1963 - 1980	1981 - 2013
<b>Description of the Fire Risk Problem</b>	<p>Moderate to low fuel loads, mosaic of landscapes</p> <p>Local preventive and mitigation are effective</p>	<p>High and continuous fuel loads, local solutions to be effective need to be planned in advance</p> <p>Suppression capacity is the quick fix solution</p>	<p>Inter-sectoral policies coordinating effort is needed for effective regional risk reduction</p> <p>Effectiveness of planned actions are uncertain or beyond cognitive human capacity</p> <p>Multiple values are in stake, some are very difficult to measure</p>
<b>Risk problem</b>	<b>Simple</b>	<b>Complex</b>	<b>Ambiguity ridden</b>
<b>Actors</b>	Agency staff	<p>Agency staff</p> <p>Direct affected groups</p> <p>External experts</p>	<p>Agency staff</p> <p>Direct affected groups</p> <p>External experts</p> <p>Stakeholders</p> <p>Public</p>
<b>Type of conflict</b>	<b>Instrumental</b>	<b>Cognitive</b>	<b>Cognitive/ Evaluative</b>
<b>Remedy</b>	Statistical risk analysis	Probabilistic Risk Analysis	<p>Probabilistic risk modeling</p> <p>Risk balancing</p> <p>Analysis &gt; deliberation</p> <p>Risk Trade-off</p>



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# 2. Forest Evolution and Risk Governance



2013

Journal of Environmental Management 130 (2013) 1–9



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## Forest fire management to avoid unintended consequences: A case study of Portugal using system dynamics

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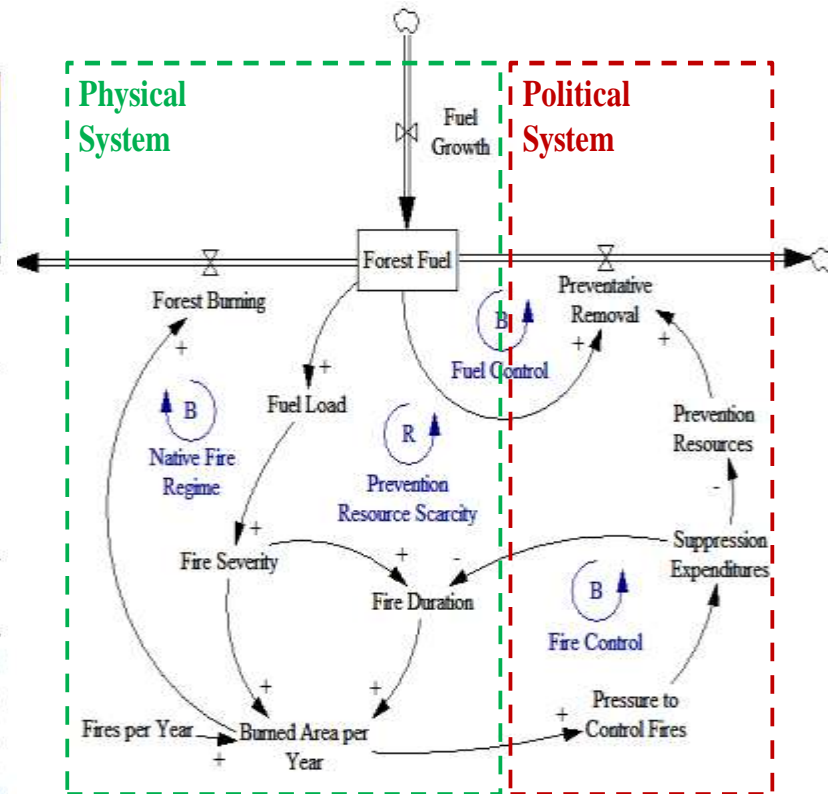
#### Keywords:

