

# Research and protection of European wilderness with REMOTE Primary Forests and Aevis foundation



**Ondrej Kameniar, Martin Mikoláš, Miroslav Svoboda, Jakob Pavlin, Marius Teodosiu, Volodymyr Trotsiuk, Pavel Janda, Radek Bače, Vojtěch Čada, Jon Schurman, Jakub Málek, Ondřej Vostarek, Martin Dušátko, Jana Lábusová, Daniel Kozák, Michal Synek, Krešimir Begović, Michal Frankovič, Karol Kaliský, Erik Baláž, Tomáš Vida, Zuzana Burdová (...)**



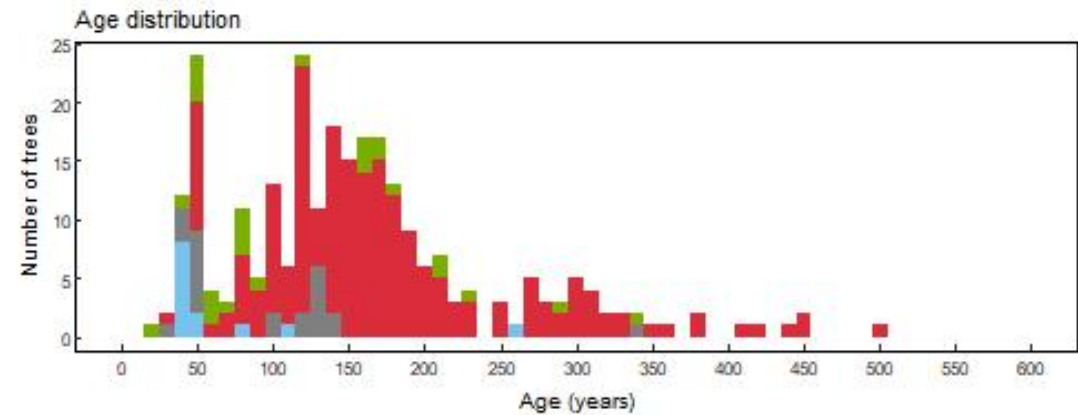
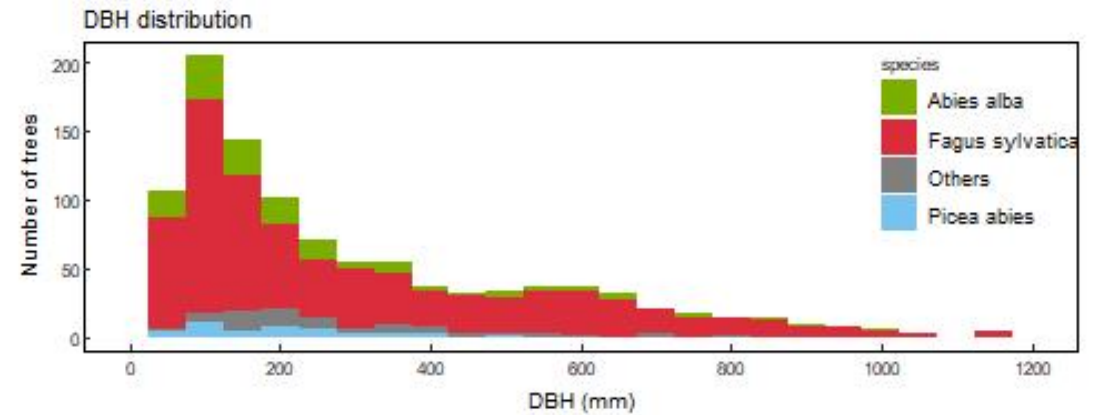
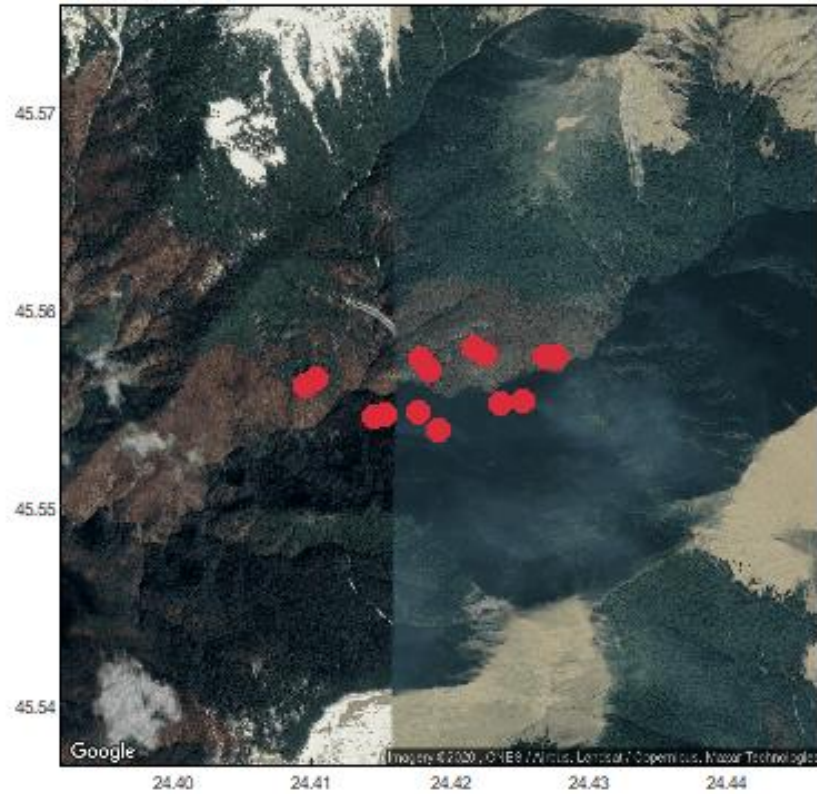
# REMOTE forests project

