



EUSALP EU STRATEGY FOR THE ALPINE REGION

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and Life Sciences, Vienna

Forest fires in the Alps

State of knowledge, future challenges and options for an
integrated fire management

Lena Vilà Vilardell, Mortimer M. Müller, Harald Vacik

7th International Wildland Fire Conference
Campo Grande, Brazil



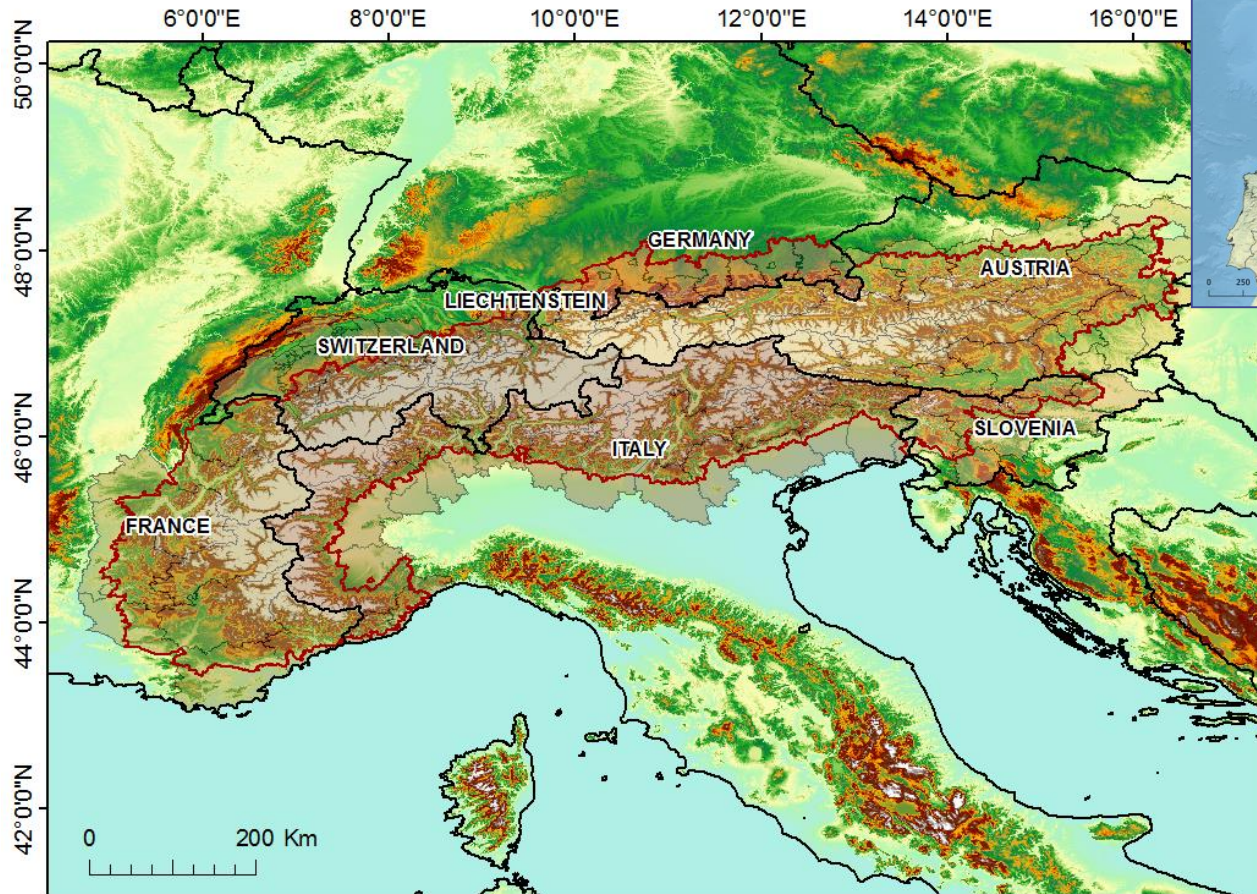
Interreg
Alpine Space
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The European Alpine region



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- 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**