Forest fires  
System dynamics  
Feedback  
Simulation

### ABSTRACT

Forest fires are a serious management challenge in many regions, complicating the appropriate allocation to suppression and prevention efforts. Using a System Dynamics (SD) model, this paper explores how interactions between physical and political systems in forest fire management impact the effectiveness of different allocations. A core issue is that apparently sound management can have unintended consequences. An instinctive management response to periods of worsening fire severity is to increase fire suppression capacity, an approach with immediate appeal as it directly treats the symptom of devastating fires and appeases the public. However, the SD analysis indicates that a policy emphasizing suppression can degrade the long-run effectiveness of forest fire management. By crowding out efforts to preventative fuel removal, it exacerbates fuel loads and leads to greater fires, which further balloon suppression budgets. The business management literature refers to this problem as the *firefighting trap*, wherein focus on fixing problems diverts attention from preventing them, and thus leads to inferior outcomes. The paper illustrates these phenomena through a case study of Portugal, showing that a balanced approach to suppression and prevention efforts can mitigate the self-reinforcing consequences of this trap, and better manage long-term fire damages. These insights can help policymakers and fire managers better appreciate the interconnected systems in which their authorities reside and the dynamics that may undermine seemingly rational management decisions.

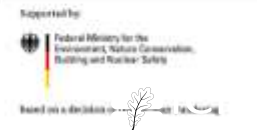
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**Lack of prevention => Fuel builds up  
=> bigger fires => + € suppression => -  
€ prevention => fuel builds up**



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# 2. Forest Evolution and Risk Governance



## After the all previous crisis

- Reactive and *top down*
- Perception vs evidence based
- Consequences misunderstood with causes
- Linear solutions



- Governments bailout (rebuilt houses, replanting and increase penalties for bad use of fire, change building codes...
- Influential stakeholders shape the system design
- Problem framing convey solution selected
- Multientities fire management system

Frames	System outputs
Failure to understand how the components of a complex system interact or how the system behaves as a whole	Failure to design effective risk management strategies
Lack of ability to recognize fast or fundamental changes in the system	Adequate evaluation of costs and benefits (efficiency) of various options and how these are distributed (equity);
Misrepresentation of information about stakeholders	Lack of adequate organizational capacity and/or suitable culture to ensuring managerial effectiveness
Inability to overcome cognitive barriers to imagining that events outside expected paradigms are possible;	Multiple departments or organizations responsible for a risk's management act individually and not cohesively



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### 3. In the aftermath of 2017



Vieira de Leiria, Portugal, 15/10/2017



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### 3. In the aftermath of 2017



rato2



Pedrogão grande, Portugal, 17/6/2017



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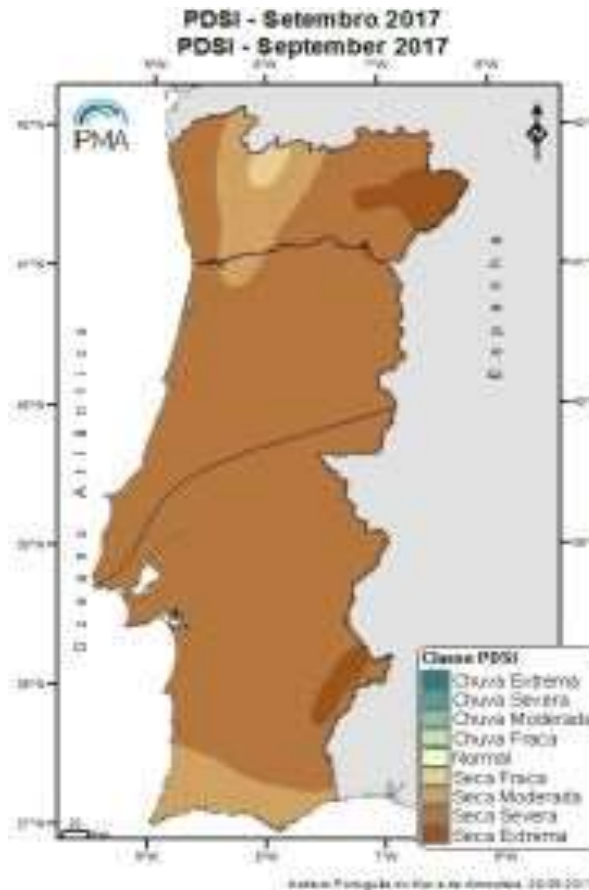