- Research on Mountain Temperate primary forests, [www.remoteforests.org](http://www.remoteforests.org)
- Largest research of primary forests in Europe
- Nine countries, mostly in Carpathians and Dinarids, scientific cooperation in every country
- Spruce, beech and mixed primary forests, tens of thousands of tree cores





## Boia Mica



Country	Romania	Minimal DBH sampled	60	Aboveground biomass (T/ha)	416
Location	Fagaras	Number of alive trees per hectare	561	Underground_biomass (T/ha)	73
Forest type	beech	Number of dead trees per hectare	18	Regeneration of height class 0-50cm (saplings/ha)	875
Altitude range (m a.s.l.)	1128-1270	Volume of alive trees (m <sup>3</sup> /ha)	554	Regeneration of height class 50-130cm (saplings/ha)	158
Years of sampling	2014	Standing deadwood (m <sup>3</sup> /ha)	12	Regeneration of height class 130-250cm (saplings/ha)	185
Plot size (m <sup>2</sup> )	1000	Lying deadwood (m <sup>3</sup> /ha)	65	Regeneration above 250cm (saplings/ha)	234



# What is natural disturbance?



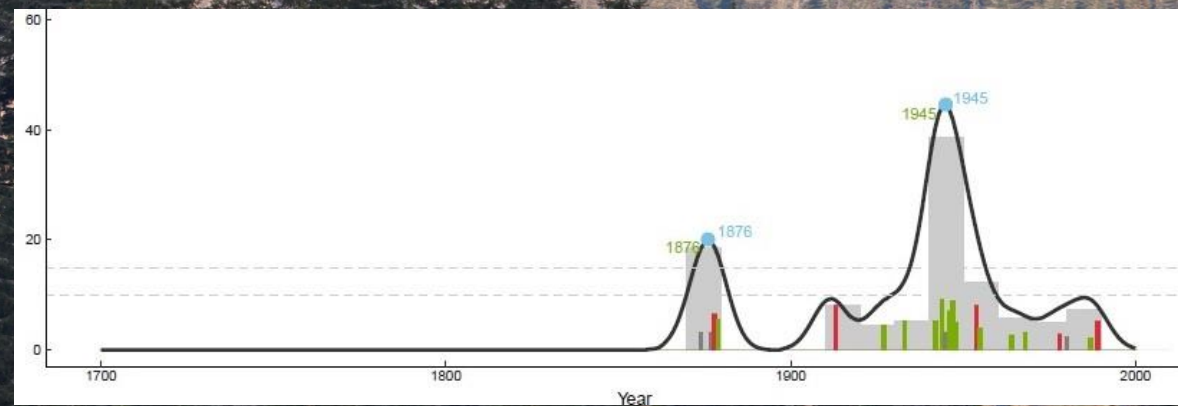
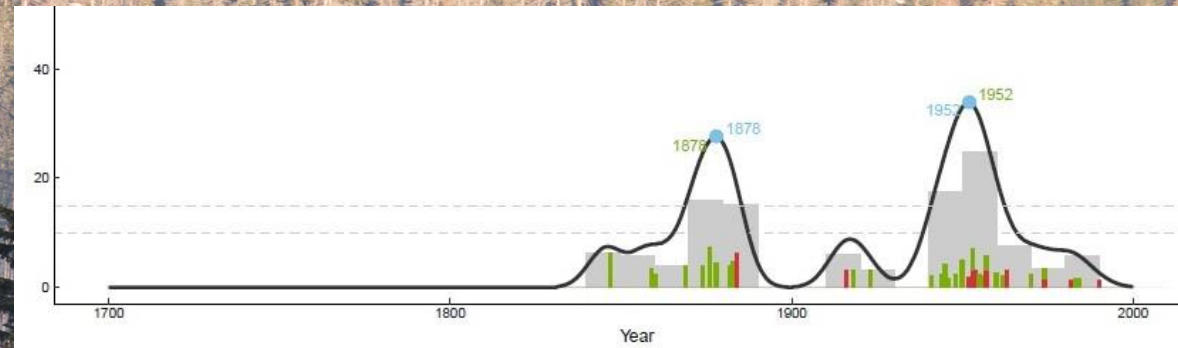
nature  
climate change

