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Domingos Xavier Viegas

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Crossing the crossroad: challenges for the implementation of a collaborative wildfire management program in Portugal.

António Patrão

Institute for Interdisciplinary Research, University of Coimbra (IIIUC),
uc1997105312@student.uc.pt

Abstract

Wildfires represent the main natural risk in Portugal. Since 2003 the territory has been affected by extreme wildfires which have consumed more than 1.2 million ha. Following those events, several modifications were introduced in wildfire policies to preserve forest and increase the resilience of communities facing wildfires. These modifications suggest that the wildfire management strategies in Portugal are changing from a response based paradigm (wildfire combat capability) to a paradigm based on prevention and community collaboration. The goal of this paper is to identify this set of transformations, analysing the main features of the wildfire management program between 2003-2013 and the challenges for the implementation of a collaborative wildfire management framework. Wildfire policies and legislation created since 2003 were collected and submitted to content analyses to identify the main resolutions and strategies for wildfire management and to explore the extent of community involvement and participation. Results suggest that since 2003 many changes were implemented in the system, setting a positive context for wildfire prevention. But these measures still reveal a low potential for community participation and empowerment towards wildfire risk. New models of risk communication and information sharing with communities that increase their involvement in the decision process are needed.

Keywords: *wildfire management, collaborative framework, wildfire policies, community.*

1. Introduction

Wildfires represent the main natural risk in Portugal. Since 2003 the territory has been affected by extreme wildfires which have consumed more than 1.2 million ha and destroyed and many tangible and intangible resources, including human lives. These great wildfires, with catastrophic features, highlight the need for reviewing the policies of wildfire management and to develop systematic actions to preserve forest, guarantee the security and increase resilience of communities (adaptative capacity) when facing wildfires. Therefore, following a tendency common to other countries such as the United States of America or Australia, where catastrophic wildfires are common, wildfire management strategies in Portugal are changing from a response based paradigm to a more collaborative/resilience oriented framework based on prevention and community participation (Pearce, 2003). After 2003 several changes were introduced in the national system for the defence of forest against wildfires, focusing in creating more resilient and safe territories. However, recent studies indicate that wildfire risk is still very high and that there is an urgent need to work on prevention issues and with communities: individual risk behaviours continue high and the collaboration of people/communities has been identified as one of the major factors to the success of the wildfire national policies (Viegas *et al*, 2012; Tedim & Paton, 2012). This paper analyses the main legislative and policy context of wildfire management framework in order to understand the changes that emerged following the 2003 wildfires and analyse at what extent these measures are favourable to the new paradigm based on prevention and community participation.

2. **Objectives**

The goal of this paper is to identify and analyse the main modifications in wildfire policies following the catastrophic wildfires of 2003. Specifically it characterizes the framework of wildfires management, from 2003-2013, identifying the main resolutions and strategies for wildfire management, and exploring the degree of community involvement and participation involved on it. Results highlight the legislative framework, its main principles and orientations, suggesting the challenges facing professionals and other stakeholders in the implementation of a more collaborative orientation within the wildfires management cycle.

3. **Methods**

In order to understand the main orientations of the policies following the 2003 wildfire catastrophic events legislative instruments (policies and legislation) focusing on wildfire management, between 2003 and 2013 were selected using wildfire as key-words and submitted to content analysis (Miles & Huberman, 1994). The data base of the national forestry services-ICNF (http://www.icnf.pt/portal/icnf/legisl/lex-flor/flor-incen-agric#dfci) which contains the majority of legislative documents connected to the Portuguese forestry sector, since 1901, was used. Legislative instruments (law, decree-law, resolution of the council of ministers and parliamentary resolution and ordinance, decree, order and legislative order) were selected on the basis of their aims and field.

