



8TH
INTERNATIONAL
WILDLAND FIRE
CONFERENCE

GOVERNANCE
PRINCIPLES:
Towards an
International
Framework

Integrated Fire Management Planning and Preparation

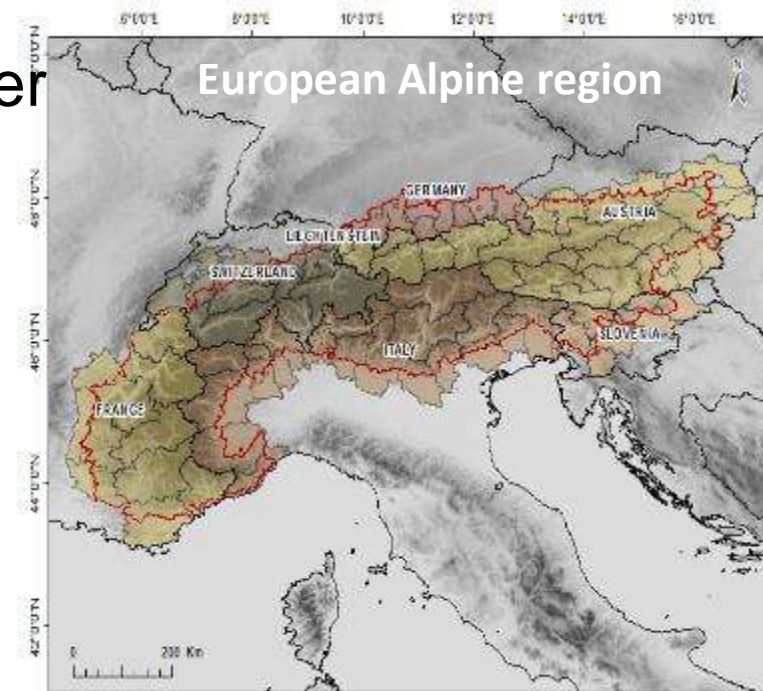
**State of knowledge, future challenges and
options for an integrated fire management in
the European Alps**

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Overview

- Motivation and background for the study
- Fire regime of the European Alpine region
- Selected results from survey
- Recommendations of White paper



In the Alpine region...

- an increasing number of drought periods and heat waves will lead to more incidences of forest fires
- an increasing fire hazard will result from rural abandonment and more recreational activities in the future
- Firefighting is generally difficult due to the rugged topography and low accessibility and is causing high costs
- More forest fires will increase vulnerability to natural hazards and reduce the protection function of mountain forests
- danger for humans and infrastructure will increase at the wildland-urban-interface
- Forest fires do not play a main role in policy making



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Download:
<https://www.alpine-region.eu/results/forest-fires-alps-state-knowledge-and-further-challenges>



Collection of Data, Survey and Workshop about forest fires in the Alps

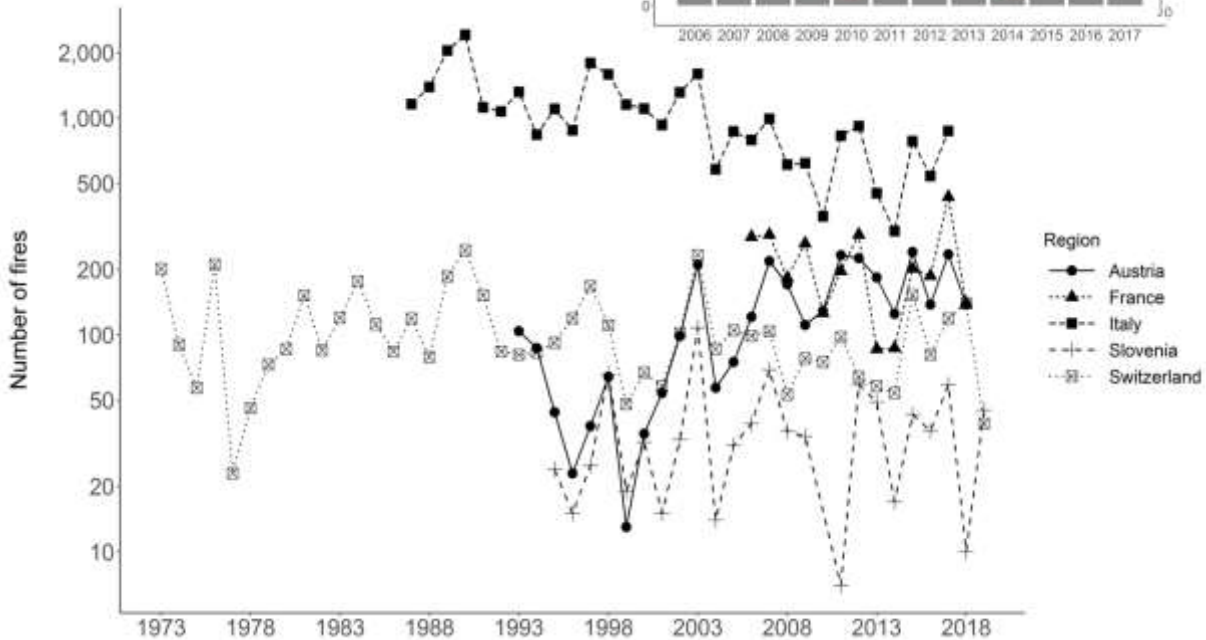
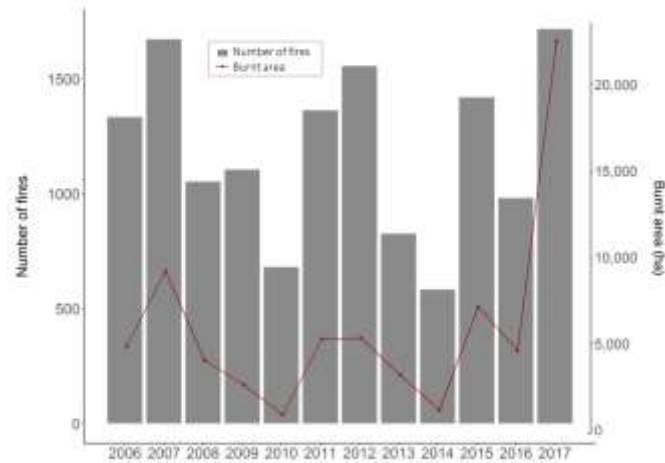