LETTERS

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## Increasing forest disturbances in Europe and their impact on carbon storage

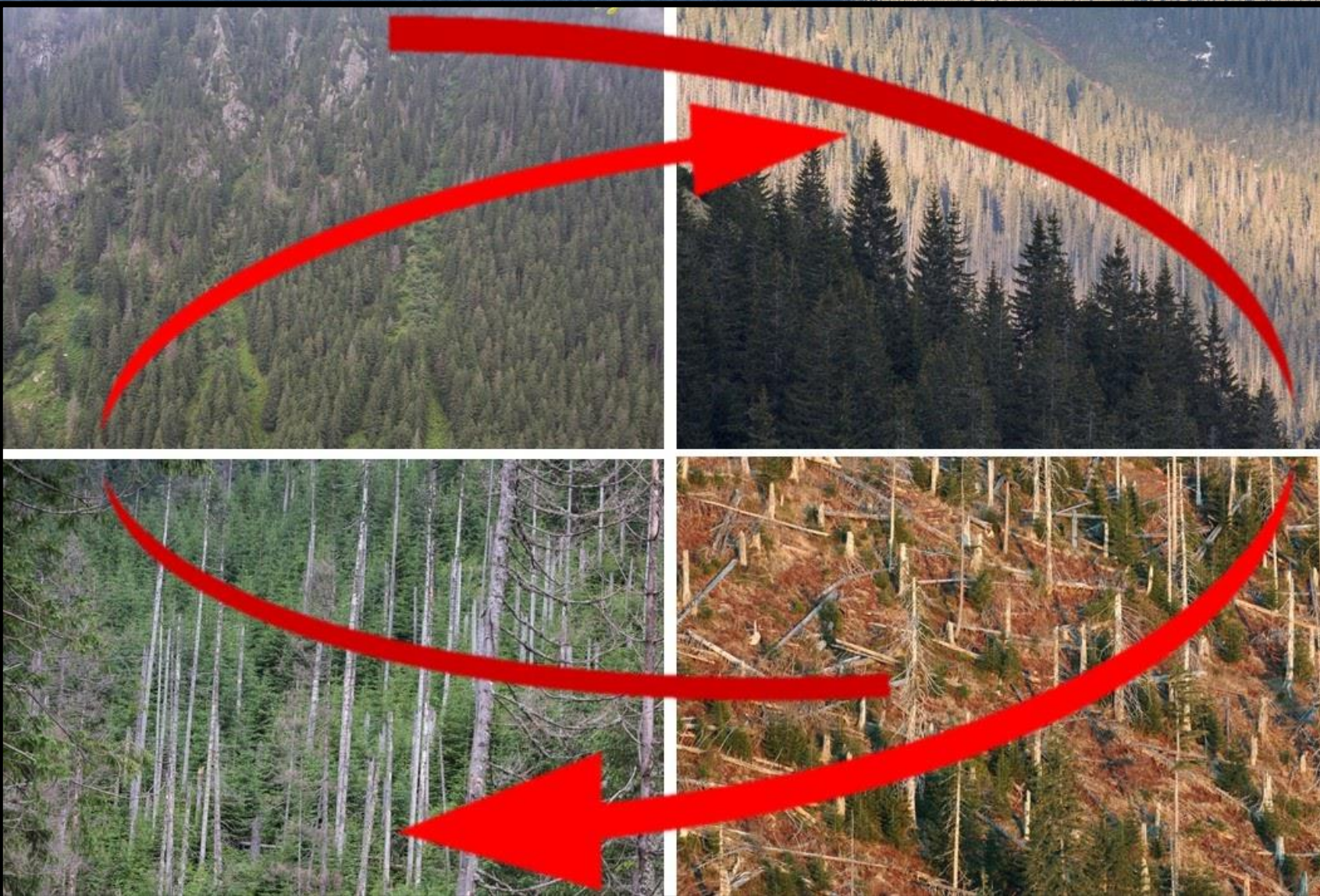
Rupert Seidl<sup>1\*</sup>, Mart-Jan Schelhaas<sup>2</sup>, Werner Rammer<sup>1</sup> and Pieter Johannes Verkerk<sup>3</sup>