3.1. **Data analysis**
The selected documents were integrally read and then submitted to content analysis (Miles & Huberman 1994) within the emergency management cycle framework (NFPA 1600) (Figure 1).
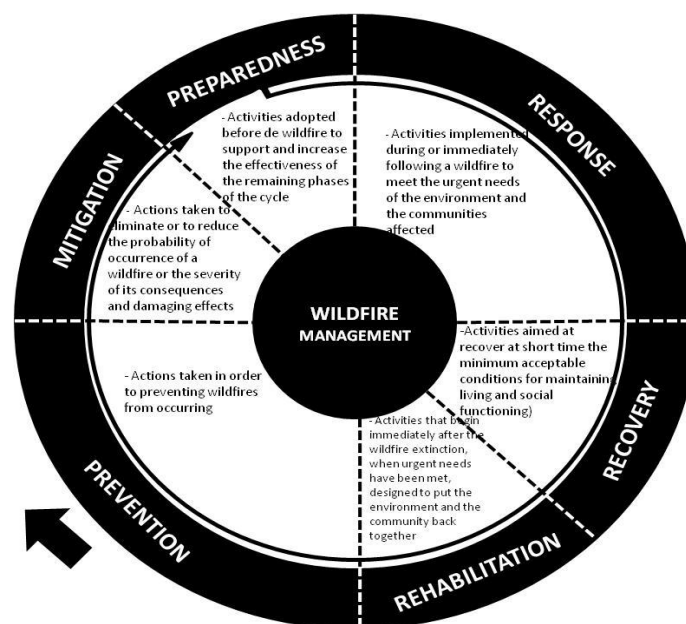

Figure 1. Wildfire Management cycle

The analysis aimed to describe and characterize the main features of the wildfire management framework: core themes, strategies used within the emergency cycle, amount of attention devoted to each of the cycle phases. Categorisation system was gradually refined by two independent judges. Each judge read the legislative documents and drew up a list of categories and subcategories based on the phases of the wildfire management cycle (Figure 1). The inter-judgment agreement score (number

of agreements / total number of agreements plus disagreements) was 80%; this reliability may be considered high (Miles & Huberman, 1994). A list of categories and sub-categories, which included definitions was produced (Table 2). Then the legislative documents were classified to the (sub)categories (judges were in full agreement) (table 3).

4. Results

4.1. Main topics/themes within the wildfire management cycle

Prevention /Mitigation is the most frequent topic within the Portuguese wildfire management cycle (Table 3). Forest management strategies (plans for sustainable management of wildfire hazardous areas at regional, local and operational level) are the most significant topics within this matter. Funding and support and the reinforcement of agents, organizations and human resources to work on prevention and mitigation actions were also underlined by the legislative instruments. Public education (focused on education to the correct use of fire and wildfire risk awareness) and prescribed burning are also present but are a lot less expressive.

Rehabilitation is the second most recurrent category (Table 3). Most common issues are support programs and funding to face the effects of wildfires, which emerged from a Disaster Declaration in August, 2003. Rehabilitation issues also emphasize operational/technical procedures (e.g. reforestation programs; harvest burned timber; control erosion; preserve water resources) to recover the burned areas, specially following the wildfires occurred in 2003-2006. The regulation of burned timber trade market was included but is less expressive.

Table 2. Themes and contents of wildfire policies and legislation: categories and subcategories within the emergency cycle

Category/	subcategory	Definition
Prevention/Mitigation: Reducing the chance of occurrence and the damaging effects of wildfires.	1.1. Forest management and planning strategies	Plans for sustainable management of wildfire hazardous areas (regional, local and operational level).
	1.2. Fuel management tools	Fuel reduction techniques (e.g. prescribed burning).
	1.3. Funding and support	Financial support (from European Community and fuel taxes) for prevention and education campaigns and plantation programs
	1.4 Reinforcement of agents, organizations and human resources. (prevention specialists)	Specialized entities and committees; specialized forest brigades; and volunteers programs.
	1.5. Public education/communication	Warning systems, definition of critical risk periods, reinforcement of the legal framework.
Response/Immediate Recovery: meeting the urgent needs of the environment/communities affected;	2.1. Reinforcement of human resources(combat specialists)	Special fire fighters; coordination between fire-fighters and civil protections agent in combat.
	2.2.Communication systems/technology	Communication systems to improve combat and the interaction/connection between entities involved.
	2.3. Special combat/response equipment	Special funding conditions to rent forest fire combat aeroplanes.
Rehabilitation: putting the environment and the community back together	3.1. Support programs (financial, social and operational)	Criteria for the attribution of financial support to repair the damages; special credit lines (preservation of pine and eucalyptus timber; *Quercus suber* plantations and cork extraction).