# 3. In the aftermath of 2017



Unmanaged land  
+ human behavior + Fuel Availability + weather severity

Water on soil



Meteorological events



+

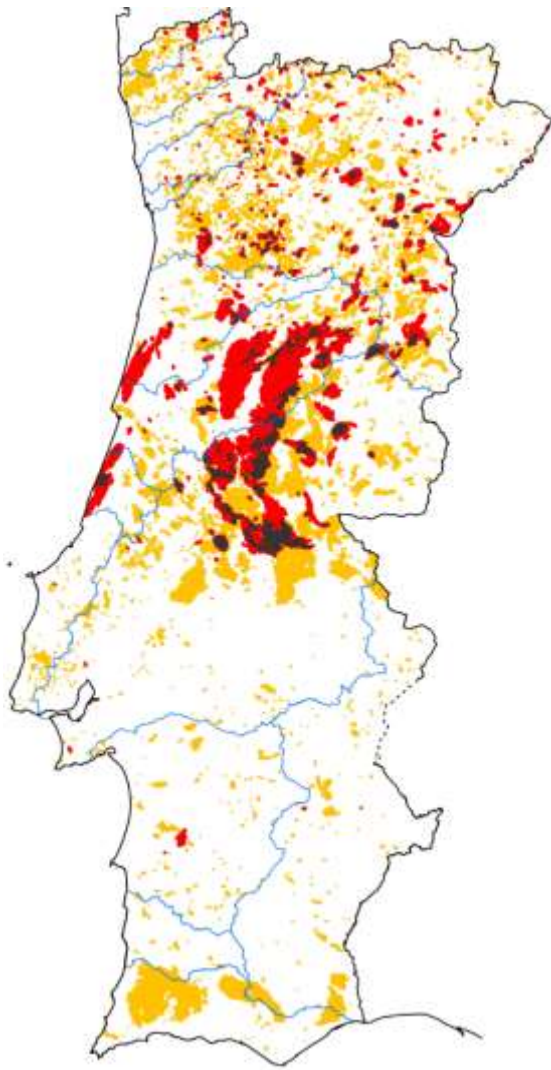


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### 3. In the aftermath of 2017



Total burnt area: c. 488 000 ha

***Recurrent on 2003/04/05 fires : 136 000 ha***

-  Burned areas in 2017
-  Burned areas in 2003, 2004 and 2005
-  Recurrence of 2017 fires in areas burnt in 2003, 2004 and 2005
-  Largest rivers watersheds