# Primary forest is a wild (dynamic) forest

- Natural disturbances are not damaging the primary forest – they create opportunity for early successional species and result is a mosaic of different successional stages,
- Salvage logging is not helping the forest – result is the interruption in forest development cycle and long lasting damage to whole ecosystem







**Artificial spruce  
moculture**

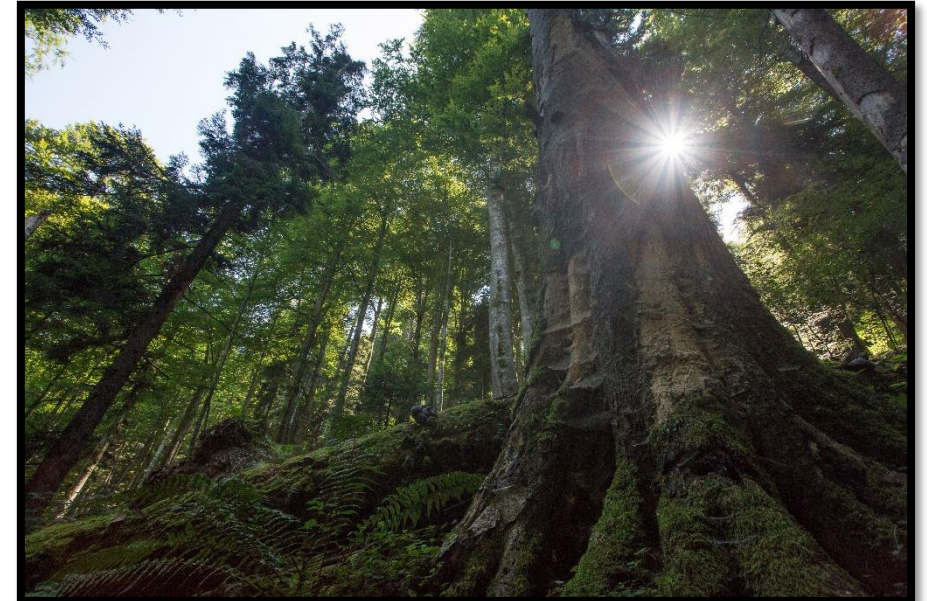
**Natural forest**



# Where are Europe's last primary forests?

Francesco Maria Sabatini<sup>1</sup>  | Sabina Burrascano<sup>2</sup> | William S. Keeton<sup>3</sup> |  
Christian Levers<sup>1</sup>  | Marcus Lindner<sup>4</sup> | Florian Pötzschner<sup>1</sup> | Pieter Johannes Verkerk<sup>5</sup> |

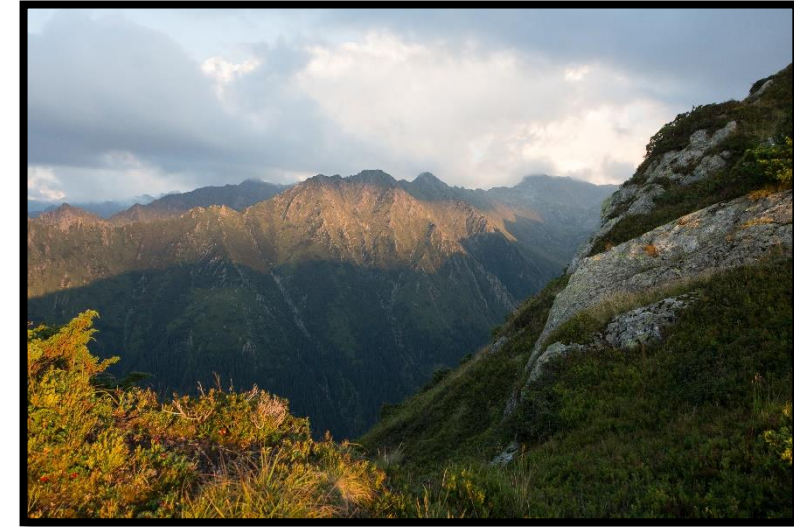
**Main conclusions:** Despite their outstanding conservation value, primary forests are rare and their current distribution is the result of centuries of land use and forest management. The conservation outlook for primary forests is uncertain as many are not strictly protected and most are small and fragmented, making them prone to extinction debt and human disturbance. Predicting where unmapped primary forests likely occur could guide conservation efforts, especially in Eastern Europe where large areas of primary forest still exist but are being lost at an alarming pace.





