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Towards rural development and bioeconomy integration into wildfire risk reduction and civil protection strategies

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Abstract

Pyrosilviculture and understory fuel management to reduce forest stand and landscape flammability represent loss-making interventions from an economic point of view. Consequently, prevention is carried out above all on public property and with public funds (e.g. Rural Development Programs), while the interest of the private individual for prevention interventions on aggregated areas is limited. These shortcomings do not allow to reach the distribution and the quantity of treated surface necessary to modify the fire regime and its impacts.

To solve this problem, we need initiatives that catalyse the interests of multiple stakeholders (economic actors, bodies responsible for territorial management and research, fire-fighter agencies) towards common goals. Moreover, we need to improve the cost-efficiency ratio of prevention through value-chains of products and services generated by preventive measures (e.g. payments for positive externalities and ecosystem services). Within the European project PREVAIL (PREVention Action Increases Large fire response preparedness) we analysed collaborative processes in the Mediterranean Basin between private and public actors that developed "smart solutions". Different sources of funding, including non-specific funds for prevention, offer additional economic resources to support preventive value-chains (e.g. RDP funds for agro-pastoral and forestry development, LIFE funds for habitat conservation, private investments, PES mechanisms). This paper analyses the key elements that characterise smart solutions for wildfire risk prevention in Southern EU: sustainability, cost-benefit ratio, synergies between sources of financing, inter-sectoral cooperation and integration between strategic prevention planning and multiple land governance objectives, innovation and knowledge transfer, and adaptive approach. A selection of solutions documented by the PREVAIL project and replicable in other contests will be presented and discussed.

1. Introduction

In recent decades in Europe there has been an increasing emphasis on multi-objective policies in fire risk management, integrating prevention, preparedness, response and recovery activities (Rego et al., 2010; Bacciu

et al., 2022). This allows for holistic territorial planning (Moreira et al., 2020), working more on the causes and promoting fire-smart territories (FST) (Tedim et al., 2016, Fernandes, 2013).

Fire risk prevention is pursued at European level with several strategies implemented by the European Commission, which contribute widely to building fire-smart territories by converging multiple objectives, e.g. Bioeconomy Strategy, LIFE programme, the EU Climate Change Adaptation Strategy and the Forestry Strategy. All of these are included in the Green Deal objectives, which allows for a synergistic approach to act on fire prevention in multiple aspects. Additional incentives for fire prevention can be provided through the Rural Development Programmes (RDPs). At the same time, active prevention have been promoted by an increasing number of local-scale initiatives especially in southern European countries. These noteworthy initiatives are characterised by the ability to adopt sustainable fuel management programmes and nature-based solution in a smart way, benefiting from policy instruments to functionally act on fire prevention with bottom up projects (Varela et al., 2020; Colonico et al., 2022). In this study, the most relevant initiatives based on management of fire prone territories were identified to define sustainable landscape-scale fuel management models for southern Europe and practical solutions for fire prevention at local level.

2. Selection and description of fire prevention initiatives

Noteworthy fire prevention initiatives were analysed in Greece, Italy, Portugal and Spain, given their particular susceptibility to fire (Moreira et al., 2020) and the high number of forest fire prevention programmes at local and regional scales (Varela et al., 2020). Data were collected through a survey filled in by the managers of the individual initiatives. The initiatives were analysed using five key criteria for the construction of FST (Tedim et al., 2016): (i) sustainability, (ii) cost efficiency in risk reduction, (iii) synergies and cooperation, (iv) knowledge exchange and transfer, and (v) adaptive management. Each initiative was assessed according to its "readiness degree" in the different fields of sustainable fire prevention, considering both its local potential and its ability to create synergies at European level. Finally, on a sub-sample of the initiatives, economic feasibility, stakeholder involvement, the legal framework and social and environmental awareness were assessed, showing strengths and weaknesses through a SWOT analysis.