Identification of the main challenges

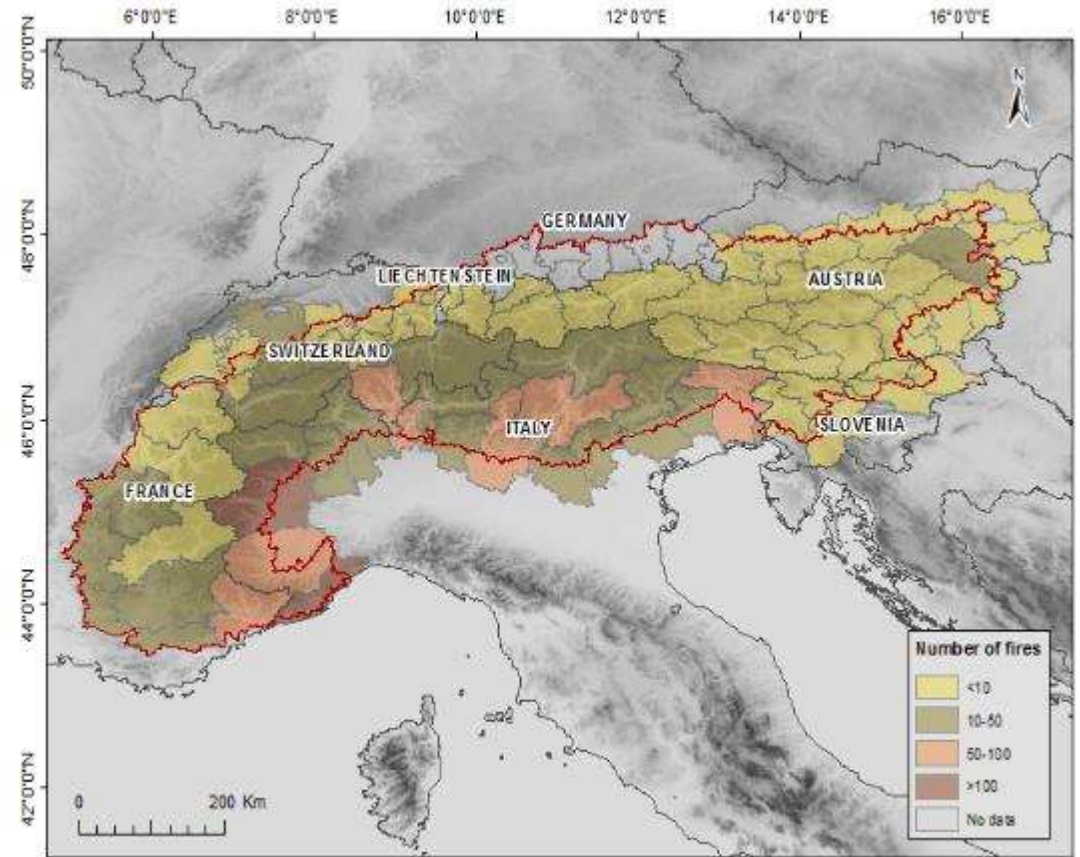


White paper for possible options for an integrated fire management in the future

Fire statistics based on national/regional databases

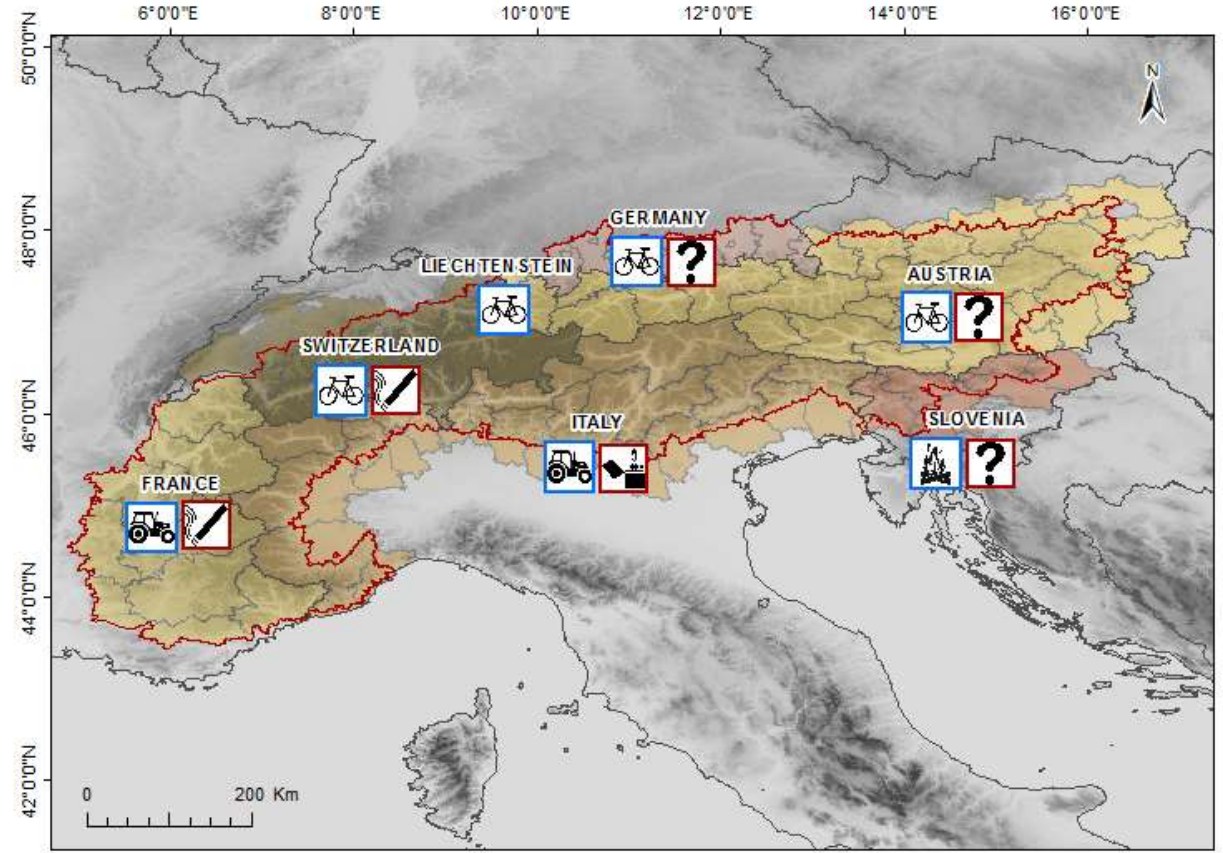
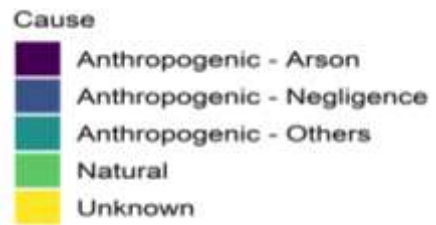
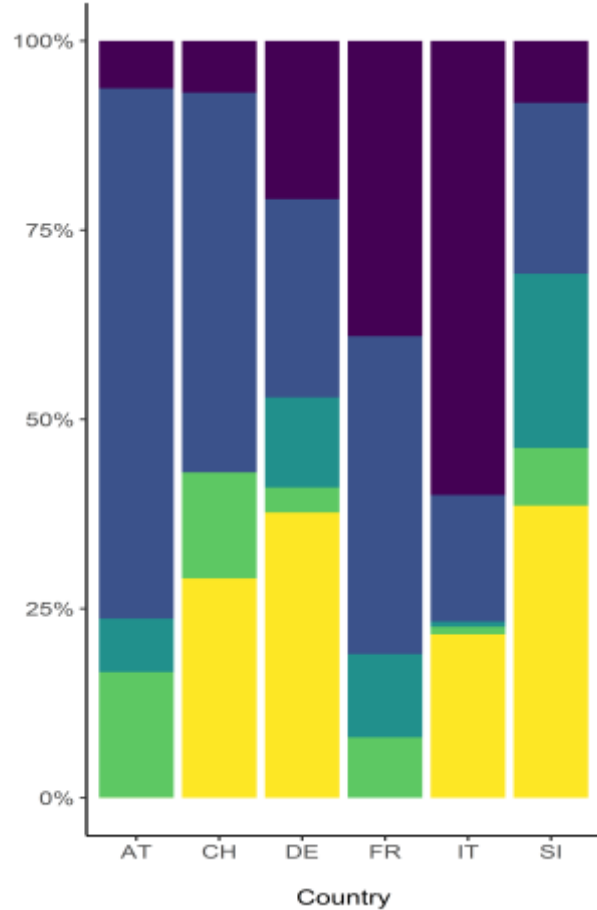