## Protection gaps and restoration opportunities for primary forests in Europe

Francesco M. Sabatini<sup>1,2,3</sup>  | William S. Keeton<sup>4</sup> | Marcus Lindner<sup>5</sup>  |  
Miroslav Svoboda<sup>6</sup> | Pieter J. Verkerk<sup>7</sup>  | Jürgen Bauhus<sup>8</sup> | Helge Bruelheide<sup>1,2</sup>  |  
Sabina Burrascano<sup>9</sup> | Nicolas Debaive<sup>10</sup> | Inês Duarte<sup>11</sup> | Matteo Garbarino<sup>12</sup>  |  
Nikolaos Grigoriadis<sup>13</sup> | Fabio Lombardi<sup>14</sup>  | Martin Mikoláš<sup>6,15</sup> | Peter Meyer<sup>16</sup>  |



-Of the 54 forest types we assessed, six had no primary forest at all, and in two thirds of forest types, **less than 1% of forest was primary**

- Even if generally protected, only ten forest types had more than **half** of their primary forests strictly **protected**

- Protecting all documented primary forests requires expanding the protected area networks by **1,132 km<sup>2</sup>** (19,194 km<sup>2</sup> when including also predicted primary forests).





# nature

THE INTERNATIONAL WEEKLY JOURNAL OF SCIENCE

## TREE DIMENSIONS

A snapshot of the  
changing symbiotic  
profiles found in the  
world's forests **PAGE XXX**

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### TWO LINE TEASER HEERE

Two-line explanation goes  
in here too  
**PAGE XXX**

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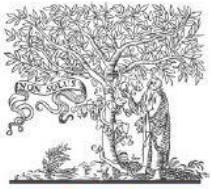
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Vol. 368 No. 7756

- sharp transitions between the dominant types of symbiosis (fungi and trees),
- these transitions are largely driven by climatically controlled decomposition rates.





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# Forest Ecology and Management

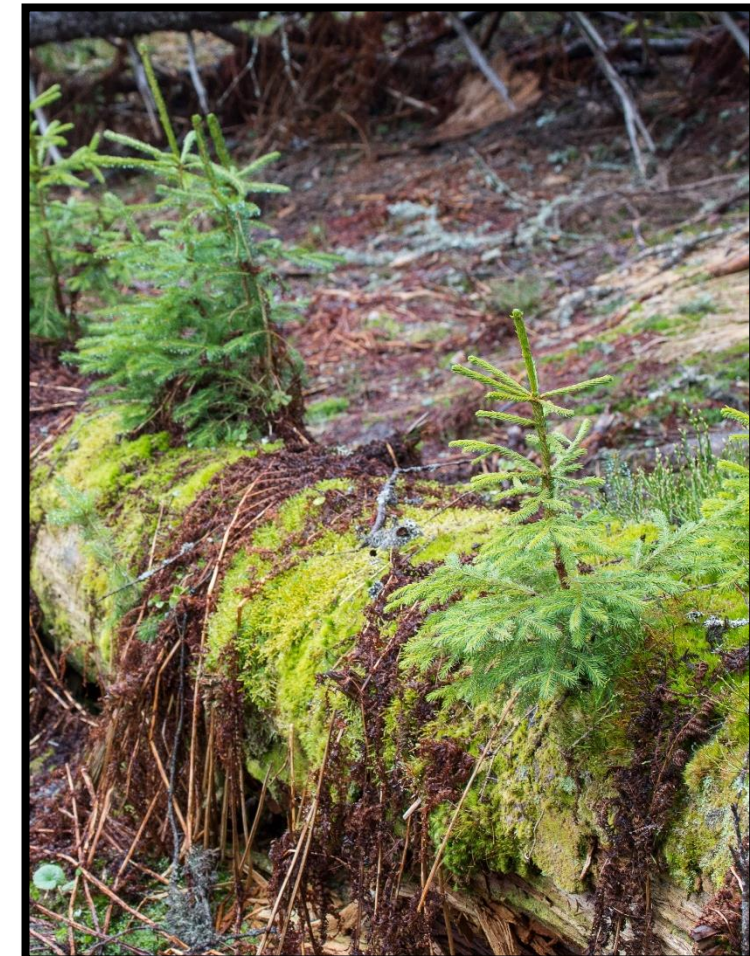
journal homepage: [www.elsevier.com/locate/foreco](http://www.elsevier.com/locate/foreco)



## Biomass carbon accumulation patterns throughout stand development in primary uneven-aged forest driven by mixed-severity natural disturbances





Meelis Seedre<sup>a,b,\*</sup>, Pavel Janda<sup>a</sup>, Volodymyr Trotsiuk<sup>a,c,d</sup>, Per-Ola Hedwall<sup>b</sup>, Robert C. Morrissey<sup>a</sup>, Martin Mikoláš<sup>a</sup>, Radek Bače<sup>a</sup>, Vojtěch Čada<sup>a</sup>, Miroslav Svoboda<sup>a</sup>

Stands that experienced lower severity disturbances never reached as high C levels as those after **higher severity disturbances** (more than 250 t C/ha).