	3.2. Reinforcement of agents, organizations and human resources (Rehabilitation specialists)	Agents and procedures and to cope with wildfire consequences and recovery of burned areas (reforestation programs; harvest burned timber; control erosion; preserve water resources).
	3.3 Regulation of burned timber trade market	Creation and establishment of burned timber points.
System for forest defence against wildfires: setting the frame	4.1. General framework	Interventions related to the prevention and defence of forest against wildfires accomplished by the public entities and private agents (public education and awareness, conservancy and land use planning, forestry, surveillance, detection, combat and aftermath of wildfires).

Response/Immediate recovery is the third category (Table 3). Most frequent issue within this topic is the reinforcement of organizational and human resources involved in combat. It centres on the coordination between national forestry services, the national civil protection services and the law forces in combat scenarios and in the specialization of professionals to work on the field (fire-fighters, law forces, forest workers and fire specialists). The allocation of special services, like combat aeroplanes and the acquisition of communication systems are also contemplated.

System for forest defense (general framework) is the fourth general category (Table 3). It contains documents related to the definition, implementation and adjustment of a National Wildfires Defense System, which were publicized in the immediate sequence of the great wildfires (years 2004, 2005, 2006).

Table 3. Classification of the fire policies and legislation on the themes (categories and subcategories) between 2003 - 2013.

Categories/subcategories	%
1.Prevention/ Mitigation	66,2
1.1. Forest management and planning strategies	22,1
1.2. Fuel management tools	2,6
1.3. Funding and support	15,6
1.4 Reinforcement of agents, organizations and human resources. (prevention specialized)	15,6
1.5. Public education/communication	10,4
2. Response/Immediate recovery	9,1
2.1. Reinforcement of human resources(combat specialists)	5,2
2.2. Communication systems/technology	1,3
2.3. Special combat/response equipment	2,6
3.Rehabilitation	19,5
3.1 Support programs (financial, social and operational)	11,7
3.2. Reinforcement of agents, organizations and human resources (Rehabilitation specialists)	5,2
3.3 Regulation of burned timber trade market	2,6
4. System for forest defence against wildfires (general framework)	5,2
Total	100

5. **Discussion**

5.1. **General framework of the wildfire management (context)**

The results of this study suggest the embracing of two major topics for wildfire management in Portugal: prevention /mitigation and rehabilitation. Together both areas integrate nearly 85% of all legislative publication, mostly issued between 2003 and 2009. This seems to point out to a turning point on the wildfire management framework, towards a more preventive/resilience orientation. However recent data evidence that funding and financial support continue to reinforce response and combat over prevention. Decision makers centre the discussion on prevention vs. response, dismissing other phases of the emergency management cycle, namely preparedness (Figure 2). Moreover, nonetheless the results suggest that public policies put an emphasis on rehabilitation the guidelines of the legislative instruments are not being successfully imported and transferred to those who implement recovery actions on the field.
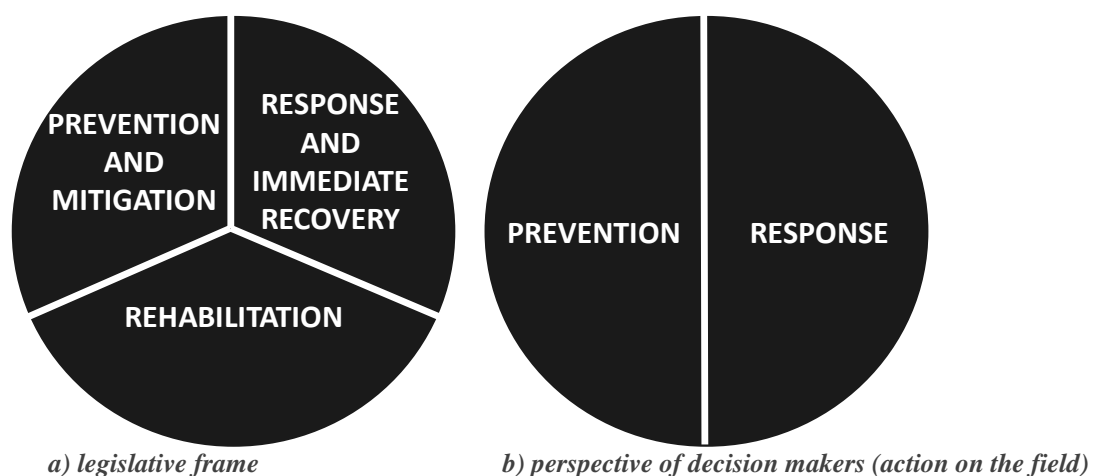