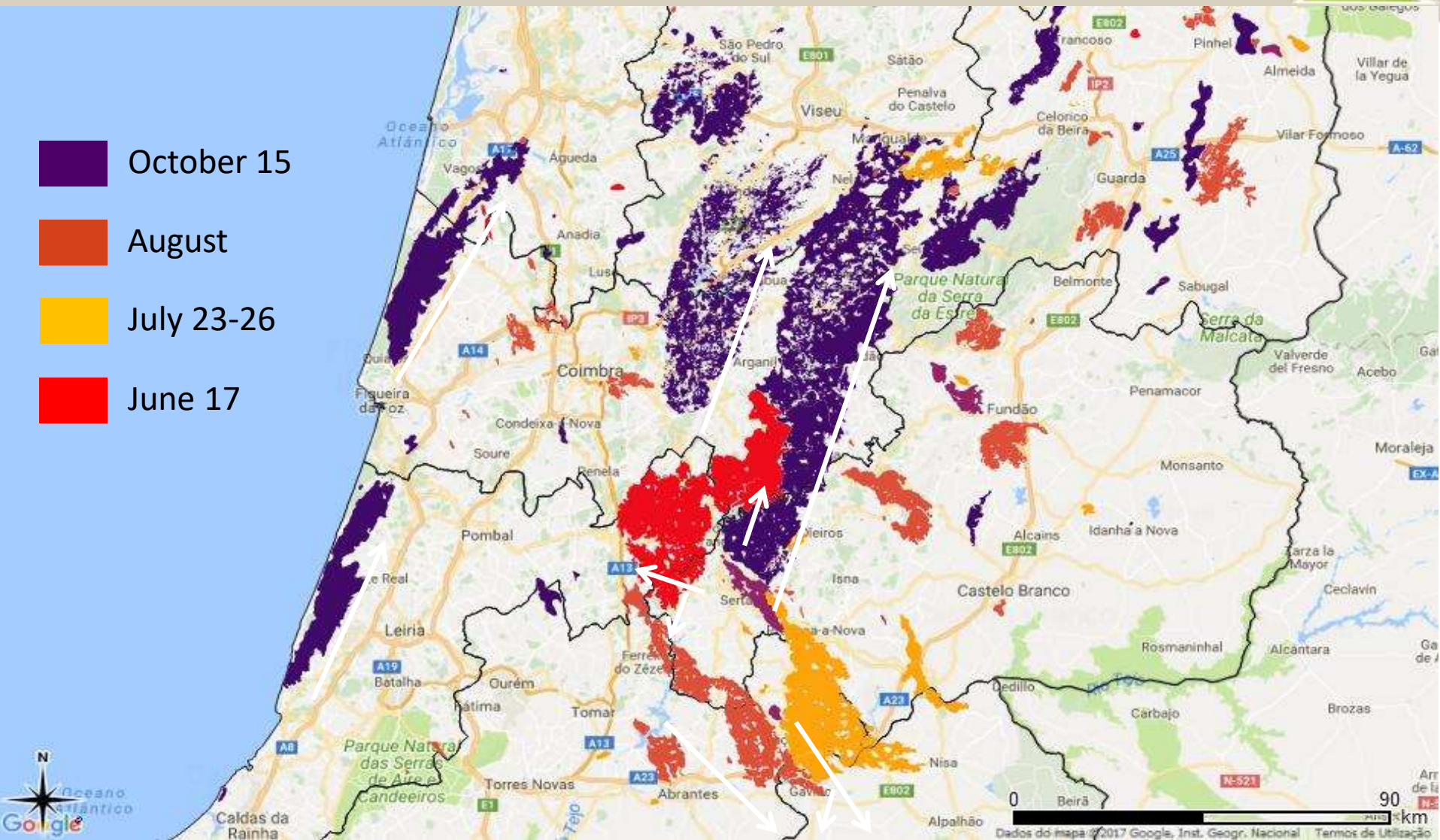




### 3. In the aftermath of 2017



- October 15
- August
- July 23-26
- June 17



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### 3. In the aftermath of 2017



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# 3. In the aftermath of 2017 – key issues to solve out pain points



In the aftermath of 2017's June and October wildfires, **Independent Technical Comissions** have reported necessities for **structural and significant changes** in several dimensions of the wildfire prevention and suppression system...

## PREVENTION

- Recognize agriculture abandonment leads to Forest Transition
- Reinforce prevention and forest management
- Promote fuel management at landscape level
- Assure land management in forested areas and shrublands

## QUALIFICATION

- Enforce the existence of standard procedures at all levels
- Increase the number of professional operatives
- Certification of skills to allow multi agencies resources sharing

## OPERATIONAL RISK MANAGEMENT

- All year round resource capability
- Reduce live and property exposure to fire
- Reduce number of ignitions
- Reinforce of public risk communication

## KNOWLEDGE

- Adopt formal “lessons learned” process
- Foster cooperation among agencies
- Private/public joint ventures in research and outreach on forest and integrated fire management

## IMPROVE READINESS AND REACTION

- Communications network
- Operatives have no knowledge of the staging area
- Information technologies to map wildfire and its potential

## GOVERNANCE

- Leadership
- Close gap between prevention and suppression
- Hierarchical top-down vs polycentric governance
- Authority vs responsibility and networking of actors



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# 3. In the aftermath of 2017



## Transformation Programme

...which originated a **Transformation Programme** towards an **Integrated Wildfire Management System (SGIF)**, inscribed in the Council of Ministers Resolution n. 157-A/2017 of October 27th.