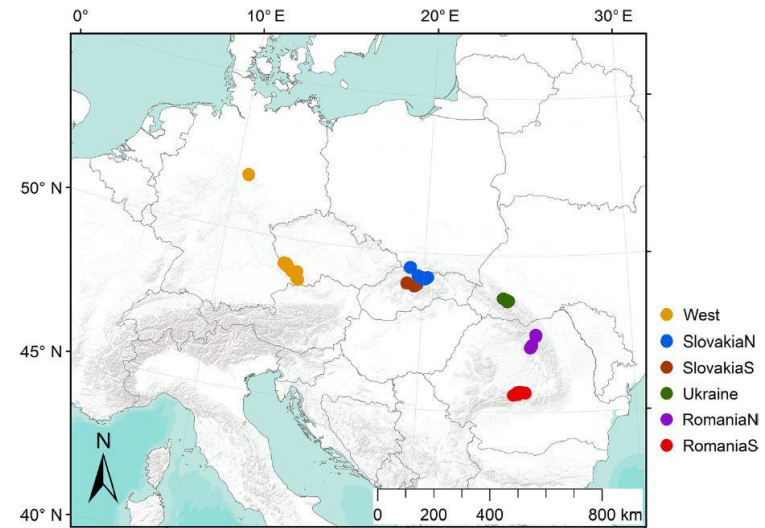


# Quantifying natural disturbances using a large-scale dendrochronological reconstruction to guide forest management

VOJTĚCH ČADA <sup>1,12</sup> VOLODYMYR TROTSIUK <sup>1,2</sup> PAVEL JANDA,<sup>1</sup> MARTIN MIKOLÁŠ,<sup>1,3</sup> RADEK BAČE,<sup>1</sup> THOMAS A. NAGEL,<sup>1,4</sup> ROBERT C. MORRISSEY,<sup>1</sup> ALAN J. TEPLY <sup>5</sup> ONDŘEJ VOSTAREK <sup>1</sup> KREŠIMIR BEGOVIĆ,<sup>1</sup> OLEH CHASKOVSKYY,<sup>6</sup> MARTIN DUŠÁTKO,<sup>1</sup> ONDREJ KAMENIAR,<sup>1</sup> DANIEL KOZÁK,<sup>1</sup> JANA LÁBUSOVÁ,<sup>1</sup> JAKUB MÁLEK,<sup>1</sup> PETER MEYER,<sup>7</sup> JOSEPH L. PETTIT,<sup>1</sup> JONATHAN S. SCHURMAN,<sup>1</sup> KRISTÝNA SVOBODOVÁ,<sup>1,8</sup> MICHAL SYNEK,<sup>1</sup> MARIUS TEODOSIU,<sup>9,10</sup> KAROL UJHÁZY,<sup>11</sup> AND MIROSLAV SVOBODA<sup>1</sup>

**-maximum patch size of more than 93 ha** with as much as 100% of the stand disturbed. Median values (and 95% ranges) for the disturbance severities were 18.7% (10.4–65.6), for the patch sizes 4 ha (1.8–28.1), and for the stand proportions disturbed 25.0% (6.1–77.3).

**-need for sufficiently large and adequately connected networks of strict reserves,** more complex silvicultural treatments





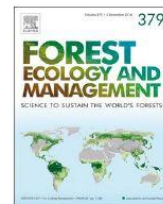


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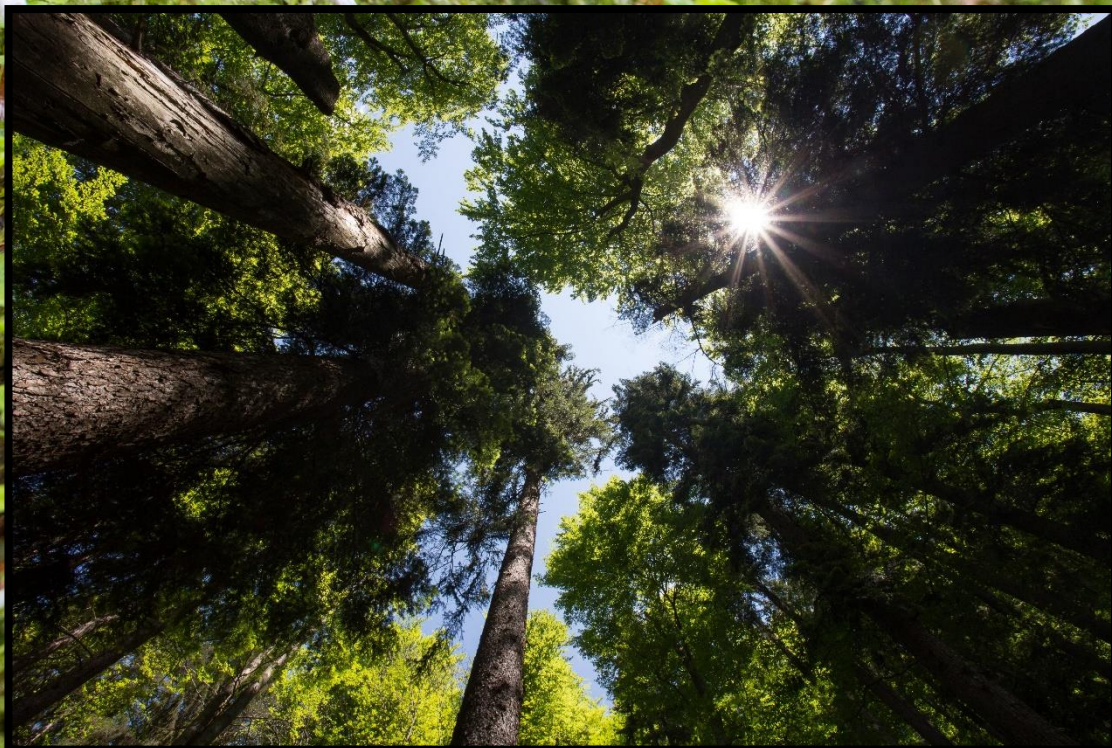
## Forest Ecology and Management