a) legislative frame   *b) perspective of decision makers (action on the field)*

Figure 2. Features of the wildfire management framework:

Therefore, recent studies and reports continue to point out to a deficit on prevention, structural problems connected to individual property and land use (large areas of abandoned or unattended lands with unmanaged or inadequately managed flammable vegetation), individual risk behaviours (high number of human-caused ignitions) and to the need to persist on community involvement and participation (Tedim & Paton 2012; Viegas *et al* 2012).

5.2. **Community involvement and collaboration (challenges)**

Content analysis suggests that the degree of community involvement and collaboration provided by Portuguese policies for wildfire management is still low. The contents analysed referred mainly to education and risk communication based on the diffusion of general information (e.g. pamphlets, media advertisements) and to the increase of the legal framework as an instrument of regulation (define what to do and how to do in a top-down orientation).

These measures represent passive forms of communication that fail to address the diversity of needs and expectations within a community and also fails to engage people in ways that facilitate their ability to make decisions (Prior & Paton, 2008). They share the assumption that providing the public with information on wildfires and the protective measures to prevent it will automatically translate into preventive behaviours, which is a wrong assumption (Paton 2003). Behaviour change in wildfire risk situations demands for the active engagement of community members within the risk communication process and the use of interactive risk communication procedures. Professionals and agencies connected to wildfire management should act as facilitators or consultants to communities rather than directing the change process in a top down manner. One possible approach would involve invite

representatives of community groups and stakeholders to review wildfire scenarios in regard to the potential challenges, opportunities and threats they could pose for each group.

Another important dimension of participation is related to the sharing and construction of knowledge between people and specialists (Callon, Lascoumes & Barthe 2001). Results suggest that the framework gives a great emphasis to the specialization of human resources (creating specialists) but less to the acknowledgment and integration of local knowledge. Within these circumstances people tend to rely on the action of the specialists, placing the responsibility of change on their shoulders and disconnecting from the field (Patrão 2010). This is important because such an orientation has the potential to increase the sense of conflict, rivalry and distrust that historically has been characterizing the relationship between the sate and the communities within the forest management (Soares e Oliveira 2006; Mendes & Tavares 2009). Community participation requires the use of strategies to promote the articulation between the scientific community, the political actors, professionals and the citizens (Mendes & Tavares 2009). Socially Fire Regimes framework (Goldstein & Hull, 2008) represent an innovative intervention on this subject.

6. **Conclusions**

Since 2003, Portugal has implemented many (and mainly positive) changes in its wildfire management program. However the framework for action includes only three (3) of the six (6) steps of the emergency management cycle, developing in a triadic structure around mitigation/prevention-response-rehabilitation, mainly in a mandatory and directive orientation (top-down). Moreover giving their structural features, many of these changes are still maturing and may take several years to bear fruit. This is special relevant in the process of community collaboration.

The framework is in a period of transformation and transition between paradigms: the system aims at a more collaborative stance but remains trapped in a top-down orientation. It demands new forms of communication, networking and deliberation to foster learning, transform values and cultivate new identities among the communities, the fire professionals and specialists (Goldstein & Butler 2012). It is necessary to develop a culture that embraces the value of empowering communities.

This exploratory study highlighted the legislative framework of the wildfire management in Portugal, its main principles and orientations, summarising some of the obstacles professionals and other stakeholders are facing in the implementation of a more collaborative wildfire management framework.. Future studies are needed to study people (communities) and fire professionals´ attitudes towards different risk communication techniques and to deepen the knowledge about collaborative processes in wildfire management, namely through action research methodology.

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