Forest fire fighting in Sardinia

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Introduction.

Today, the prevention and management of forest fires is not only a technical problem but above all – due to the impacts on human systems – a social one.

1) Wildfires produce in Sardinia approximately 400,000 tons/year of GHG, half of which is CO2. [1,2]

Structural prevention of agro-forestry sectors is a key factor for adequate safety also of urban settlements and scattered rural ones; an **improvement in the organisational network** in the direction of a common, **shared and standardised method** as far as possible would allow for greater effectiveness in interventions, reducing the damage to people, their property and the natural environment.

Ultimately, improving a system of "management" of fires and not simply of "fighting fires".

[1] AA.VV. "Estimating annual GHG and particulate matter emissions from rural and forest fires based on an integrated modelling approach" in Science of the Total Environment, Elsevier,2023, https://doi.org/10.1016/j.scitotenv.2023.167960

[2] In "Modelling Fire Behaviour and Risk," Proterina C, Alghero 2011 ISBN 978-88-904409-7-7

The adoption of a **shared method** (languages, protocols, typology of intervention groups) would enable the **interchangeability** of experiences and mutual contribution in the event of emergencies of a supra-regional or international exchanges. (see recent ITA EU Modex 2025)

Unfortunately, the Sardinia Region does NOT have an organic law for the prevention and fight against forest fires

Sardinia has addressed the issue with amendments to general laws (financial and similar).

We cite for example L.R. 3/1989 on civil protection and subsequent amendments.

The latest is L.R. 8/2016, which actually anticipated the T.U.F.F. but regarding the fight against fires it refers simply to the Regional Plan

National and Regional synoptic law framework

Reference laws	TUFF	L.155/21	L.R.8/16
Actions (Regional scale)	Regional forest program	Coordination between forest plans and prevention plans	Regional Forest Plan
(Country scale)	Landscape oriented plans	idem	Landscape oriented plans
(Local scale)	Municipality plans	idem	Detailed plans

Wildfires are changing - to change our vision it's a must

Table 3. Wildfire events classification based on fire behavior and capacity of control.

	Fire Category	Real Time Measurable Behavior Parameters			Real Time Observable Manifestations of EFB				Type of Fire and Capacity of Control *
		FLI* (kWm^{-1})	ROS (m/min)	FL (m)	PyroCb	Downdrafts	Spotting Activity	Spotting Distance (m)	
Normal Fires	1	<500	<5 [a] <15 [b]	<1.5	Absent	Absent	Absent	0	Surface fire Fairly easy
	2	500–2000	<15 [a] <30 [b]	<2.5	Absent	Absent	Low	<100	Surface fire Moderately difficult
	3	2000–4000	<20 [c] <50 [d]	2.5–3.5	Absent	Absent	High	≥100	Surface fire, torching possible Very difficult
	4	4000–10,000	<50 [c] <100 [d]	3.5–10	Unlikely	In some localized cases	Prolific	500–1000	Surface fire, crowning likely depending on vegetation type and stand structure Extremely difficult
Extreme Wildfire Events	5	10,000–30,000	<150 [c] <250 [d]	10–50	Possible	Present	Prolific	>1000	Crown fire, either wind- or plume-driven Spotting plays a relevant role in fire growth Possible fire breaching across an extended obstacle to local spread Chaotic and unpredictable fire spread Virtually impossible
	6	30,000–100,000	<300	50–100	Probable	Present	Massive Spotting	>2000	Plume-driven, highly turbulent fire Chaotic and unpredictable fire spread Spotting, including long distance, plays a relevant role in fire growth Possible fire breaching across an extended obstacle to local spread Impossible
	7	>100,000 (possible)	>300 (possible)	>100 (possible)	Present	Present	Massive Spotting	>5000	Plume-driven, highly turbulent fire Area-wide ignition and firestorm development non-organized flame fronts because of extreme turbulence/vorticity and massive spotting Impossible

Note: [a] Forest and shrubland; [b] grassland; [c] forest; [d] shrubland and grassland; *FLI classes 1–4 follow the classification by Alexander and Lanoville [125].