8818-(2) Diário da República, 1.ª série — N.º 201 — 27 de outubro de 2017

### PRESENCIA DO CONSELHO DE MINISTROS

#### Resolução do Conselho de Ministros n.º 157-A/2017

Portugal enfrenta um problema estrutural de ordenamento do território, que o Conselho das Autarquias Locais vem tentando combater mas grave ameaça à segurança das populações e ao potencial de desenvolvimento económico e social do país.

Para responder às várias estruturas desta problemática, o ordenamento do território não pode ser apenas um instrumento de ordenamento do território, mas também um instrumento de intervenção no território, pelo que necessariamente é necessário promover a reforma do modelo de prevenção e combate a incêndios florestais.

O Programa de 2020 Governo Constitucional, no âmbito do sistema de segurança da proteção civil e das condições de prevenção e combate, prevê a adoção de medidas no âmbito da prevenção com o objetivo de evitar e de reduzir danos, a criação de comunidades resilientes aos riscos associados à ocorrência de incêndios graves e catástrofes e a melhoria da resposta operacional, por via do reforço das ações do Grupo de Intervenção de Prevenção e Socorro (GIPS) do Sistema Nacional de Proteção Civil (SNPC), da Força Especial de Bombeiros (FEB), da Autoridade Nacional de Proteção Civil (ANPC) e do Instituto Português do Mar e da Atmosfera (IPMA).

Os incêndios de grandes dimensões que, nos dias 17 de junho e 15 de outubro de 2017, afetaram no Portugal Continental tiveram consequências vitais no nível da vida humana, para além dos danos materiais e prejuízos na habitação, emprego/agricultura, infraestrutura, equipamentos e bens de pessoas, agravados a nível local, que se somam à destruição da floresta e dos bens e serviços por ela produzidos.

Face à dimensão das consequências dos incêndios que ocorreram nos concelhos de Pedrógos Grandes, Castanheira de Pera, Freguesia dos Vinhos, Góis, Paredes, Pombal, Vila Verde e S. João, entre os dias 17 e 24 de junho de 2017, foi criada, através da Lei n.º 49-A/2017, de 10 de julho, uma Comissão Técnica Independente (CTI), constituída por membros do Parlamento e representantes das forças armadas.

O Relatório produzido por esta CTI, entregue ao Assembleia da República a 17 de outubro de 2017, aponta falhas estruturais e operacionais no modelo de prevenção e combate aos incêndios florestais e ao Sistema de Proteção Civil que levaram a estas consequências, incluindo a ausência de um plano nacional de prevenção e combate a incêndios florestais e da sua defesa contra incêndios.

Com base neste Relatório, no âmbito da Lei n.º 49-A/2017, foi criado o Sistema Nacional de Proteção Civil (SNPC), no âmbito da Lei n.º 49-A/2017, para assegurar a prevenção e combate aos incêndios florestais, incluindo a defesa do território da prevenção e combate.

Tal reforma deve ser profunda, não apenas prevista pela CTI, mas levada a cabo com rapidez, com o objetivo de reforçar todos os mecanismos que têm sido criados e Dispositivo contra Incêndios Florestais.

Assim, para permitir uma ação coordenada entre todos e a implementação integrada do sistema, é necessário desenvolver e concretizar estratégias e a estrutura da nova rede que articula a prevenção, com o enquadramento desestruturado de novos sistemas integrados de Operações de Prevenção e Socorro (SIGOPS), Sistema de Gestão de Operações (SGO) e Sistema Operacional Permanente (SOP), entre outros, e promover a criação da Unidade de Mando para a coordenação do Sistema de Gestão Integrada de Fogos Rápidos (SGIFR), cuja constituição será assegurada pela Agência para a Gestão Integrada de Fogos Rápidos (AGIFR), a qual se constitui no organismo de coordenação, formação pela CTI.