Lurnfeld, Austria, 22.04.2015
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Neunkirchen, Austria, 01.08.2013
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Study objectives



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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



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Online
survey



Forest fire
databases

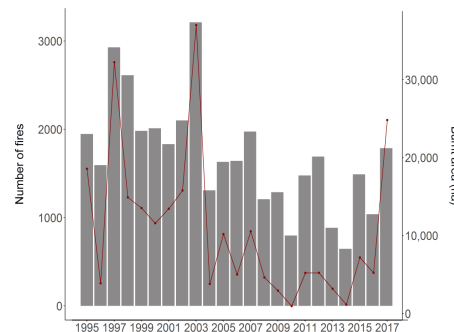
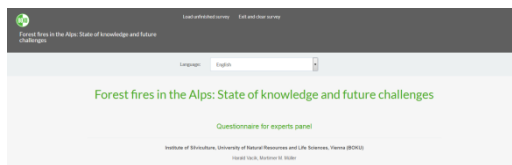


Workshop

Targeted to
stakeholders dealing
with forest fires

Trends in fire
regime

Identification of
main challenges



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Online Survey in European Alps



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Forest fires in the Alps: State of knowledge and future challenges

Language: English

Forest fires in the Alps: State of knowledge and future challenges

Questionnaire for experts panel

Institute of Silviculture, University of Natural Resources and Life Sciences, Vienna (BOKU)
Harald Vacik, Mortimer M. Müller

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

	Authorities	Scientists	Action forces	Total
Austria	11	4	8	23
Switzerland	17	3	2	22
France	2	6	2	10
Italy	3	5	3	11
Germany	3	2	2	7
Slovenia	5	1	-	6
Liechtenstein	1	-	-	1
Total	42	21	17	80

Forest fire fighting

What are the assumed challenges in the future regarding the difficulties/efficiency of forest fire fighting in your region / the alpine region of your country?

Check all that apply

- ☐ Insufficient number of action forces
- ☐ Inadequate equipment
- ☐ Not enough or inadequate vehicles
- ☐ Inadequate training of action forces
- ☐ Missing/insufficient air support
- ☐ Water availability
- ☐ Several large fires at the same time
- ☐ High costs through large and/or long lasting fires
- ☐ Difficulties in sparsely populated regions to maintain operational capability (e.g. retirements, insufficient equipment, few members of fire brigades)
- ☐ Area of conflict at the wildland-urban-interface (WUI)
- ☐ Infrastructure in the forest (e.g. cell towers)
- ☐ Others (please specify):

Political and legal frameworks

How efficient are the measures in place to control the forest fire situation in your country?

	Very efficient	Efficient	Less efficient	Not efficient	Not applicable
Legislation (e.g. environmental or forest law)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Temporal limited legal ban to ignite fires	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information for the public (e.g. public awareness, press releases)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information for qualified personnel (e.g. translated or accessible technical materials)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information for private forest owners (e.g. property rights, risk assessment, possible measures and implementation)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Economic incentives (e.g. funding, subsidies, lower insurance costs)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cooperation between responsible agencies (e.g. during firefighting, risk precaution)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Others (please specify):	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Forest management

Arrange the following post-fire difficulties according to their importance.

Double-click or drag-and-drop items in the left list to move them to the right - your highest ranking item should be on the top right, moving through to your lowest ranking item.

Your choices	Your ranking
Expensive restoration of forest cover	
High costs of protective measures	
Risk of following natural hazards (e.g. mudslides, rockfall, new avalanche-prone slopes)	
Risk of complete erosion of the soil	
Others (please specify):	