Tedim et al. *Fire* **2018**, *1*, 9; doi:10.3390/fire1010009 www.mdpi.com/journal/fire

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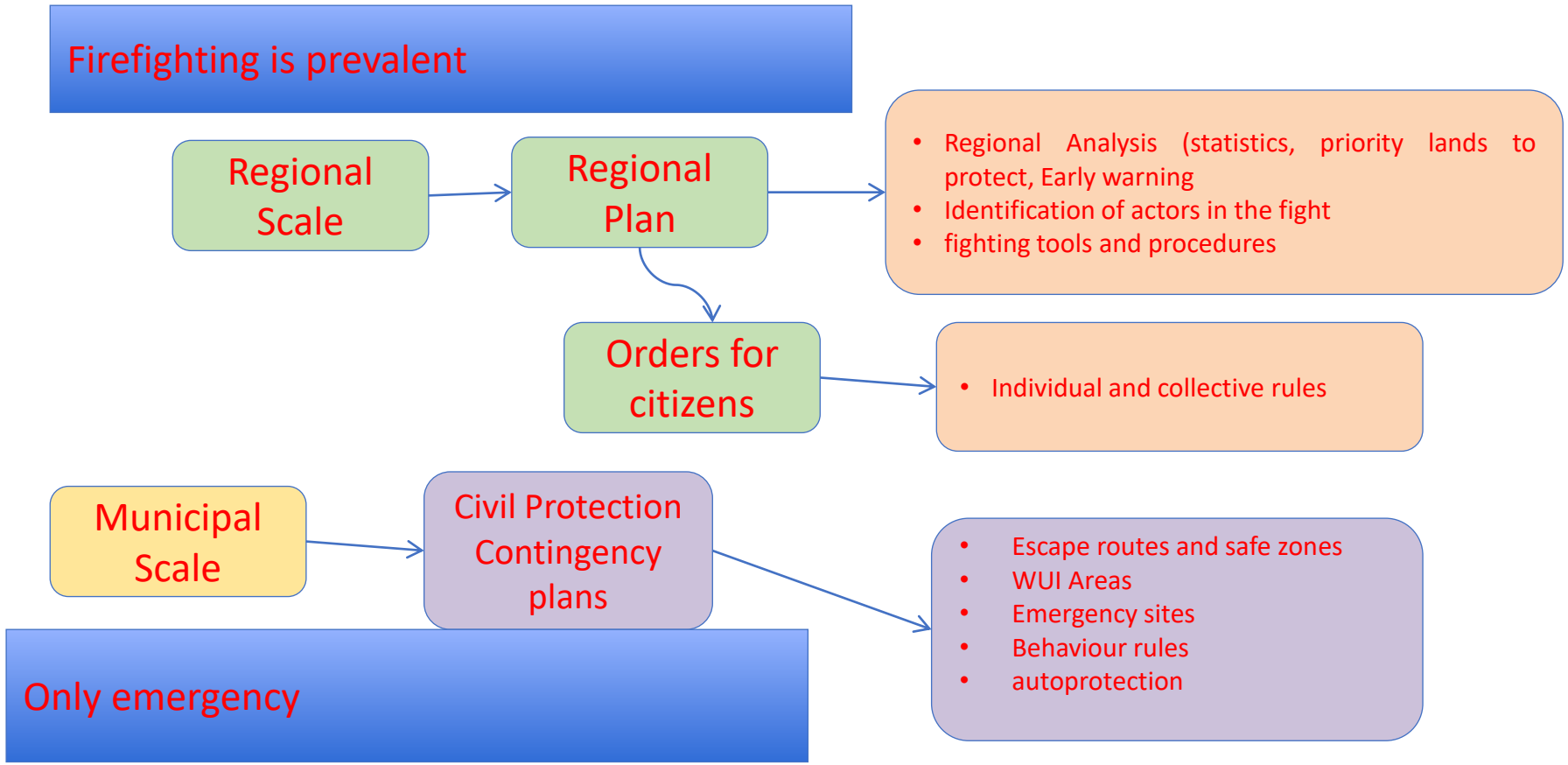
Montiferru wildfire:
Crown wildfire, wind driven and/or plume driven
Spotting plays a relevant role
Caotic propagation e (downdraft, PyroCb)
impossible to extinguish