Tais grandes princípios orientam a reforma. Os primeiros ligam, o princípio da aproximação entre prevenção e combate. Tais princípios implicam um reforço e progressiva reestruturação da rede para os pilares da prevenção e vigilância, com uma nova centralidade de planeamento da Agricultura, Floresta e Desenvolvimento Rural no sistema e a implementação estruturalmente do Sistema de Conservação da Floresta e Floresta, I. P. (ICFP, I. P.), bem como o desenvolvimento da rede de guardas e capatazes florestais e do Serviço de Proteção da Floresta e do Ambiente (SEPA) da GNR, a par da institucionalização dos municípios e das freguesias, no âmbito da sua estruturação de prevenção e de combate a incêndios florestais, bem como a sua vigilância. Deve ainda considerar, neste contexto, a papel vital dos produtores florestais, beneficiando da capacidade que a sua organização em Grupos de Intervenção Florestal (GIF) e outros entidades do Sistema Florestal lhes oferece.

Em segundo lugar, o princípio da profissionalização e capacitação do sistema. Este princípio exige um forte investimento no SLD, o reforço do investimento da mesma resposta, envolvendo a intervenção de especialistas nas principais áreas de intervenção relevantes, e a incorporação do conhecimento científico no planeamento, intervenção e gestão de incêndios, bem como a qualificação técnica de todos os intervenientes. Tendo em conta, segundo ainda referido, a Tercia Nacional de Bombeiros, integrando a rede de profissionais no sistema de resposta nacional, e os seus recursos humanos especializados (TEEP) no mesmo sistema, bem como outros recursos profissionais.

Reflete a profissionalização e capacitação de sistemas através da ANPC, cuja estruturação atualizada, com uma rede de pessoal próprio e devidamente formado, com recursos humanos e organizacionais, bem como uma estrutura de direção centralizada e integrada no âmbito da lei geral, mediante a criação de uma estrutura de resposta nacional de Gestão Integrada de Fogos Rápidos (GIFR) nos Forças Armadas e a criação de unidades de resposta da GIPR da GNR, a todo o território nacional. A Força Armada inclui unidades e unidades e a gestão centralizada dos seus recursos de combate a incêndios florestais, por meios próprios do Estado ou outros que sejam internacionalmente necessários.

Além disso, segundo também referido a contribuição para o voluntariado nas Autarquias Locais, de Bombeiros, integrando como a profissionalização qualificada de Equipes de Intervenção Permanente, beneficiando do investimento estrutural dos Corpos de Bombeiros Voluntários, uma gestão e avaliação que a estrutura de coordenação de resposta nacional e de defesa do território.

Em terceiro lugar, o princípio da aproximação. Este princípio permite a progressiva e tendencial separação

## Strategic Axis

- 1. Protect Populations
- 2. Reduce Ignitions
- 3. Manage fuel in high risk áreas
- 4. Reinforce and pre-position response assets in high risk áreas

Improved decision and capacitation

Establish a Special Unit for integrated fire management, reporting to Prime Minister

- Design new model and national fire strategy and plan (2019-2030)
- Incorporate independent parliament comission recommendation
- Tranform the system and Manage change



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### 3. In the aftermath of 2017



## Benchmarking and exchange of experiences



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### 3. In the aftermath of 2017



#### Political commitment



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### 3. In the aftermath of 2017



With Australians and South africans



FireWise – by South africans



In Finland



European Union



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### 3. In the aftermath of 2017



Portuguese being trained in Chile



Chile training in Portugal



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# 4. Integrated Fire Management