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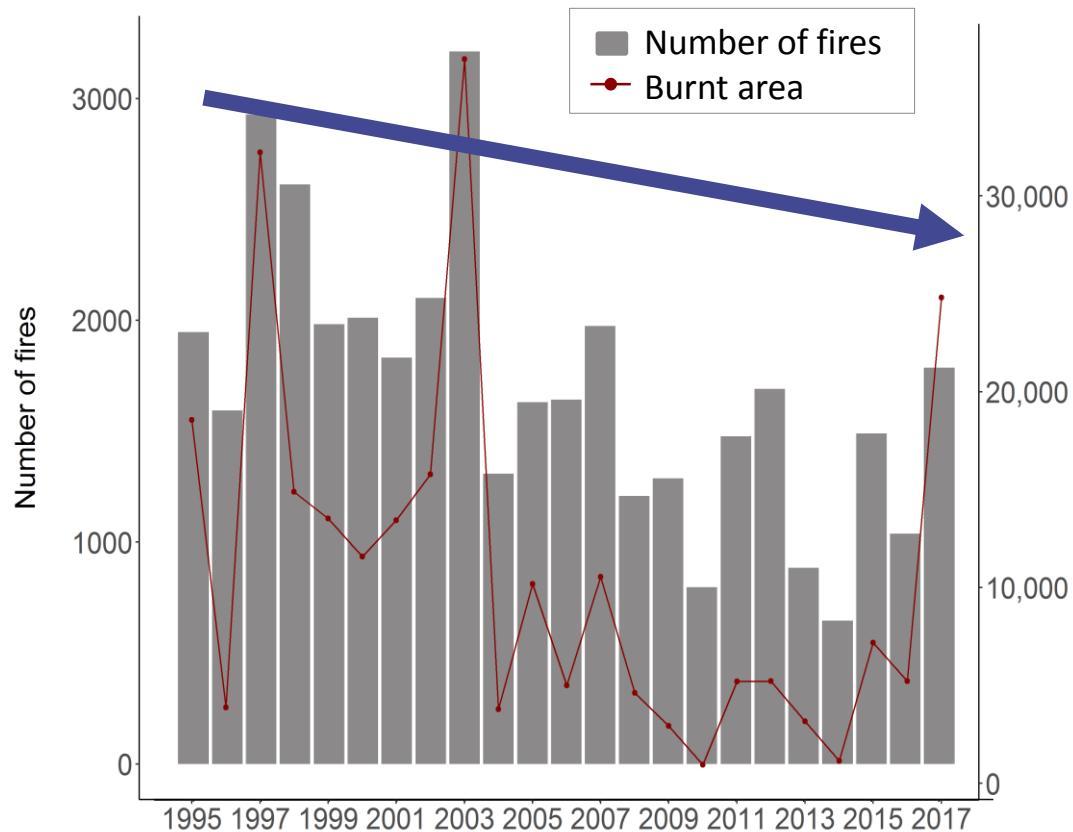
- **Forest fire experts of the Alpine region:** action forces, scientists, authorities
- Discussion of the **survey results**
- Identification of the **main challenges** of fire management in the Alps
- **Success stories** on fire management



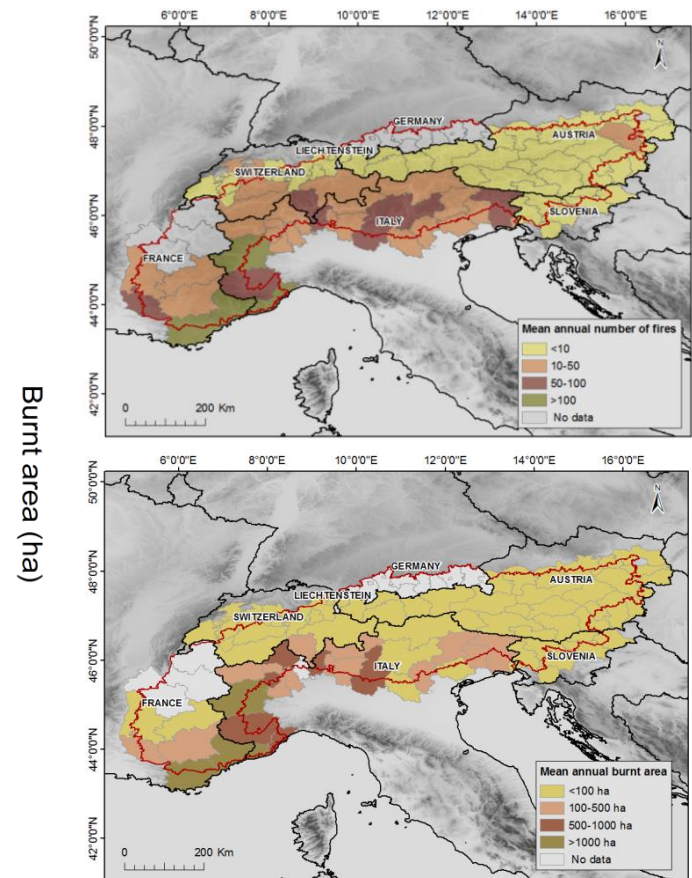
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Fire regime in the Alpine region