General Scenario of Firefighting regional plan and Contingency Municipal plans

As is:

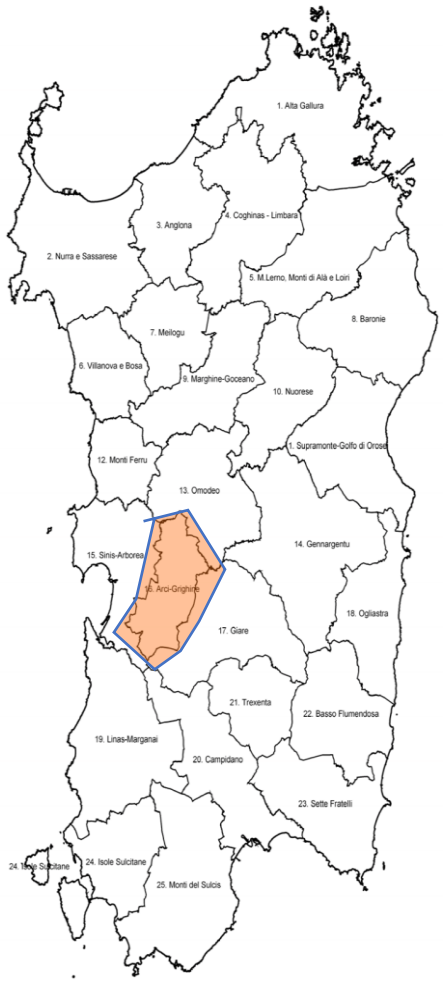


Landscape planification

The unique example

Only a little number of municipalities are planning their forest land (Macomer, Ala dei sardi)

Fig. 25.5 Carta regionale dei distretti forestali.