Annual /mean number of forest fires per country



Sources: Austria: Waldbrand-Datenbank Österreich
 France: Prométhée database
 Italy: EFFIS Annual Fire Reports; State Forest Service
 Slovenia: EFFIS Annual Fire Reports
 Switzerland: Swiss Federal Institute for Forest (WSL)
 No data available for Germany and Liechtenstein.
 Source: National/Regional databases.

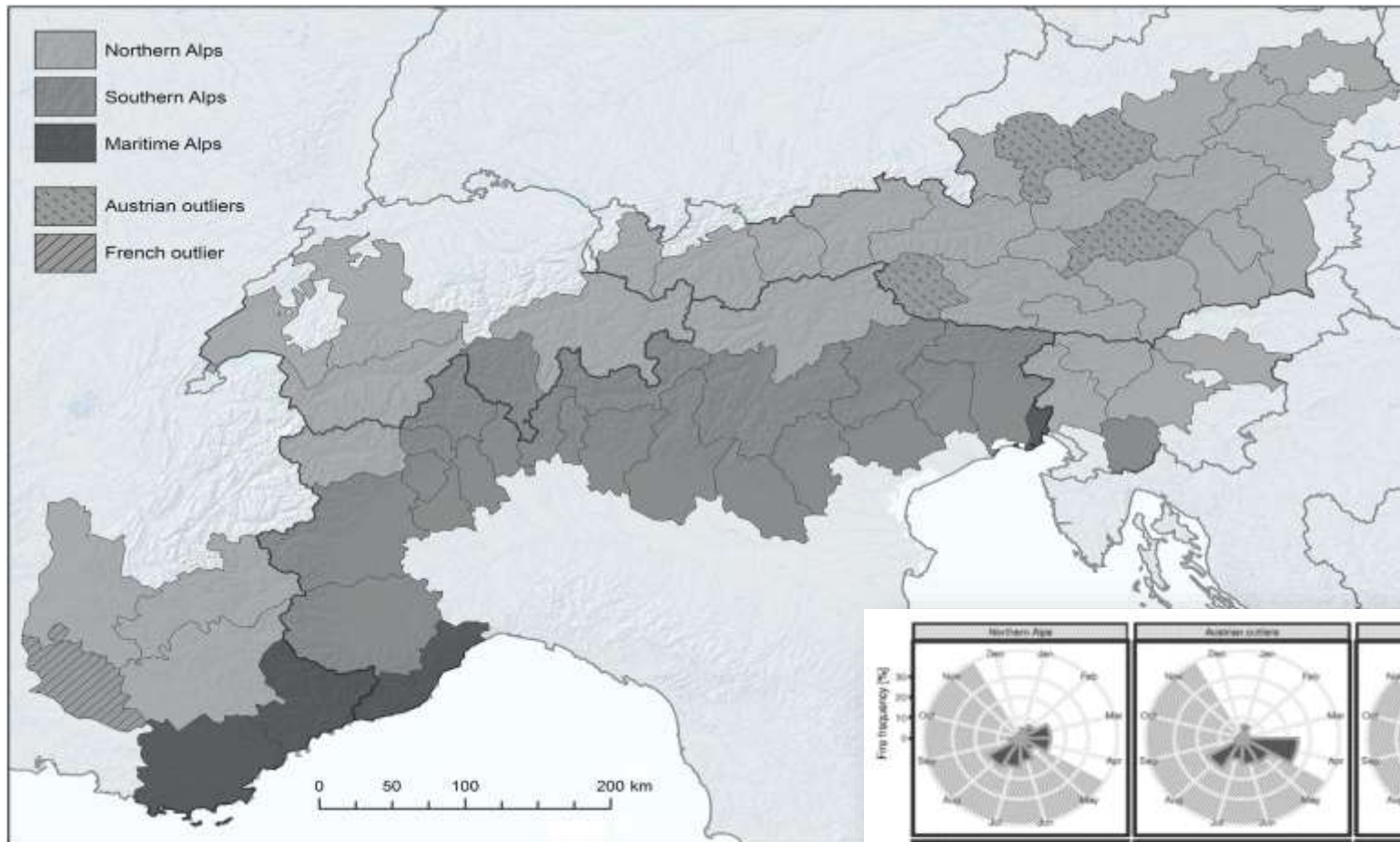
Main causes of ignition per country in Alpine region



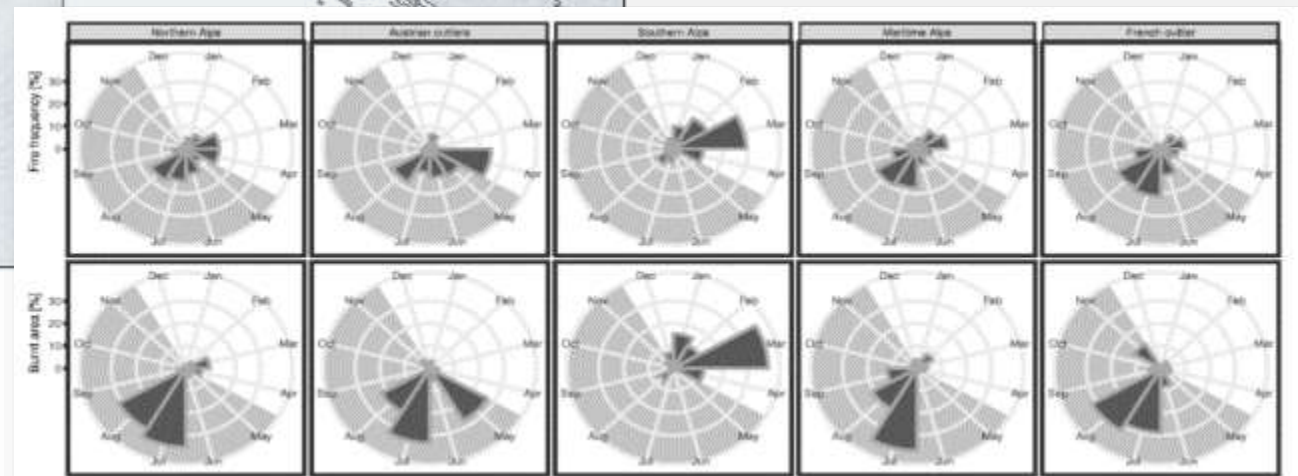
Sources:

- Austria: Waldbrand-Datenbank Österreich
- France: Prométhée database
- Germany: Bundesanstalt für Landwirtschaft und Ernährung
- Italy: EFFIS Annual Fire Reports; State Forest Service
- Slovenia: EFFIS Annual Fire Reports
- Switzerland: Swiss Federal Institute for Forest (WSL)
- No data available for Liechtenstein.
- Source: National/Regional databases.