Thirty-eight initiatives were identified in the four countries under analysis, distributed mainly in Spain (17 initiatives - 45%) and Portugal (11 initiatives - 29%), followed by Italy (7 initiatives - 18%) and Greece (3 initiatives - 8%). Most of these initiatives are implemented by public agencies (60%), financed largely by the Life Programme and Rural Development Programmes (RDPs), followed by initiatives with private investment. Most initiatives are characterised by being mainly related to Direct and Indirect fire prevention, with half of them focusing on Preparedness as an important step in disaster risk management. The initiatives were then evaluated according to their representativeness in each of the 5 evaluation criteria (from "Not at all represented" (0) to "Totally represented" (4)), creating a ranking that allowed for the identification of the most represented criteria and the most comprehensive solutions.

3. The fire-smart solution model

Through the analysed initiatives it is possible to build a general model for the creation of sustainable fire risk prevention programmes in southern European countries, based on some key elements useful for building smart solutions and planning fire resistant and resilient landscapes (Fig. 1).

Some of the fire smart solutions identified are based on the short supply chain as an added value to fire prevention, enhancing products through a label that certifies fire prevention activities. In fact, certification is a powerful tool at local, national and international level to recognise the multiple purposes of these initiatives, maximising cost-efficiency and producing socio-economic services (Varela et al., 2018). Fire prevention must also be recognised as a true ecosystem service, given its multiple roles in different social sectors and the importance of being integrated into territorial governance. Indeed, fire prevention is an essential tool for the creation of resilient and fire-resistant landscapes, which goes hand in hand with biodiversity conservation, water supply, mitigation of other natural hazards, landscape aesthetics, civil protection of infrastructure and local economic development. Another element that contributes to the fire smart solutions definition is the ability to create synergies between local development and international support, giving space for wide-ranging projects

(Proença, 2019). Finally, it is very important to consider the available knowledge on fire risk management at the time of planning functional local activities.