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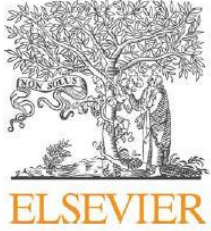
### Natural dynamics of temperate mountain beech-dominated primary forests in Central Europe

Michal Frankovič<sup>a,\*</sup>, Pavel Janda<sup>a</sup>, Martin Mikoláš<sup>a,b</sup>, Vojtěch Čada<sup>a</sup>, Daniel Kozák<sup>a</sup>, Joseph L. Pettit<sup>a</sup>, Thomas A. Nagel<sup>a,c</sup>, Arne Buechling<sup>a</sup>, Radim Matula<sup>a</sup>, Volodymyr Trotsiuk<sup>a,d</sup>, Rhiannon Gloor<sup>a,e</sup>, Martin Dušátko<sup>a</sup>, Ondrej Kameniar<sup>a</sup>, Ondřej Vostarek<sup>a</sup>, Jana Lábusová<sup>a</sup>, Karol Ujházy<sup>f</sup>, Michal Synek<sup>a</sup>, Krešimír Begović<sup>a</sup>, Matej Ferenčík<sup>a</sup>, Miroslav Svoboda<sup>a</sup>





# Birds and natural disturbances- Capercaillie (*Tetrao urogallus*)



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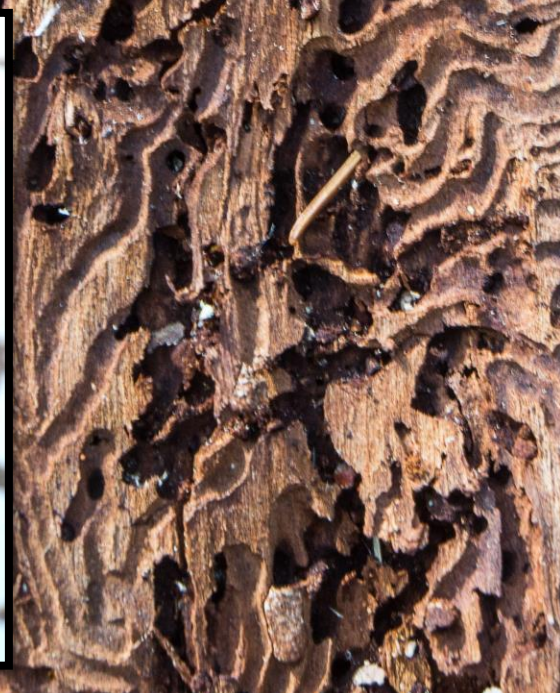
journal homepage: [www.elsevier.com/locate/foreco](http://www.elsevier.com/locate/foreco)

Mixed-severity natural disturbances promote the occurrence of an endangered umbrella species in primary forests

Martin Mikoláš<sup>a,b,\*</sup>, Marek Svitok<sup>c</sup>, Kurt Bollmann<sup>d</sup>, Jiří Reif<sup>e,f</sup>, Radek Bače<sup>a</sup>, Pavel Janda<sup>a</sup>,



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# Bird community and disturbances in spruce primary forest