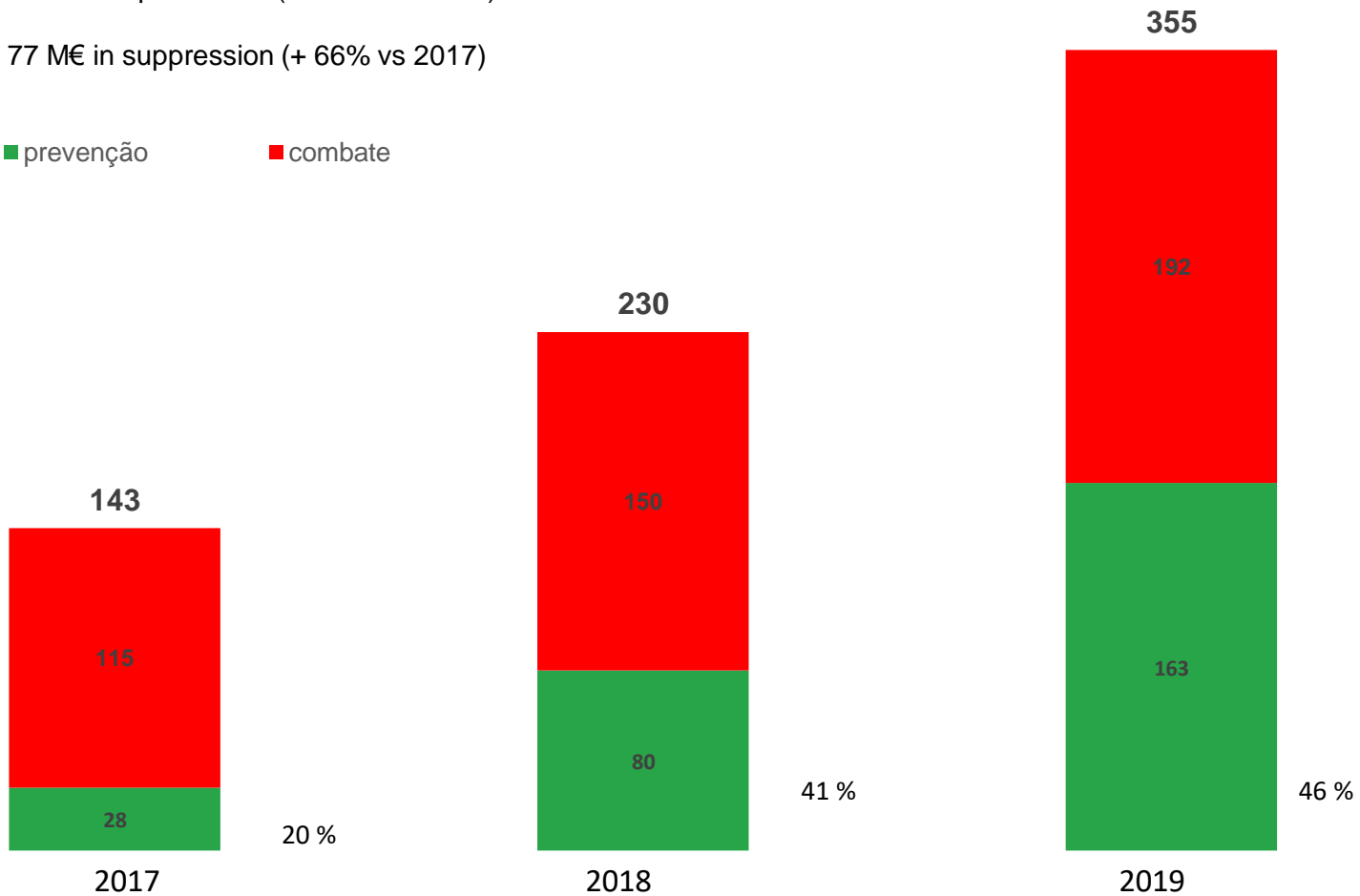
+ 212M€

+ 135 M€ in prevention (+ 400% vs 2017)

+ 77 M€ in suppression (+ 66% vs 2017)

■ prevenção

■ combate



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# 2018

- Start focusing on the **causes** than on just mitigating effects
- Reduce Danger > Fostering private efforts to **decrease fuel load** around villages, aiming to **reduce vulnerability to life and property**, and in the forestlands.
- **Be prepared > Communicating with citizens, including tourists**, so that they know what to do when a fire occurs.
- **This is a tremendous amount of work**, to be done in the scope of risk governance and perception.