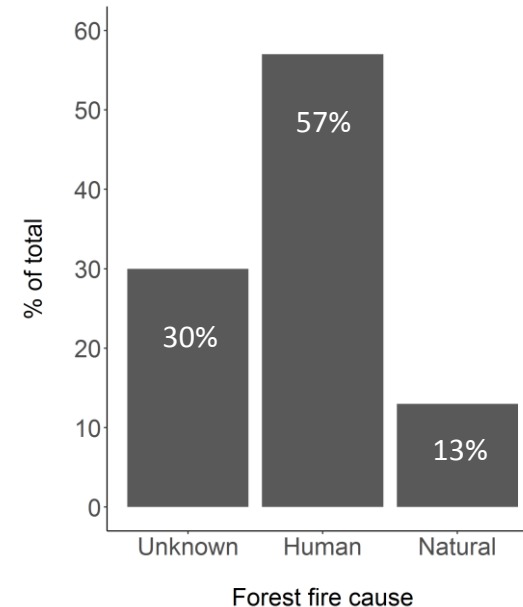
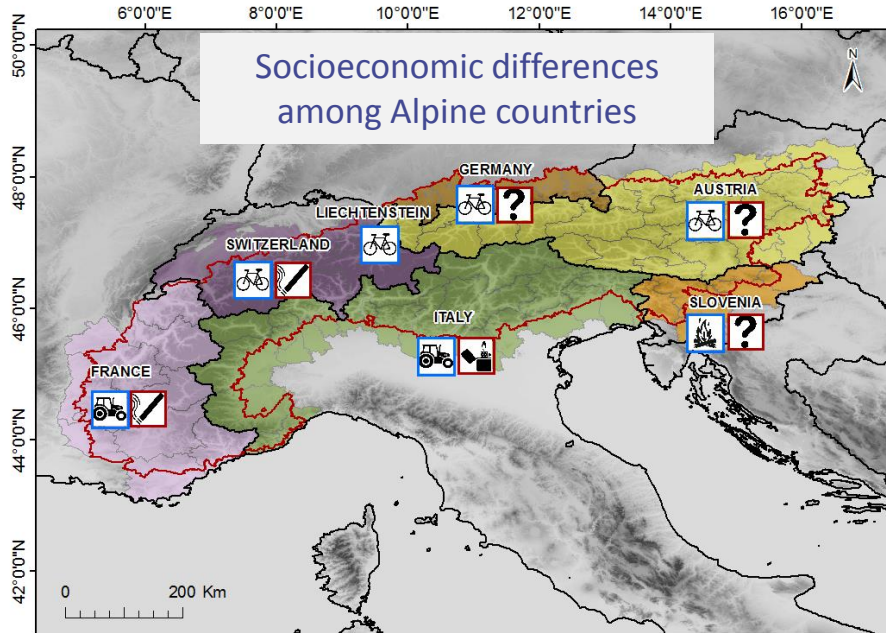
Number of fires and burnt area have slightly decreased over the last decades in the Alpine region.