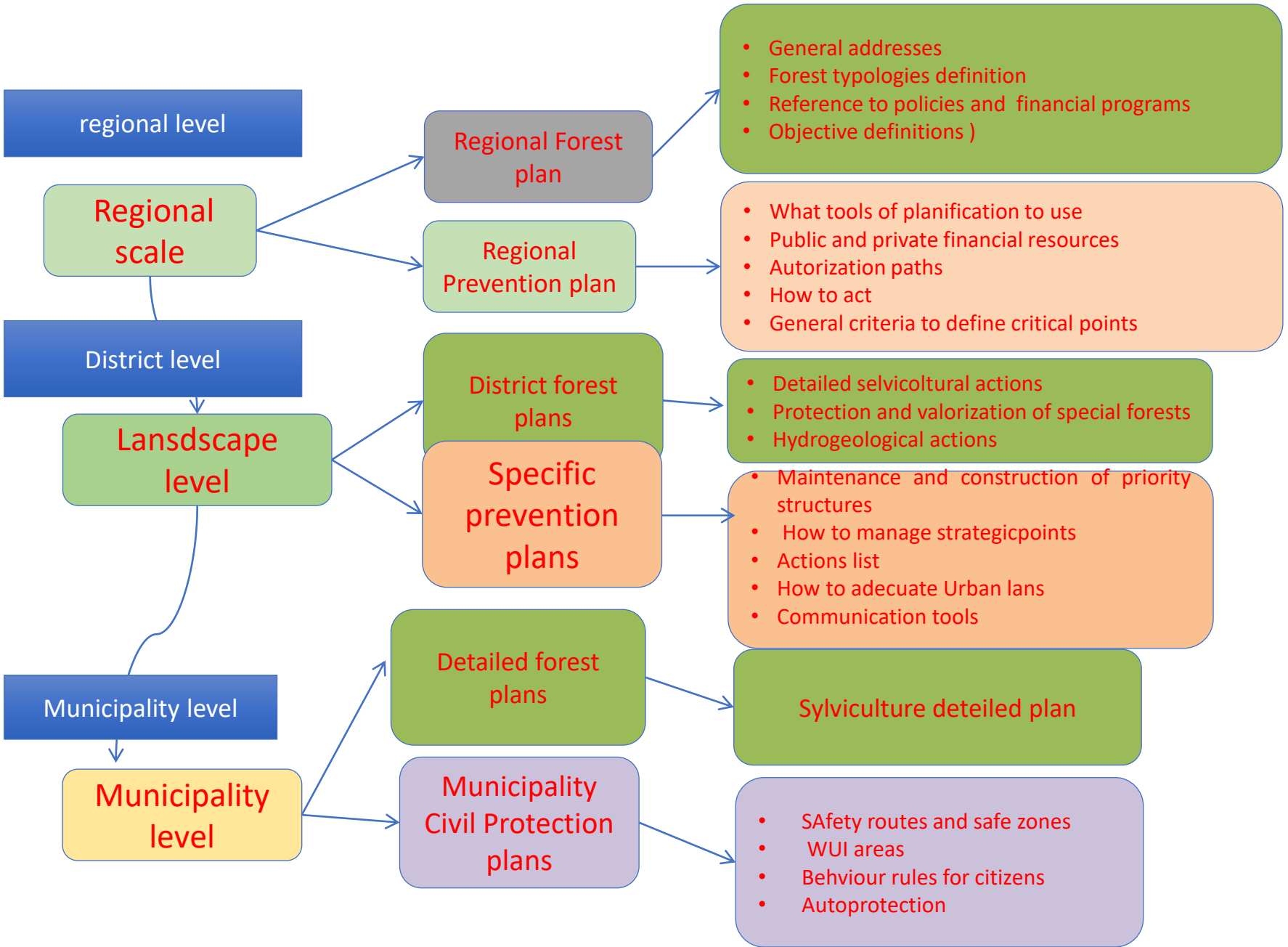


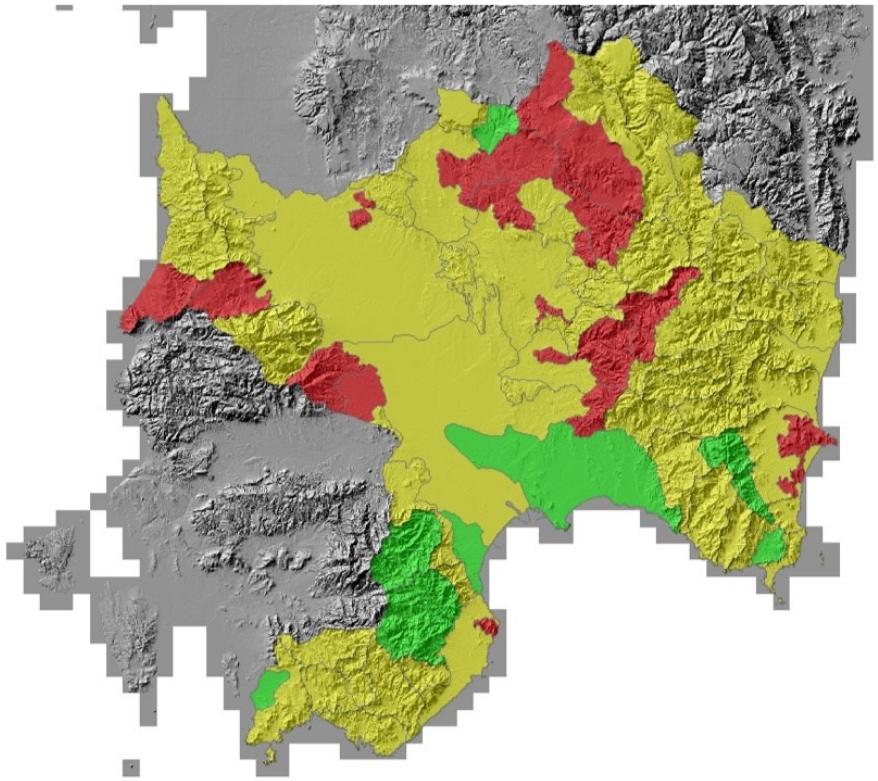
-**Local communities aren't involved in structural planning**
(only contingency plans are actived in case of sudden emergency)