Distribution of European Alpine fire regime clusters



- high fire density on southern parts of the Alps and lower proportion of burnt areas in the north
- climatic (frequency and length of drought periods), environmental (vegetation types, elevation and orientation of valleys), and socio-economic factors discriminate the clusters
- at regional level, anthropogenic factors and land use are important for differentiating the occurrence of wildfires, at cross-regional scale climatic factors gain importance



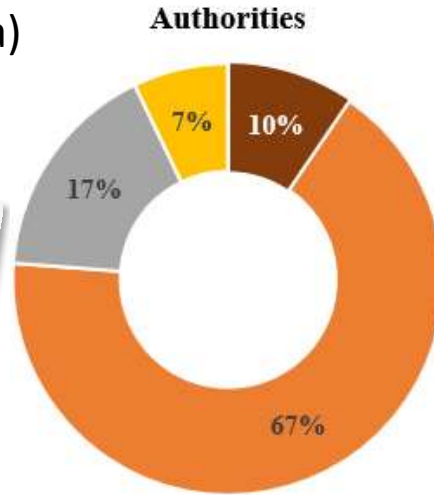
Conedera et al. (2018) Characterizing Alpine pyrogeography from fire statistics, *Applied Geography* 98, 87–99

Bekar et al. (2020) Cross-regional modelling of fire occurrence in the Alps and the Mediterranean Basin. *International Journal of Wildland Fire* 29, 712-722.

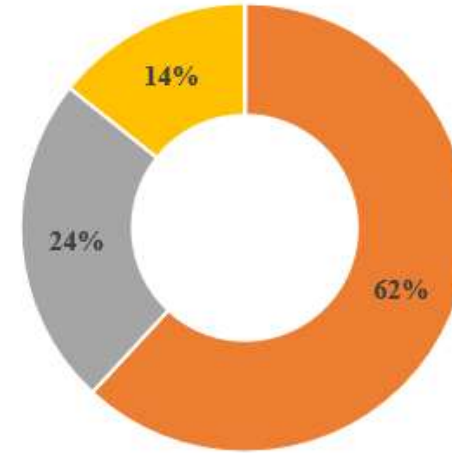


Expectations regarding the future fire regime in the Alpine region differ among the three stakeholder groups and also between the regions according to
 (a) number of forest fires
 (b) burnt areas

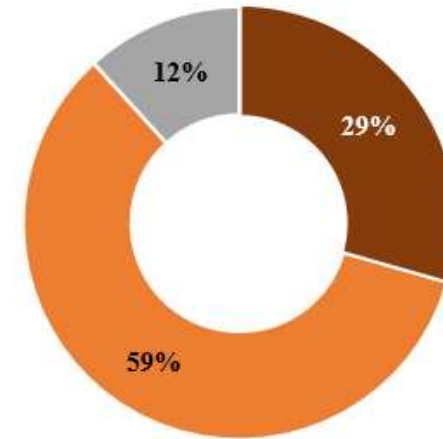
(a)



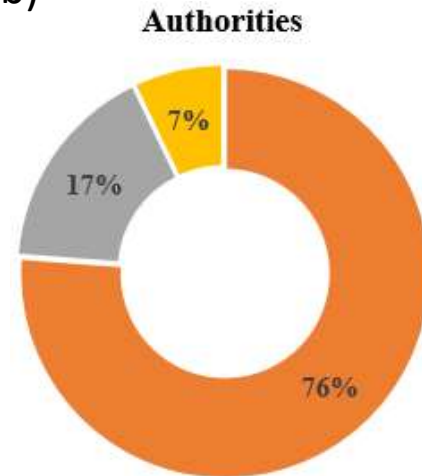
number of forest fires
Scientists



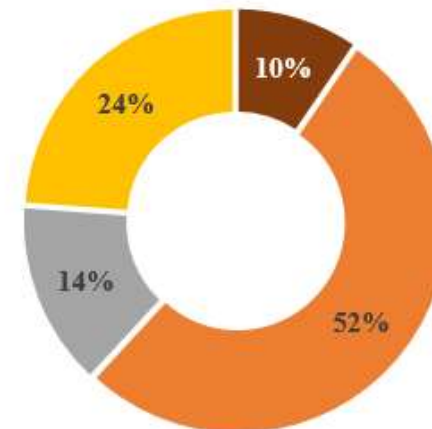
Action Forces



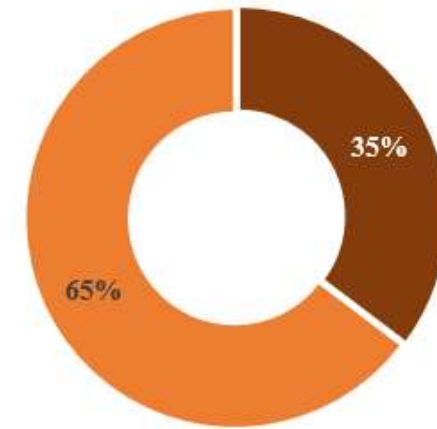
(b)