More and bigger forest fires in the Southern Alps than the Northern Alps






Causes of ignition in the Alpine region



Main causes of ignition

-  Arson
-  Negligence
-  Unknown

Main drivers of fire regime

-  Recreational activities
-  Rural abandonment
-  Traditional uses of fire

Documentation of forest fires

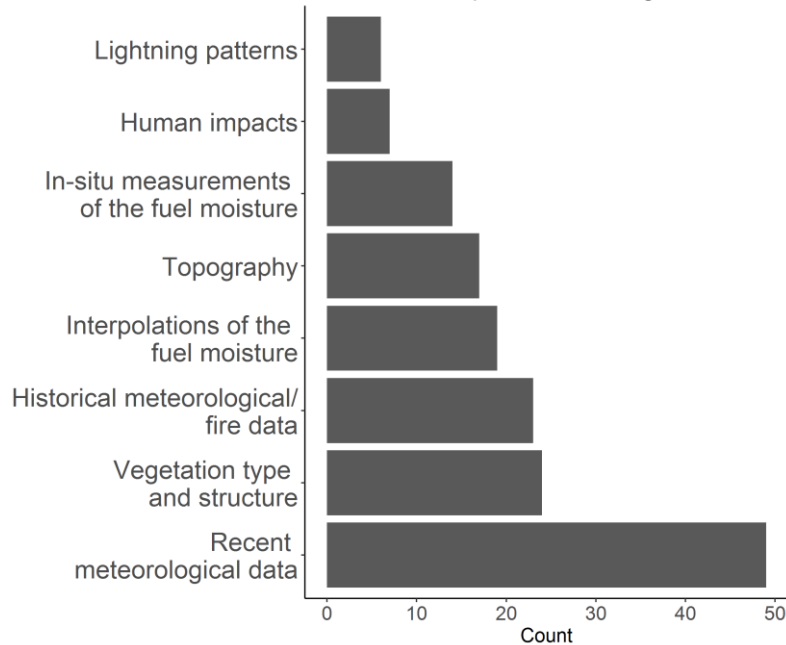
	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	
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Fire danger assessment in Alpine region



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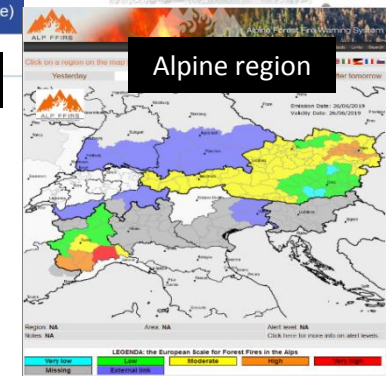
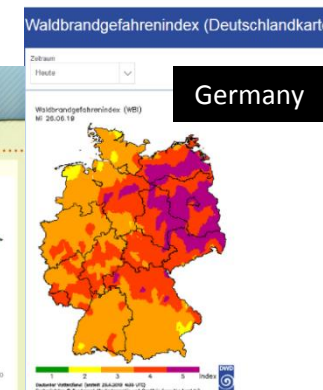
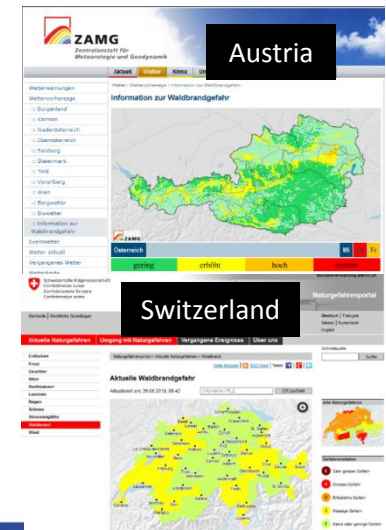
Parameters and methods used to predict fire danger



Regional weather models
resolution: 1 x 1 km



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



Fire danger assessment in Alpine region



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Parameters and methods used to predict fire danger

Lightning patterns



Regional weather models

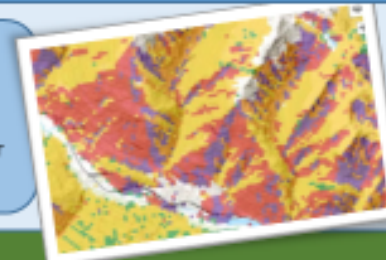
Fire danger rating in complex terrain



Country: Germany
Scale: Regional (Alps)

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.