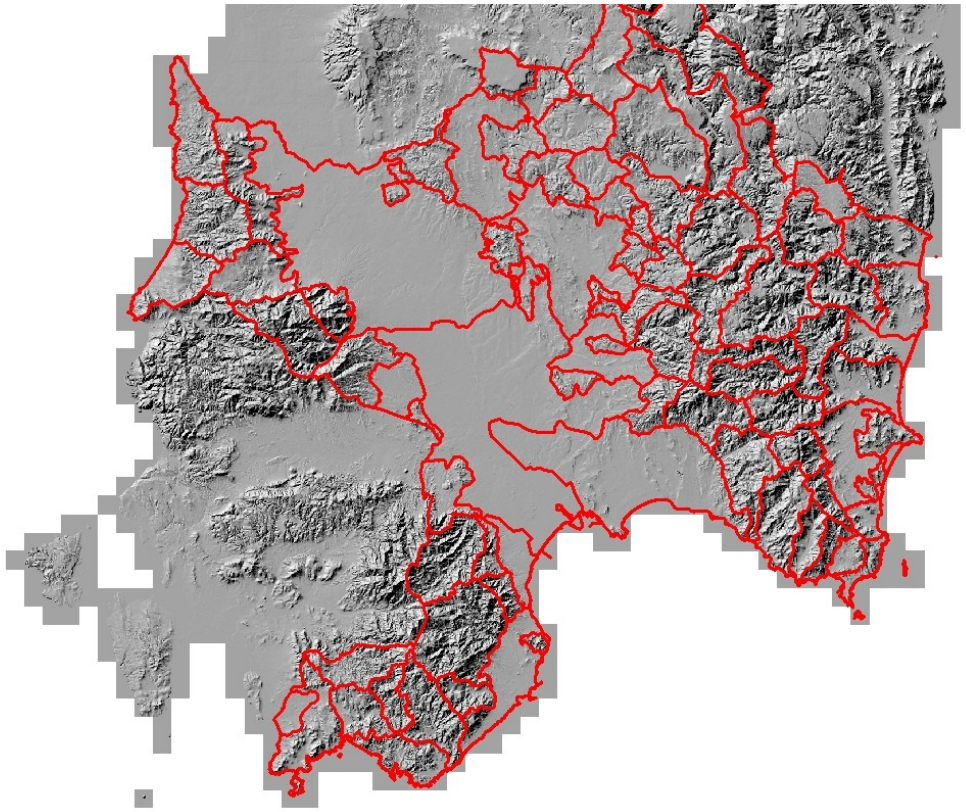
Integrated Coordination of forest planning and wildfire prevention at regional, distretto, locale prevention is not active

- **Effective actions of rural and land development are not linked to wildfire prevention**

As it should be:







Knowing our fire history it's possible

(Different kind of wildfire are essential to an effective response)

•**initial attack**, tipe a) slow propagation, weak intensity, local crews could attack rapidly

•**extended attack** tipe b) rapid propagation, medium intensity, aerial support needed

•**extended attack** tipe c) high propagation and intensity, strong aerial support needed
•and local activation of Advanced Command Post and municipal Civil protection Center.