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# 2018

- **Surveillance and patrolling** capabilities will be reinforced to **reduce ignitions**, and stronger initial attack
- **Improve meteorological and decision making capabilities in wildfire risk management**, to be more effective managing suppression resources
- **Reinforce operations with wildfire expertise** seeking a tight integration of fire behavior and forest knowledge with strategic and tactical levels



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# 4. Integrated Fire Management



The Special Unit had set the strategic priorities for 2018

1. Protect Populations
2. Reduce Ignitions
3. Manage fuel in high risk areas
4. Reinforce and pre-position response assets in high risk areas
5. Improved decision and capacitation

## Results

Zero fatalities

43% ignition vs 10yr average

19 fires > 100 ha vs 116 10yr average

1 fires > 1000 ha vs 16 10yr average



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## 4. Integrated Fire Management



### After 2018

- Recognize the **systemic faults** and socio-ecological challenges ahead and redesign wildfire risk **governance** and wildfire risk **management**
- **Integrate prevention and suppression.**
- **Segment** and **specialize** organization to assure that wildfires are managed both **to protect people** and their houses **and forest resources**
- Reinforce **prevention** and promote institutional cooperation, both public and private, to **close gaps** between prevention and fire suppression



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# 4. Integrated Fire Management



Steps were taken towards an integrated wildfire management system

## ✓ Launching the wildfire integrated management agency (**AGIF**)

- **Organic Law** of the Agency and setting up an installation committee;
- **700 candidates** parsed against previously defined professional profiles to provide **61 vacancies**.
- 42 persons contracted

## ✓ **New Model** – Integrated Wildfire Management System

- **2018** Approval of a **Unified Prevention and Suppression Directive**, laying ground to a new model of integrated management, **set on principles like result oriented action, operational flexibility, transparency and accountability;**
- **2019** Integrated fire management fire plan
- **New organizational and management model to be operational in 2022**

- ✓ Creation of the **ForestWise Collaborative Lab**, as a research, knowledge and innovation centre, where a AGIF participates as shareholder and as member of the administration board



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## 4. Integrated Fire Management



### INTEGRATED WILDFIRE MANAGEMENT SYSTEM

Afforest, shrub  
and rural areas

Life & property  
WUI

Forest & conservation  
Agency

(Ministry of Agriculture and Environment – ICNF)

Civil protection  
Agency

(Ministry of Internal Affairs – ANPC)

AGENCY



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Supported by:  
Federal Ministry for the  
Environment, Nature Conservation,  
Building and Nuclear Safety  
Based on a decision of the German President



## 4. Take away messages



In the Mediterranean and Atlantic Portugal, the forest expansion endured for as long as informal and local solutions worked

What we have ignored is what citizens can do and the importance of real involvement of the people versus just having somebody in Washington make a rule.

Elinor Ostrom



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## 4. Take away messages



- Wildfires and fire management are a **complex** problem, asking for societal solutions more so than in technology
- Most of the area is private thus public policies do matter (national and European)
  - Agriculture
  - Energy
  - Forestry and nature conservation
  - Development
- Institutional assets are critical (resources, regulation, procedures, culture)
- Managing uncertainty, ambiguity and complexity
- Science based decision making process
- Leadership, Dialogue and communication



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**SEMINARIO INTERNACIONAL  
PLANIFICACIÓN Y PREVENCIÓN DE  
INCENDIOS DE PAISAJE Y EL ROL DE LA  
RESTAURACIÓN POST INCENDIOS**

**Santiago, Chile, 20 y 21 de junio 2019**

**Gracias | Thank You**