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

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7th International Wildland Fire Conference
Campo Grande, Brazil
The European Alpine region

- Area: 190,717 km²
- Densely populated: 14 million people
- Strong environmental gradients: from oceanic to dry climate
- Mont blanc: 4810 m a.s.l.
Why are forest fires relevant in the Alpine region?

- Alps highly affected by climate change
- Forest fires are expected to increase in frequency and intensity due to
  - climate change
  - increasing rural abandonment and recreational activities
- Pose protection function of forests against gravitational hazards at risk
- Fire danger assessment difficult due to complex topography
- High costs for firefighting and post-fire management
- Current situation is unable to cope with extreme forest fire events
Study objectives

Research questions:

• Have the frequency and intensity of forest fires increased due to climate change?
• What are the main challenges of fire prevention, suppression, and post-fire management in the Alps?

Objectives:

• Characterize forest fires in the Alpine region and identify the main challenges
• Propose a framework for integrated fire management in the Alpine region
Methodology

Online survey + Forest fire databases + Workshop

Targeted to stakeholders dealing with forest fires

Trends in fire regime

Identification of main challenges

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Online Survey in European Alps

In five languages: Slovenian, Italian, French, German, English

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EUSALP - Workshop

- **Forest fire experts of the Alpine region**: action forces, scientists, authorities
- Discussion of the **survey results**
- Identification of the **main challenges** of fire management in the Alps
- **Success stories** on fire management

June 2019, Vienna | © Trung Hoàng
Number of fires and burnt area have slightly decreased over the last decades in the Alpine region.

More and bigger forest fires in the Southern Alps than the Northern Alps
Causes of ignition in the Alpine region

Socioeconomic differences among Alpine countries

Forest fire cause

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<td>57%</td>
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Documentation of forest fires

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Main causes of ignition
- Arson
- Negligence
- Unknown

Main drivers of fire regime
- Recreational activities
- Rural abandonment
- Traditional uses of fire
Fire danger assessment in Alpine region

Regional weather models resolution: 1 x 1 km

Insufficient for narrow valleys, mountain peaks, and meteorological differences on northern and southern slopes
Fire danger assessment in Alpine region

Parameters and methods used to predict fire danger

Regional weather models

Resolution: 1 x 1 km

Insufficient for narrow valleys, mountain peaks, and meteorological differences on northern and southern slopes.

Fire danger rating in complex terrain

Problem description
- Underestimation of fire danger at mid-elevation forests due to lack of stations, complex orography, and temperature inversion in the winter term.
- The current used forest fire index (WBI) is not suitable for conditions that foster fires with characteristics like grassland fires.

Solution
- Use of meteorological stations of the avalanche warning service to calculate an adapted fire danger index.

Best practices
- Improvement did not require additional installations.
- Correct assessment of actual fire danger in mountainous areas.
- Better danger assessment increases awareness-raising and reduces the number of forest fires.
Present and future firefighting challenges in the Alpine region

Other challenges:
- Topography
- Non-professional action forces
- Lack of experience
- Missing training at all levels
- Management of large fires
Present and future firefighting challenges in the Alpine region

Other challenges:
- Topography
- Non-professional action forces
- Lack of experience
- Missing training at all levels
- Management of large fires

Specialized firefighters for mountain forest fires

Problem description
- Lack of specialized firefighters for mountainous areas.
- Use of inadequate materials and techniques for mountainous areas.
- Associated high costs, prolonged activity, and greater damage to the forest.

Solution
- Establishment of a network of specialized, trained, and well-equipped fire brigades in mountainous areas.

Best practices
- Trainings joint by regional fire brigades.
- Common standard of performance, operational tactics, and knowledge.
- Modern equipment and adapted firefighting techniques.

Water availability: High costs through large and/or long lasting fires

Count
0 10 20 30 40
Summary of main challenges

**Fire prevention**
- **Integration** of fire management in planning
- Improve regional **fire danger assessment**
- **Stop rural abandonment**
- Awareness rising in recreational activities
- Adapt **fuel treatment**
- **Research** and **exchange of knowledge**
- **Documentation** of fire records
- Adaption of Forest / Fire policy

**Fire suppression**
- **High costs** (firefighting)
- **Water availability**
- **Resources** (simultaneously large fires, insufficient air support)
- **Training** of fire brigades
- (Transnational) **exchange of knowledge**

**Post-fire management**
- **High costs** (post-fire measures)
- Risk of **natural hazards** and **soil erosion** in protection forests
- **Research**
- **Long term monitoring**
- (Transnational) **exchange of knowledge**

Lurnfeld, Austria, 22.04.2015
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Integrated Fire management

**Climate change**
- Changed precipitation pattern
- Longer drought periods
- More heatwaves
- Dry lightning strikes

**Drivers**
- Increased recreational activities
- Extensive use of natural resources
- Rural abandonment
- Traditional fires

**Socioeconomic changes**
- Maintain biodiversity
- Renewable energy
- Sustainable development
- Open forests to new users

**New policies**

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**Forest fires**

**Impacts**
- Destruction of protection forests
- Natural hazards
- Loss of natural resources
- Soil erosion
- High costs for firefighting and post-fire measures
- Endangered Wildland-Urban-Interface
- Air pollution and carbon release

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**Elements of integrated fire management**

**Prevention measures**
- Improve early warning systems
- Increase resistance and resilience of forests
- Anticipate effects of climate change
- Improve forest fire management planning
- Foster awareness-raising

**Suppression measures**
- Knowledge on forest infrastructure
- Promotion of specialized action forces
- Adapted firefighting techniques
- Quick and efficient air support
- Use of technical fires

**Post-fire management**
- Restore the forest cover
- Mitigate risks of fire effects and natural hazards
- Continue monitoring of burnt sites
- Investigate fire behavior
- Evaluation case studies

**Knowledge transfer and exchange**
- Establish a multi-stakeholder approach
- Transnational training of fire brigades and action forces
- Continue forest fire research
- International workshops
- Address negative effects of rural abandonment
- Joint terminology

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Thank you!