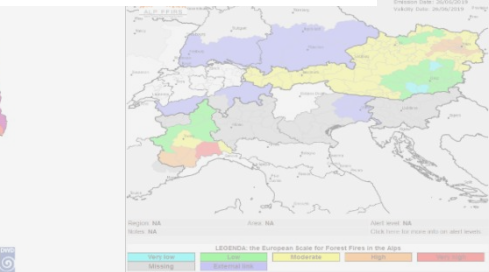
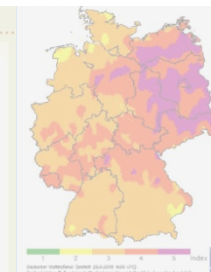
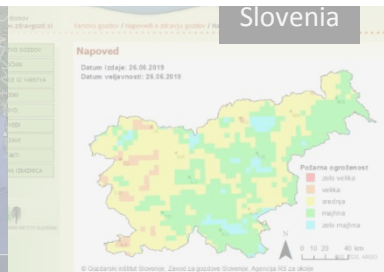


Solution

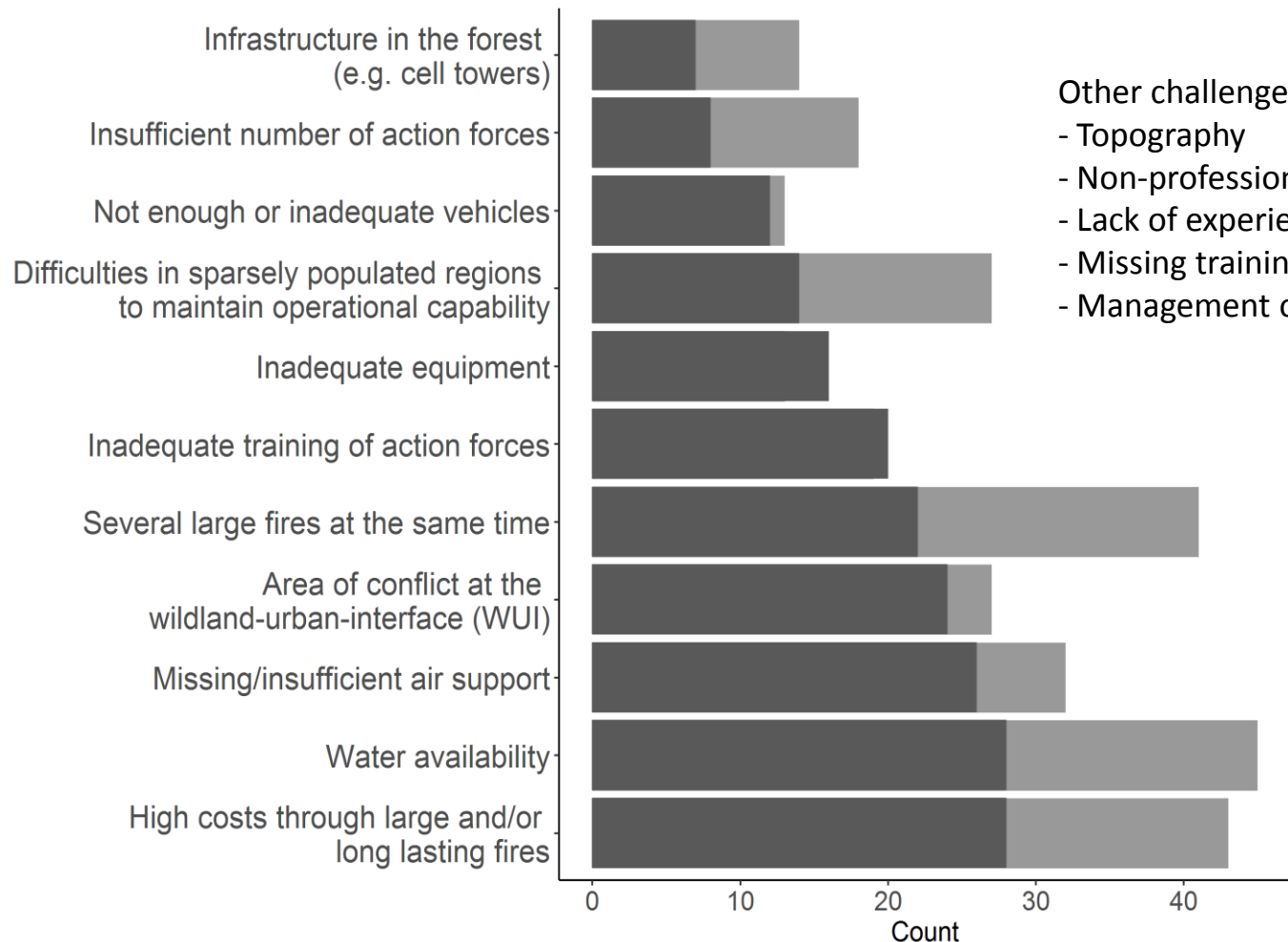
- Use of meteorological stations of the avalanche warning service to calculate an adapted fire danger index.