•**extended attack** tipe **d)** WUI is under threat; evacuation procedures are needed
Advanced Command Post assumes the **Unified Command** modality

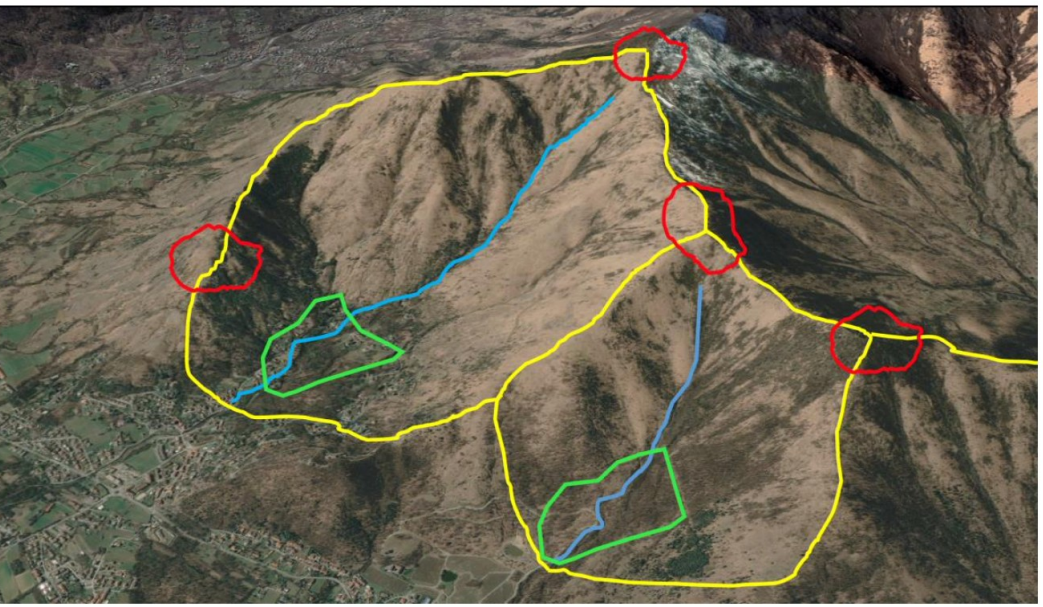


Figura 5. Esempi di nodo di impluvio (verde) e nodi di cresta (rosso) da trattare per ridurre l'infiammabilità e le probabilità di incanalamento delle fiamme lungo l'impluvio (in azzurro la linea di impluvio), e per evitare la moltiplicazione dei fronti di fiamma in più bacini (evidenziati in giallo).

«"**Strategic management points**" are the areas on which targeted structural prevention actions should be carried out during the planning stage (prescribed grazing, prescribed burning, community gardens and other associated agricultural activities, firebreaks, etc.) in order to interrupt the possible paths of fire propagation.

*"**prescribed fire**", the expert application of fire on planned surfaces, through the use of personnel specifically trained in the use of fire and by adopting previously defined prescriptions and operating procedures as specified in L. 155/21*