Burnt area of forest fires
Scientists

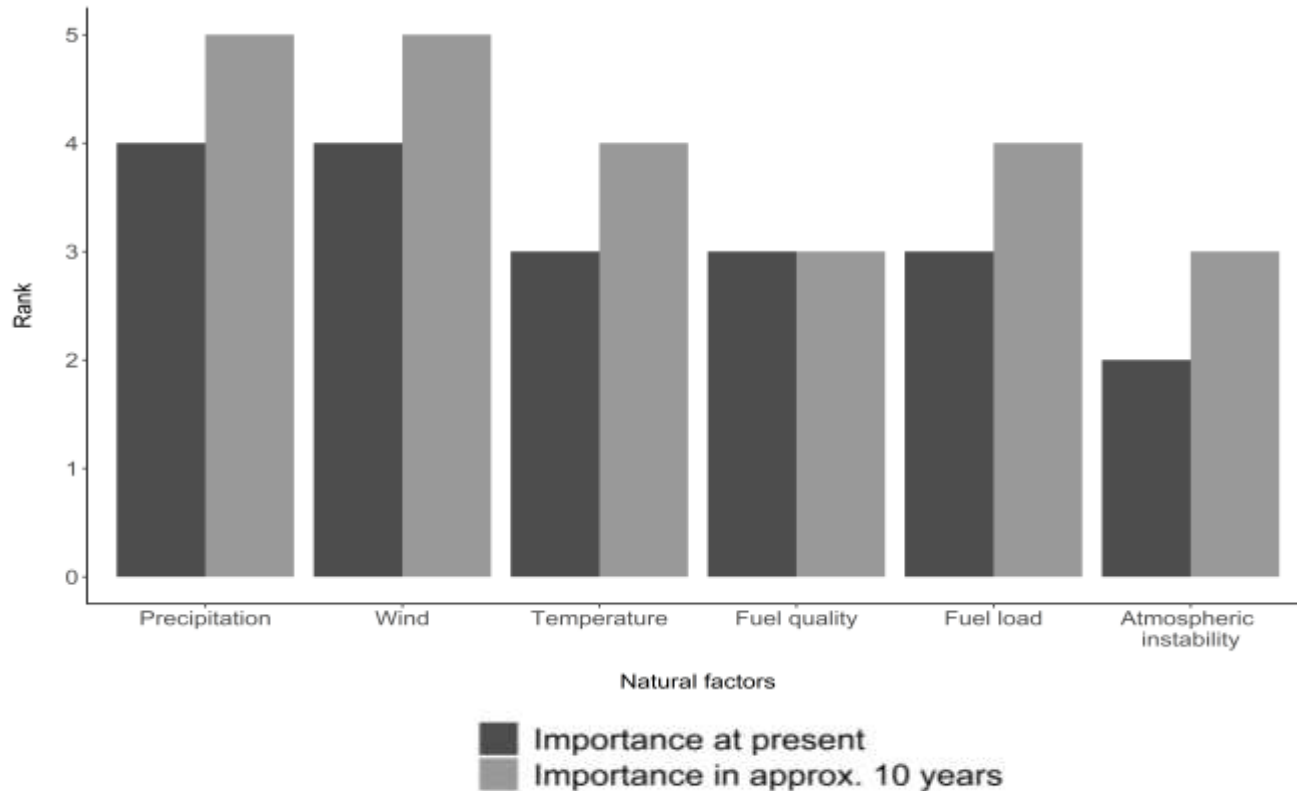


Action Forces



■ Strong increase ■ Increase ■ Constant progression ■ Decrease ■ Strong decrease

Expectations regarding most important **natural factors** as drivers of the present fire regime are precipitation, wind, temperature, fuel quality, fuel load, and atmospheric instability - **in the future, the relevance of *all* these factors increases**

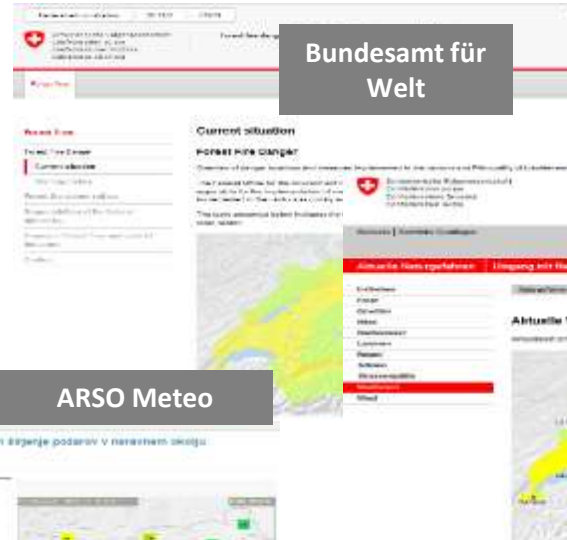


Other factors:

- Non-managed forest areas for biodiversity reasons increase fuel
- Increased exposure to winter fires due to reduced snowpack
- Change in tree species composition and ground vegetation



ZAMG
Deutscher Wetterdienst



Bundesamt für Welt



ARSO Meteo

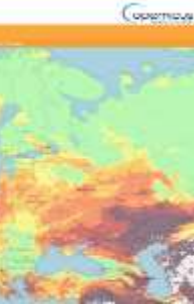
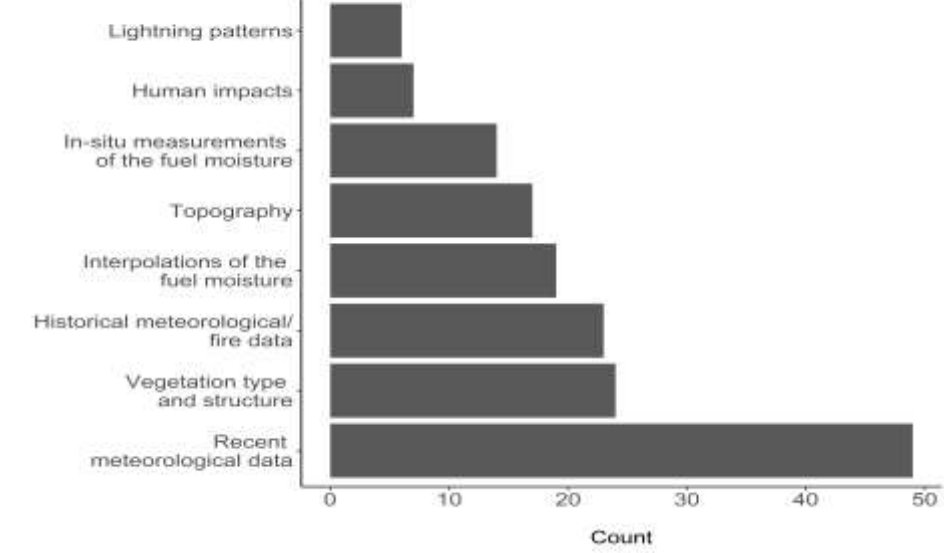