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

Infrastructure in the forest
(e.g. cell towers)



Other challenges:

Specialized firefighters for mountain forest fires



Country: Switzerland
Scale: Regional (Ticino)

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.



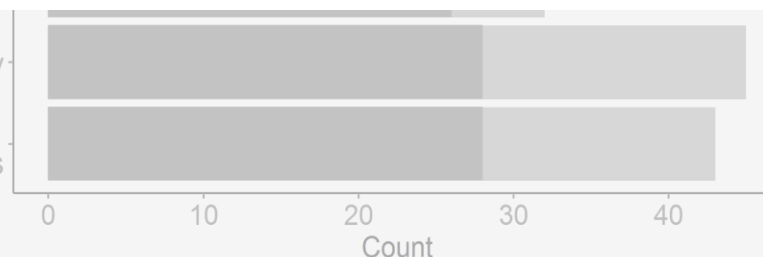
Solution

- 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



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**



Lurnfeld, Austria, 22.04.2015
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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**



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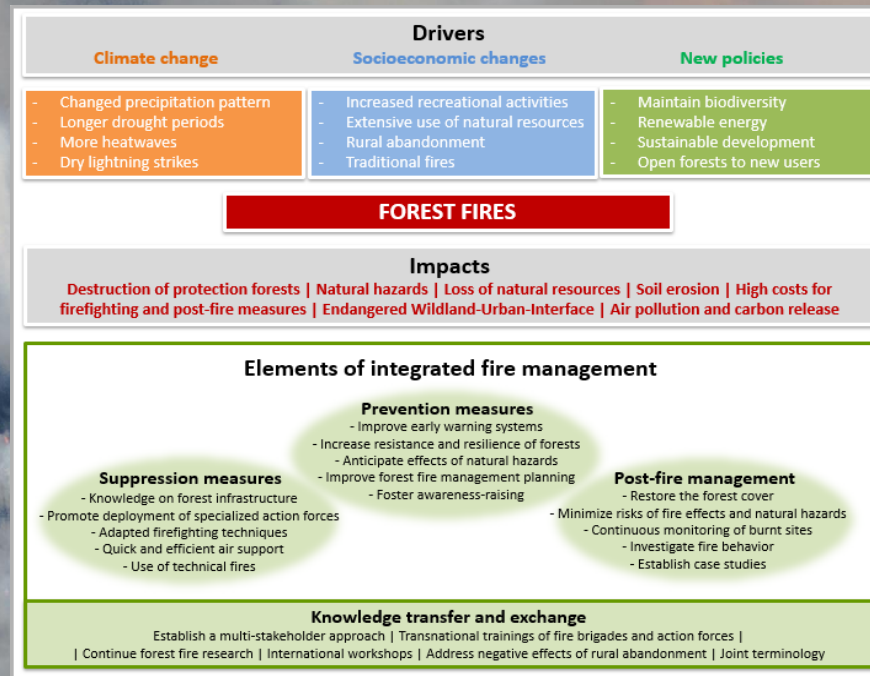
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Integrated Fire management

Thank you!



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