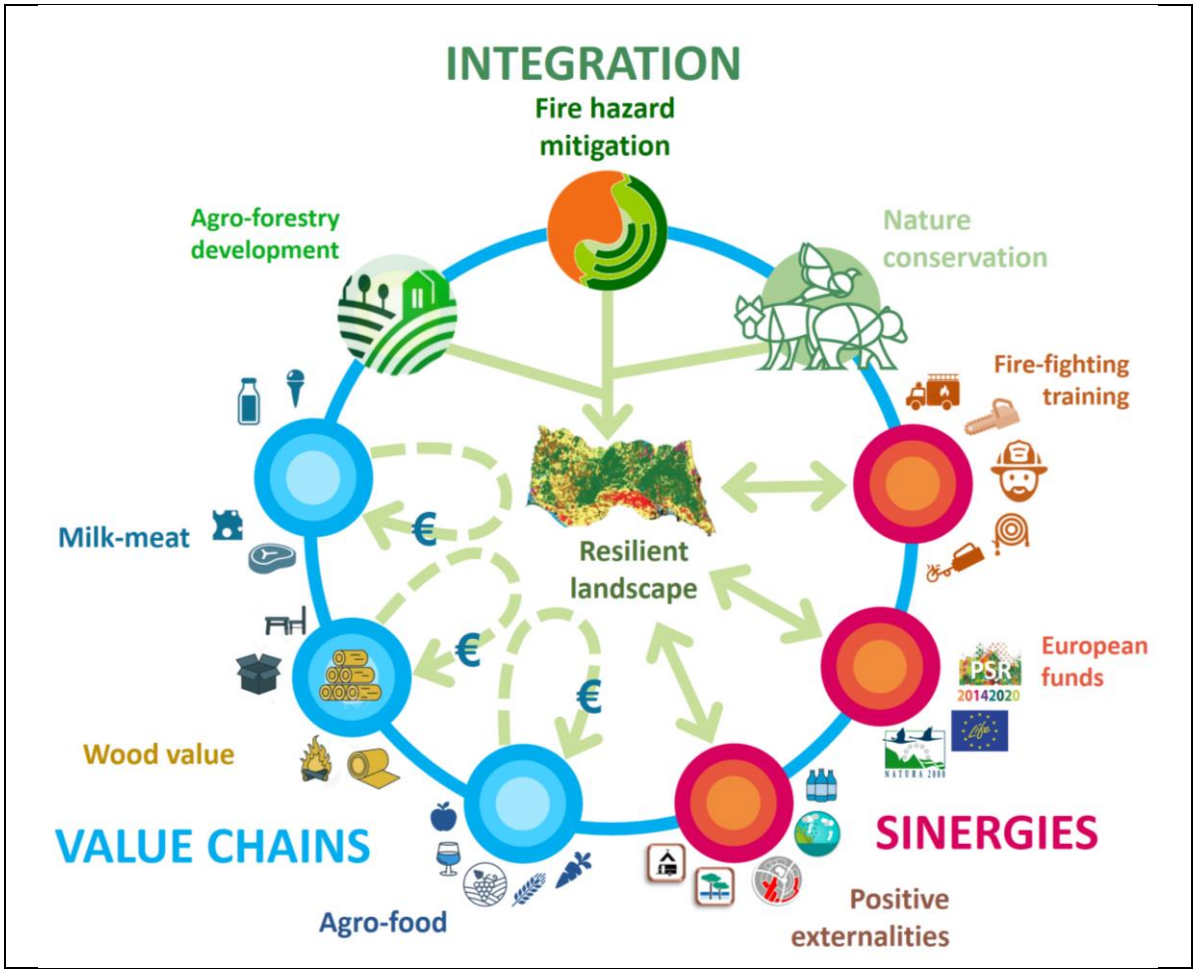

Figure 1 - Key emerging components that characterizes a smart-solution for wildfire risk prevention

4. Prospects for smart solutions replication under the EU Green Deal

The smart-solution model proposed here (Fig. 1) finds with the Green Deal the perfect opportunity to be implemented, acting on forest fire prevention at multiple levels to achieve objectives at the landscape and territory scale. The projects' continuity is also ensured by medium-long term incentives, being able to count on long-lasting projects to manage fire prone landscapes in the future. The ability to involve multiple actors and agencies is a further strength, addressing the European objectives of cooperation and transdisciplinarity and creating local networks essential for managing the territory as a whole (Rego et al., 2018). The fire smart solutions model we propose can also be of inspiration for the creation of calls and projects related to fire prevention funding at European level, being able to identify the key points of local interest, creating per example multi-measure calls for integrated territorial projects in high wildfire risk areas. These types of calls allow the convergence of multiple actors with different goals and objectives, which, with the right policy-management framework, can be able to create complex projects able to manage the territory in a holistic way and include fire risk mitigation.

5. Conclusions

Dealing with extreme fires requires interfacing with many areas simultaneously, such as the environmental and socio-economic factors (Ascoli et al., 2021; Fernandes, 2013; Tedim et al., 2018; Wunder et al., 2021). Indeed, to contain fire effects, it is necessary to adopt multi and transdisciplinary strategies that include the different components at stake (Tedim et al., 2016, Varela et al., 2020).

The smart-solution concept for fire risk management offers a framework to be applied at the local level by being able to take advantage of European tools to achieve its objectives. Their implementation at a local level and replication at a European scale is only possible through close communication between initiatives and institutions involved in fire risk and land management, including communities in a mutual exchange of good practices.

In conclusion, fire smart solutions are a concrete example of implementing the Green Deal locally in disaster risk management. The fundamental criteria of the fire smart solutions presented here derive from a direct exchange with local realities and define the most important aspects to create functional networks for fuel management. These criteria should be considered in the creation of future public funding calls for fire prevention projects, allowing a broad involvement of public and private actors to build solutions adapted to the real needs of marginal territories.

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