Slovenian Forest Service



ALP FFIRS

Parameters and methods used to predict fire danger

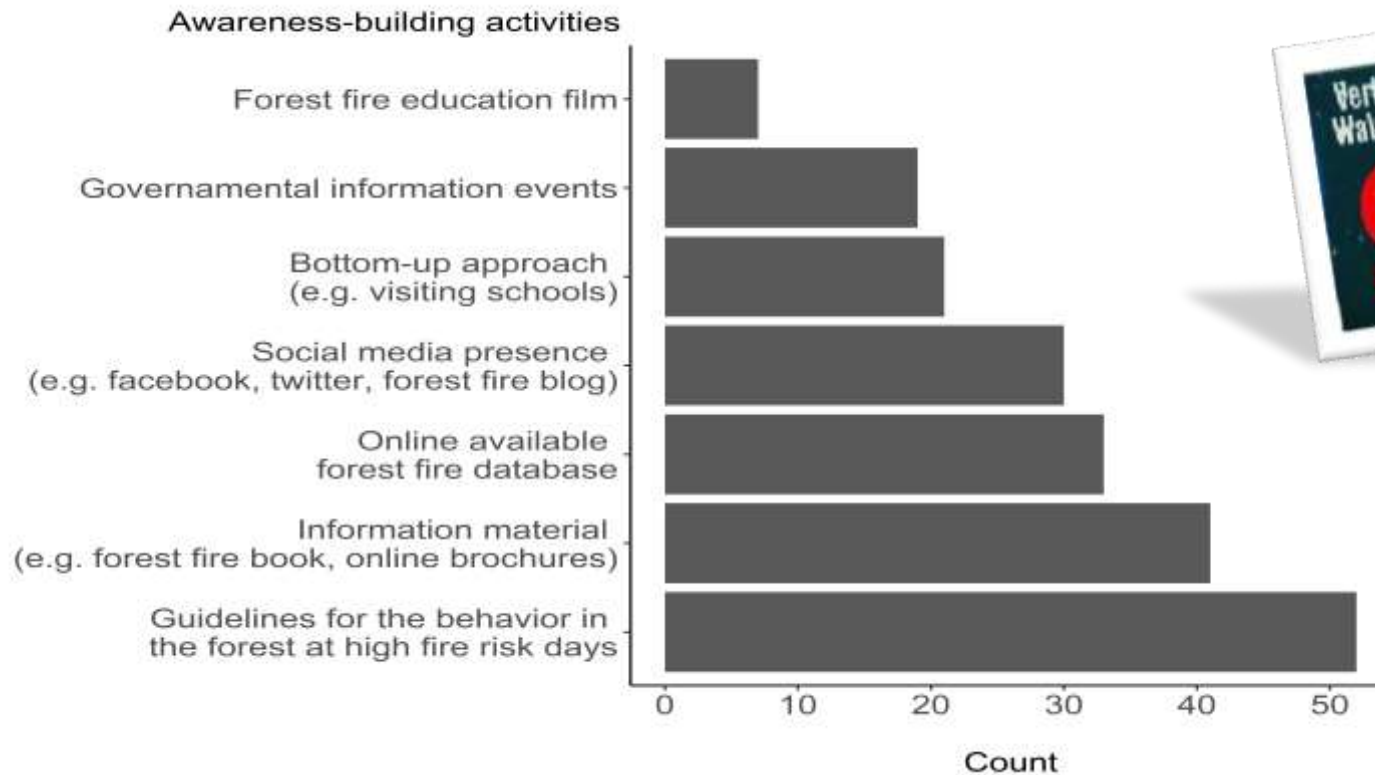


Most common parameters used to **predict fire danger**: recent / historical meteorological data, vegetation type and structure, fire data, interpolations of fuel moisture, topography, in-situ measurements of fuel moisture, human impacts, and lightning patterns

adequate under most climatic and seasonal conditions - BUT:

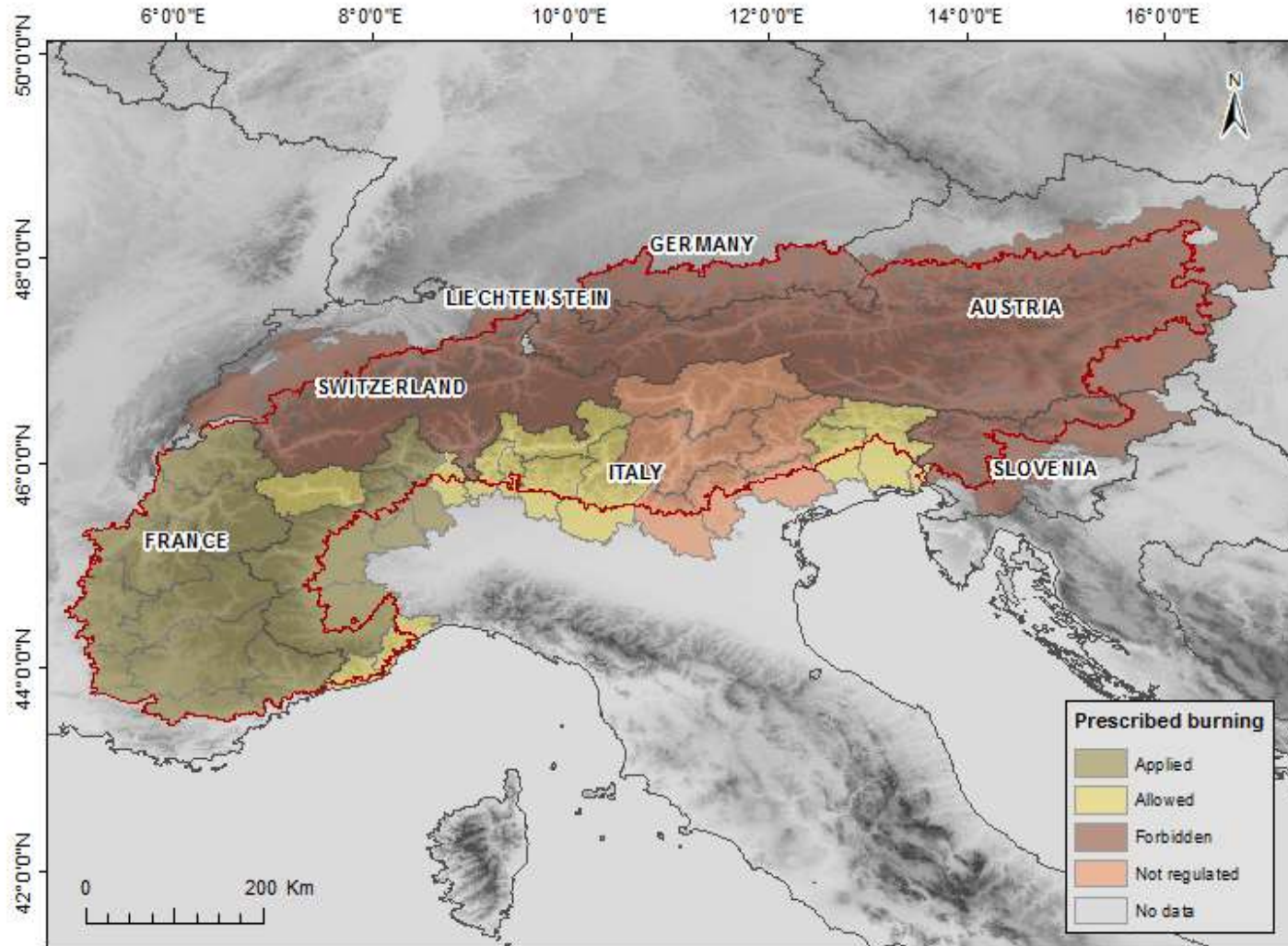
- prediction in winter/spring not satisfactory
- small-scale topography needs to be considered
- vegetation type and structure relevant on small scale
- socio-economic factors needs to be considered

The most common **awareness-building activities** conducted for the population are guidelines for the behavior in the forest at high fire risk days, information material, online resources and social media presence. Bottom-up approaches, governmental information events, and forest fire education films support the activities.



