

Report of the Working Group on:

**FOREST FIRES:
NEW PARADIGMS BETWEEN PREVENTION, MANAGEMENT AND RECOVERY**

31st January 2022

Academy of Georgofili
Italian Academy of Forestry Sciences

1 - Introduction

On January, 31st, 2022, the Academy of Georgofili and the Italian Academy of Forestry Sciences jointly organized a study day, entitled 'Forest fires: new paradigms between prevention, management and recovery'. The aim of the meeting was to explore the possibility of a change in approach, moving from a purely reactive approach to a proactive one, in which prevention occupies a prominent place and can usefully act to reduce the likelihood of extreme fires occurring.

In recent years mass media have spread dramatic images of uncontrollable, repeated disastrous wildfires. These are certainly extreme fires or extreme wildfire events (EWE): pyro-convective phenomena, characterized by FLI (fireline intensity, measured in kilowatts per meter, kWm^{-1}) $> 10,000$, ROS (rate of spread) $> 3\text{kmh}^{-1}$, spotting distance and onset of secondary fires, triggered by wind-borne sparks and embers, $> 1\text{km}$. These wildfires represent about 10% of the total number events that normally occur, but they account for 90% of the area burned. In the near future they are projected to be the new normal, as unfortunately shown by numerous studies.

2 - Are our firefighting institutions effective against such events?

The answer is: in the presence of EWE, even with the most advanced technology and equipment, including aircraft, firefighting institutions cannot control them. The type of defense against wildfires, in Italy as in any country with wildfire problems in rural areas, is typically reactive, an emergency response. It operates quite effectively on wildfires with fireline intensity values of up to $4,000 \text{kWm}^{-1}$, with increasing difficulty and a high percentage of failures in the interval from $4,000$ to $10,000 \text{kWm}^{-1}$, without any success beyond the control capacity threshold value, internationally accepted in a fireline intensity value of $10,000 \text{kWm}^{-1}$, which is too low if we consider that EWE can reach intensity values of the order of $150,000 \text{kWm}^{-1}$.

The aircraft that in many countries, such as Italy, are available to firefighting organization (air tankers for waterbombing and firebombing such as Canadair, heavy and medium-sized helicopters, small agricultural aircraft, such as Air tractor or Dromader) do not change the situation, since aircraft operate with increasing difficulty up to values of $3,000$ ($5,000$) kWm^{-1} and no more, according to the very few data in literature.

3 - Rationale for a paradigm shift

For fire line intensity values from $10,000 \text{kWm}^{-1}$ onwards, it is not possible to resort to traditional firefighting: the current paradigm of suppression must be overcome with strategic preparation of the territory, to make it less prone to the risk of fire, moving from a purely reactive approach (i.e. based on immediate reaction or response to the onset of an event) to a proactive approach, i.e. based on prevention.

The paradigm shift calls for a greater emphasis on prevention, which complements but certainly does not eliminate the suppression paradigm, but rather enhances and strengthens its operational capacities.

4 - Paradigm shift hypothesis

Supranational institutions, such as the European Commission (2018, 2020), have come out clearly in favor of the paradigm shift, that has long been suggested by the research community. The new paradigm is identified in the concept of coexisting with fire, whose guidelines are:

- allocating more funds to prevention, which today appears to be a residual activity, by shifting the distribution of funds so that it accounts for at least 60% of the firefighting budget;
- recognizing, accepting and utilizing the beneficial aspects of fire (prescribed fire, backfire, tactical fire, suppression fire);
- using the concepts of resistance, resilience and vulnerability.

Prevention currently almost predominantly consists of one-way communication, such as: prescriptive decrees, imposing bans and restrictions on use, and propaganda which, while welcome, do not capture the complexity of the concept of prevention, which encompasses a wide range of actions and interventions such as:

- building infrastructures (e.g. watchtowers/lookouts and wildfire detection and monitoring systems, trails and forest roads, helicopter landing sites, water supply points, firebreaks and fuel breaks of various widths);
- initiatives (e.g. preventive silviculture; recovery of TFK, traditional fire knowledge; involvement and empowerment with formation, information and training of local populations, interventions aimed at enhancing resistance and resilience and reducing the vulnerability of settlements (e.g. Firewise Communities)