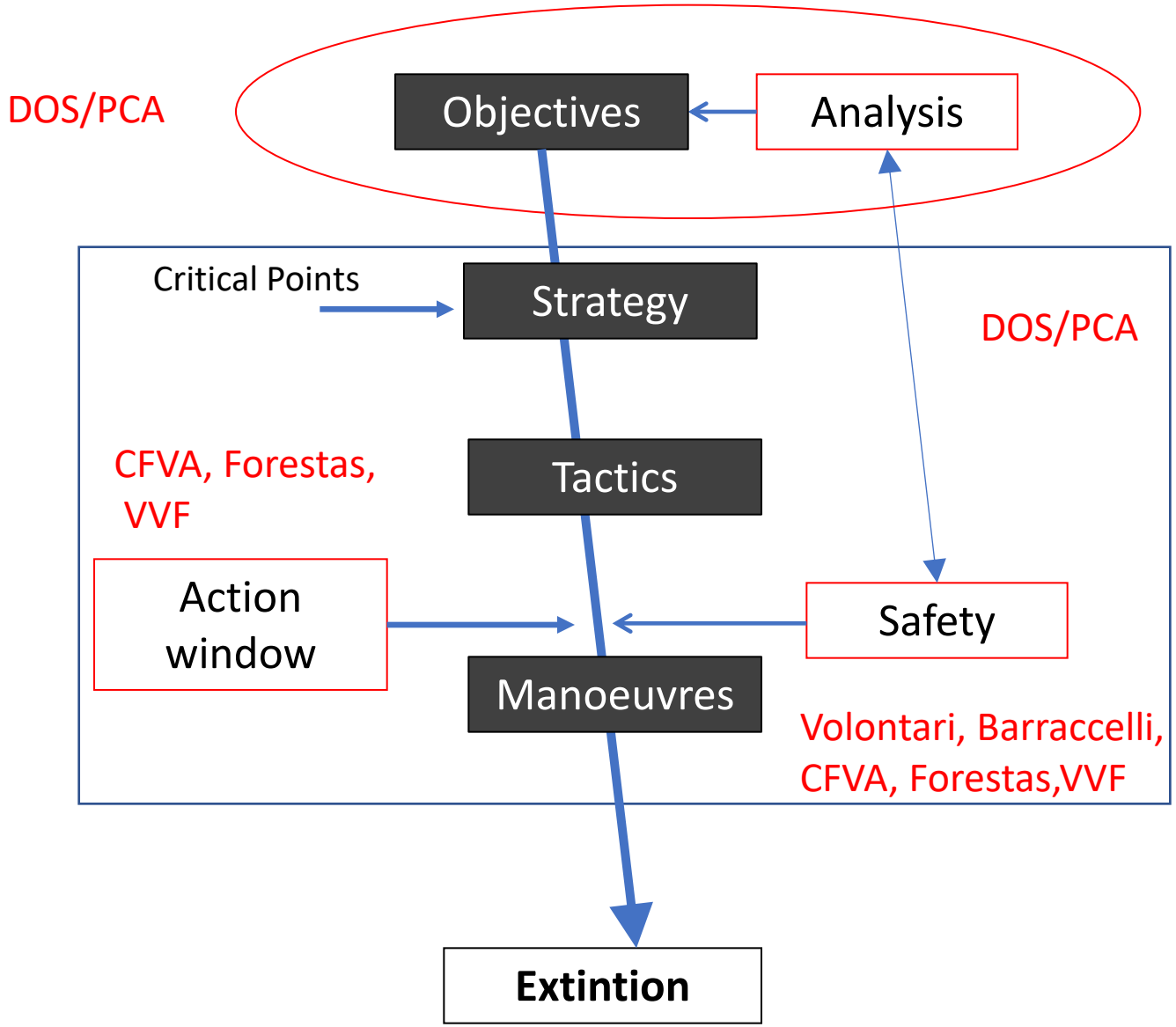
In the video GAUF-CFVA (Mastros de fogu) intervention to realize a firebreack n Mandas (CA)

“Backfire”, the technical use of fire through the use of personnel specifically trained in its use during fire attack and extinguishing operations;

As best Practices is needed a "**Fire Prevention Mark**” for the support of marketing in favour of economic activities agro-forestry carried out within the strategic management points and in general as planned actions to reduce the fuel load, such as **prescribed grazing**, **viticulture**, **horticulture** etc.

Figura 8. Nucleo aggregato e rispettive fasce di protezione: fascia perimetrale del centro abitato (in blu), la fascia di protezione dello spazio urbano (arancione) e la zona buffer (verde).

Is needed also a complete **Urban planning** to prevent WUI Risk


DOS/PCA
Objectives
Analysis
Critical Points
Strategy
DOS/PCA
CFVA, Forestas,
VVF
Tactics
Action
window
Safety
Manoeuvres
Volontari, Barraccelli,
CFVA, Forestas,VVF
Extintion

Thank you!