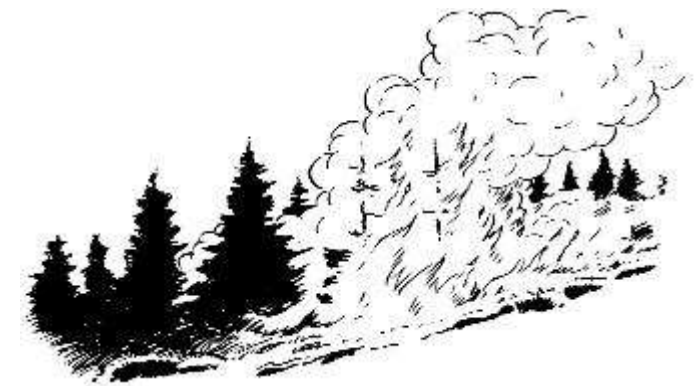
Other activities:

- Traditional media
- Homepage
- Lightning fire ban
- Phone application
- Warning signs

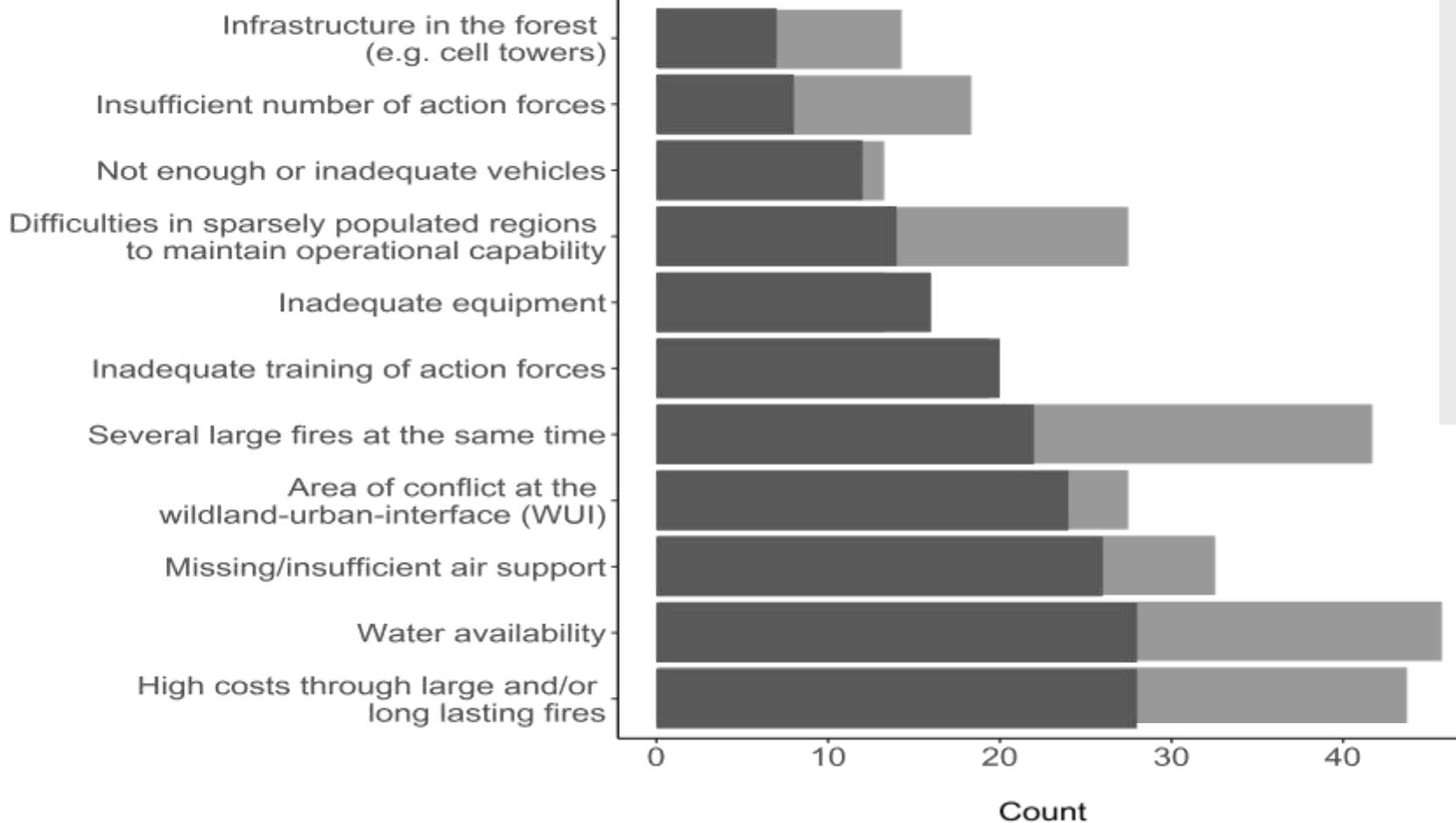


In many alpine countries, prescribed burning is mostly not used and/or forbidden: **lack of expertise, nature conservation concerns, forest law or air pollution control, risk avoiding policies;**

France and Italy regulate it with regional laws and regional fire management plans