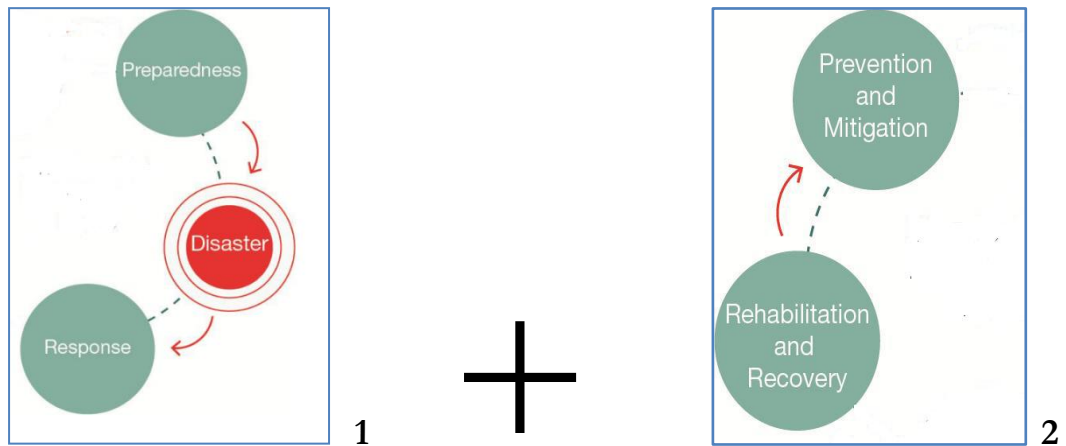
5 - The Fire Smart Territory concept

In view of the above, the recent planning concept called Fire Smart Territory (FST) is interesting: at a territorial level, it proposes actions and interventions that act synergistically both on the human component (which cannot limit itself to inertly and passively assisting extinguishing interventions, which are often inadequate compared to the characteristics of the fire in progress), and on the physical component, i.e. the territory, activating interconnected actions that have the function of reducing the expected intensity of any fire. Reducing the expected intensity is based on a general reduction in the fuel load present in the intervention area, to be implemented in area treatments instead of linear treatments (fuelbreaks, ploughed strips).

The intervention methods require the use of different and additional professional skills to those that have so far managed firefighting, such as experts in social sciences, especially sociology and anthropology, since the desired paradigm shift involves people and populations at risk, also having to face difficult operational choices, such as the possible evacuation of inhabited settlements.

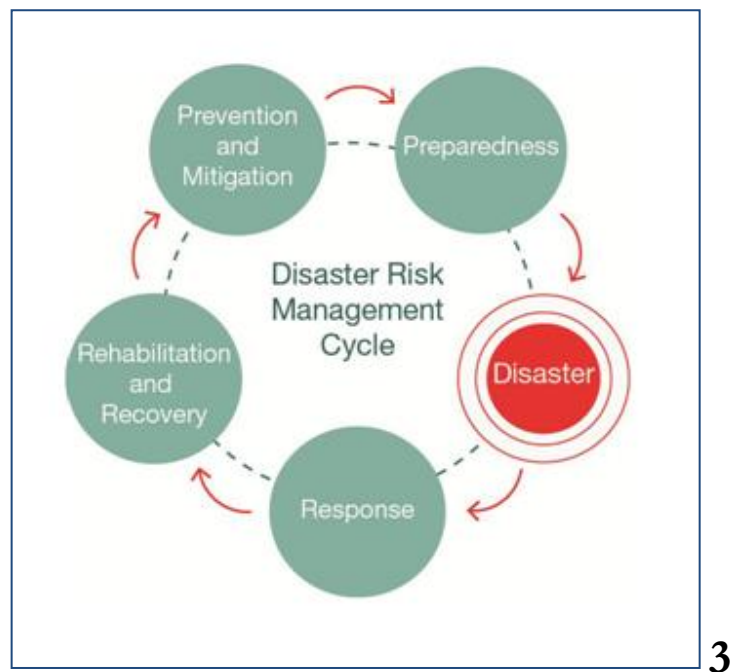
Another area in which the social sciences are fundamental is in the detailed analysis of the causes of wildfires, to be carried out at national level. It is strange to attempt to contain a phenomenon which is clearly worsening, without a precise and reliable knowledge of its causes, 95% of which are anthropogenic. The lack of knowledge about the causes of wildfires still exists, and these risks thwarting any serious attempt at prevention based on changing the behavior, attitudes, habits, custom, emotions and mores of people living in areas at risk.

The concept of paradigm shift



1 The **suppression paradigm**: an incomplete risk reduction cycle: only preparedness and response phases are present. A typically reactive approach.

2 The prevention paradigm integrates the reactive approach with two crucial phases: **prevention and mitigation** and **rehabilitation and recovery**, respectively acting before and after a wildfire event



3 The **prevention paradigm**, integrating the four phases. It complies with the risk reduction cycle standard

Images adapted from Franciosi et al. Participatory process for Civil Protection planning as a tool for a long perspective in Disaster Risks Reduction. International Conference Life Franca.Trento 21-22 October 2019.https://www.lifefranca.eu/wp-content/uploads/2019/10/15_Participatory-process-for-Civil-Protection-planning.pdf