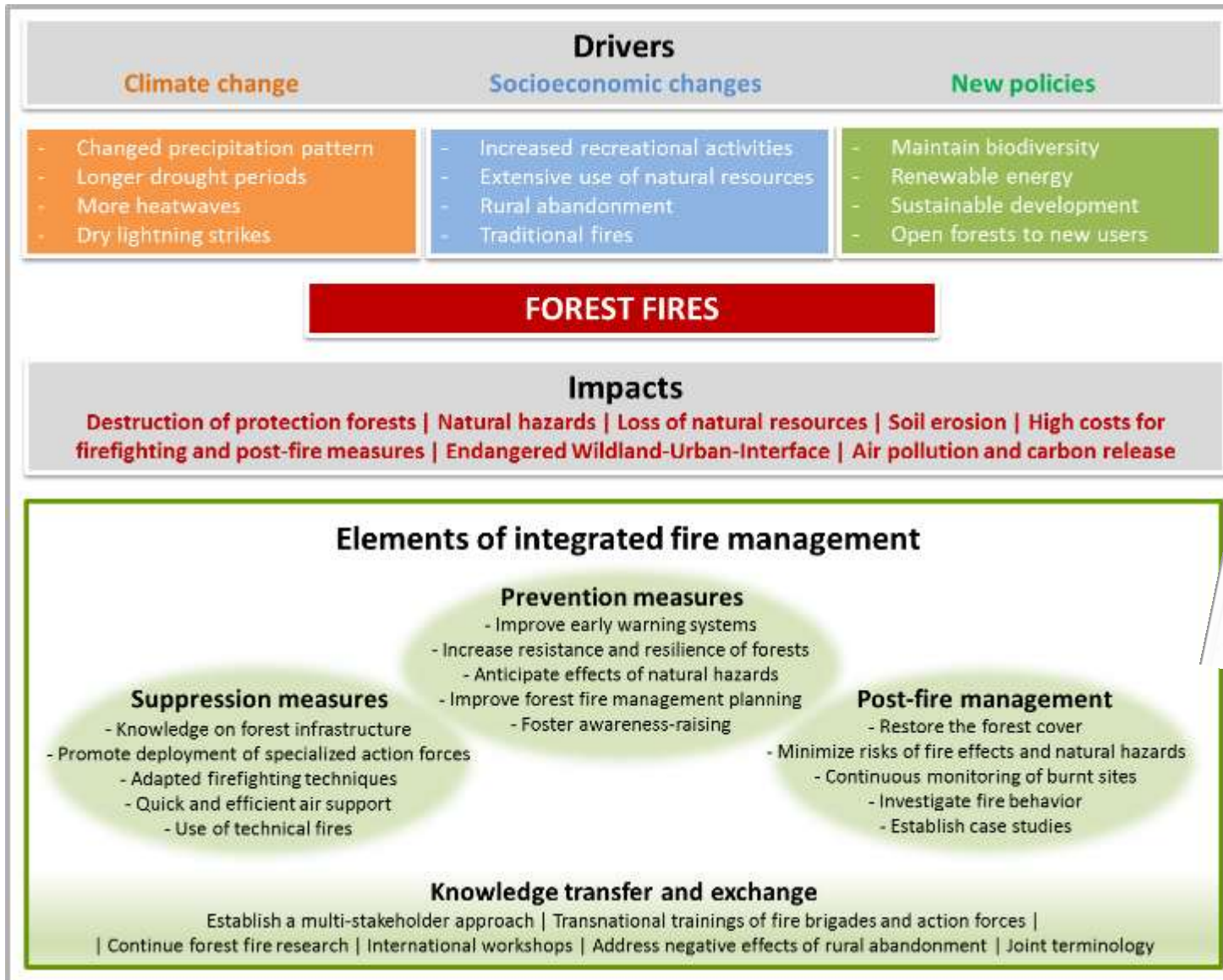
Future challenges of forest fire fighting



Additional challenges:

- Inaccessibility
- Poor coordination/communication
- Forest road condition (in winter)
- Adaptation to changing fire regime
- Insufficient funds
- Non-professional action forces
- Lack of experience
- Topography
- Missing training at all levels
- Management of large fires
- Inadequate air strikes / night flight prohibitions
- Staff management
- Fire intensity
- Lack of equipment maintenance

Importance at present
 Importance in approx. 10 years



- **Design and implement short- and long-term prevention measures**
 - Improve early warning systems considering specific characteristics of topography and site conditions of the Alpine region
 - Increase resistance and resilience of forests by promoting site adapted tree species
 - Anticipate the effects of natural hazards by promoting fuel management
 - Adapt forest management, including prescribed burning, establish protection measures at WUI
 - Improve forest management planning by considering fire behavior and dynamics
 - Foster awareness-raising activities for stakeholders and population to establish “fire awareness culture”

Best practices

- More accurate prediction of fire danger in the winter season.
- Anticipation of the preventive measure needed.
- Identification of the areas more prone to winter fire and development of site-adapted measures.

Bringing prescribed fire practices on the main national TV science program (3M viewers)

Problem description

- Fire prevention in Italy is still in its infancy, especially when it comes to prescribed burning. A large part of environmentalists, people and associations strongly oppose to prescribed burning for its perceived threat to biodiversity and soil biodiversity.

Solution

- Shot a short documentary on prescribed burning for the national science program on national TV (“super-scienze”).
- Documentary broadcasted in 2018, with 3+ million viewers.
- First time that prescribed fire was mentioned by national media.


Best practices

- First step towards popularizing the importance of fire prevention and expanding the role of vegetation and climate in fire spread.
- It gave voice and relevance to fire scientists.




Country: Italy
Scale: National

- **Adapt suppression measures to specific conditions of Alpine region**
 - Compile dynamic fire risk maps on local and national scale to identify current and future fire hotspots and low fire intensity areas, to guarantee firefighters safety and tactical suppression actions
 - Adapt firefighting techniques and use technical (controlled) fires in suppressing strategies
 - Improve knowledge about and build an adequate forest infrastructure
 - Promote the deployment of specialized action forces
 - Ensure quick and efficient air support by helicopters



Problem description

Long response time needed for firefighters to start with the initial attack of a forest fire, especially in remote Alpine areas. Bad accessibility of these areas and a low number of firefighters can lead to larger and uncontrolled fires, which are hard to be suppressed during the operations.



Best practices

- Mean time to start with the initial attack of forest fire is reported to be 20 minutes.
- Voluntary and well trained action forces are available 24/7.
- Every 25th person in Austria is member of a volunteer fire brigade, which allows to rise awareness on forest fire issues.
- Costs for equipment and training are covered by joint funds from municipalities, federal provinces and the federal government.



Dense network of fire protection roads

Country: Austria
Sub-Regional District

Problem description

- Long time to first fighting a forest fire.
- Lack of forest roads available for firefighters in remote areas where forestry is not economically profitable.



Solution

- Building 600 km of fire protection roads in an area of 60,000 ha.
- Reaching 25 m of forest roads per hectare in high-risk areas.

Best practices

- Area accessible to firefighters are their vehicles.
- Creating average four to six per hectare fire (below one hectare).
- Reduced damage after forest fires.
- The measure of forest management of non-profitable sites.

- **Improve understanding and measures on post-fire management**
 - Restore forest cover using technical measures and improve post-fire ecological-based restoration activities
 - Minimize risks of fire effects and natural hazards
 - Investigate studies on fuel modeling and fire behavior
 - Establish continuous monitoring and case studies on burnt sites to monitor mortality and regeneration

Integration of research with forest fire management needs


Co. fire: Switzerland
Site n. Regional (Ticino)

Problem description

- Lack of clean and consistent forest fire data for statistics and modeling.
- Lack of regional fire danger rating and fire risk maps.
- Choice of post-fire restoration measures unclear.



Solution

- Management of the database at national level, researchers involved
- Development of a regional fire danger rating system (Fire Niche)
- Development of regional fire risk maps, suitable for all seasons
- Research on post-fire effects on forests

Best practices

- Tight cooperation between researchers and forest service
- Active feedback
- Research tailored on problem-solving needs

16/18

- **Support knowledge transfer and exchange of experiences**
 - Establish a multi-stakeholder approach among authorities, action forces and scientists
 - Conduct transnational trainings and specific forest fire scenarios for fire brigades and action forces
 - Continue with collaboration in forest fire research in the Alpine countries
 - Address negative effects of rural abandonment and recreational activities
 - Organize international workshops
 - Use joint terminology





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 Bundesministerium
Land- und Forstwirtschaft,
Regionen und Wasserwirtschaft



Many thanks for your attention!

Austrian Forest Fire Research Initiative
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Forest fire database: <https://fire.boku.ac.at>
Forest fire Blog: <https://fireblog.boku.ac.at>
Integrated Forest Fire Danger Rating: www.waldbrand.at