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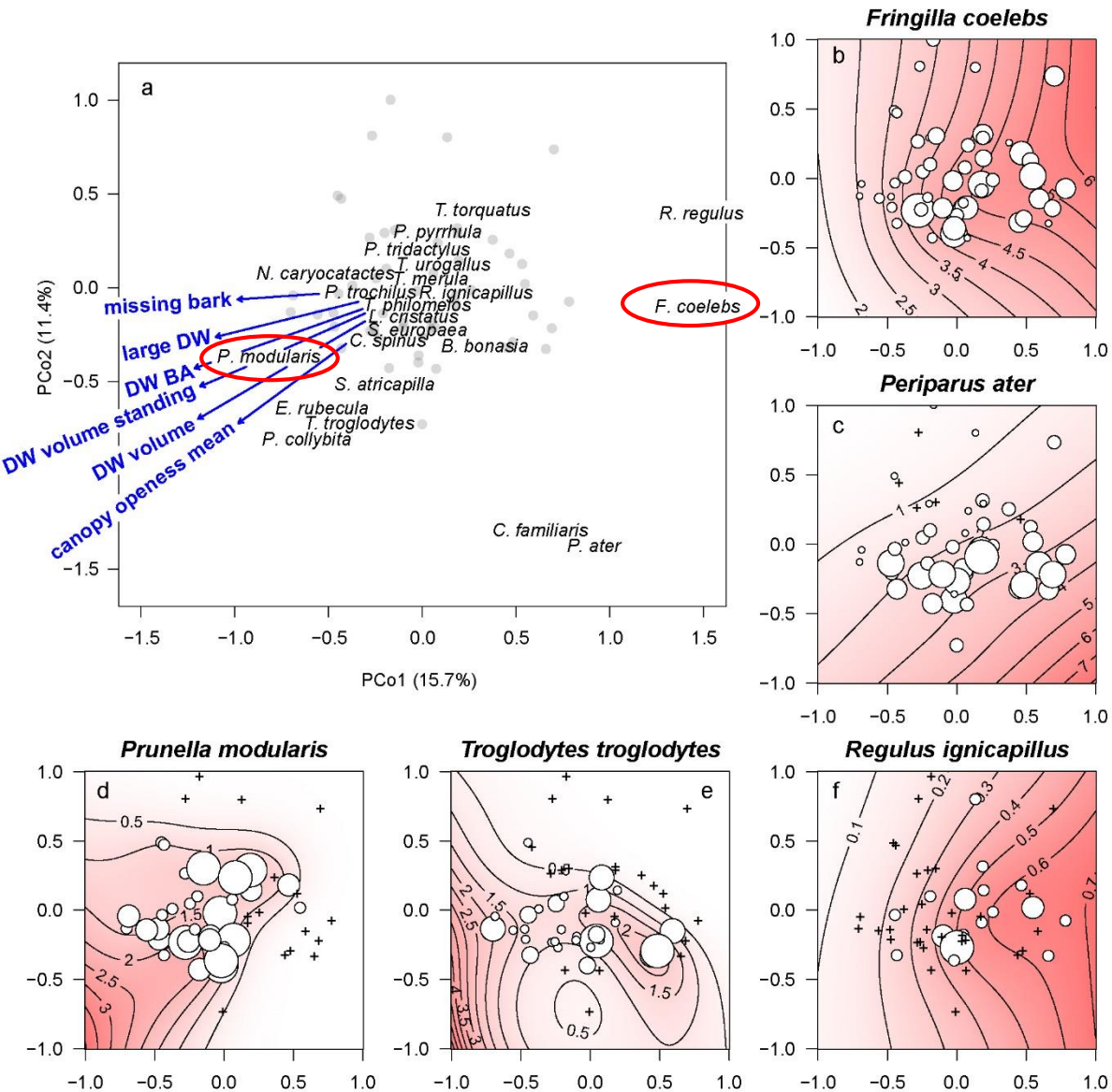
## Historical natural disturbances shape spruce primary forest structure and indirectly influence bird assemblage composition

Ondrej Kameniar<sup>a</sup>, Michal Baláž<sup>b</sup>, Marek Svitok<sup>c,d</sup>, Jiří Reif<sup>e</sup>, Martin Mikoláš<sup>a,g</sup>, Joseph L. Pettit<sup>a</sup>, William S. Keeton<sup>h</sup>, Jessika M. Pettit<sup>a</sup>, Ondřej Vostarek<sup>a</sup>, Thomas Langbehn<sup>a</sup>, Volodymyr Trotsiuk<sup>a,i</sup>, Federico Morelli<sup>f</sup>, Michal Frankovič<sup>a</sup>, Daniel Kozák<sup>a</sup>, Pavel Janda<sup>a</sup>, Vojtěch Čada<sup>a</sup>, Matej Ferencík<sup>a</sup>, Jakub Málek<sup>a</sup>, Krešimir Begovič<sup>a</sup>, Michal Synek<sup>a</sup>, Jana Lábusová<sup>a</sup>, Kristýna Svobodová<sup>a</sup>, Miroslav Svoboda<sup>a</sup>





# Structure vs. birds

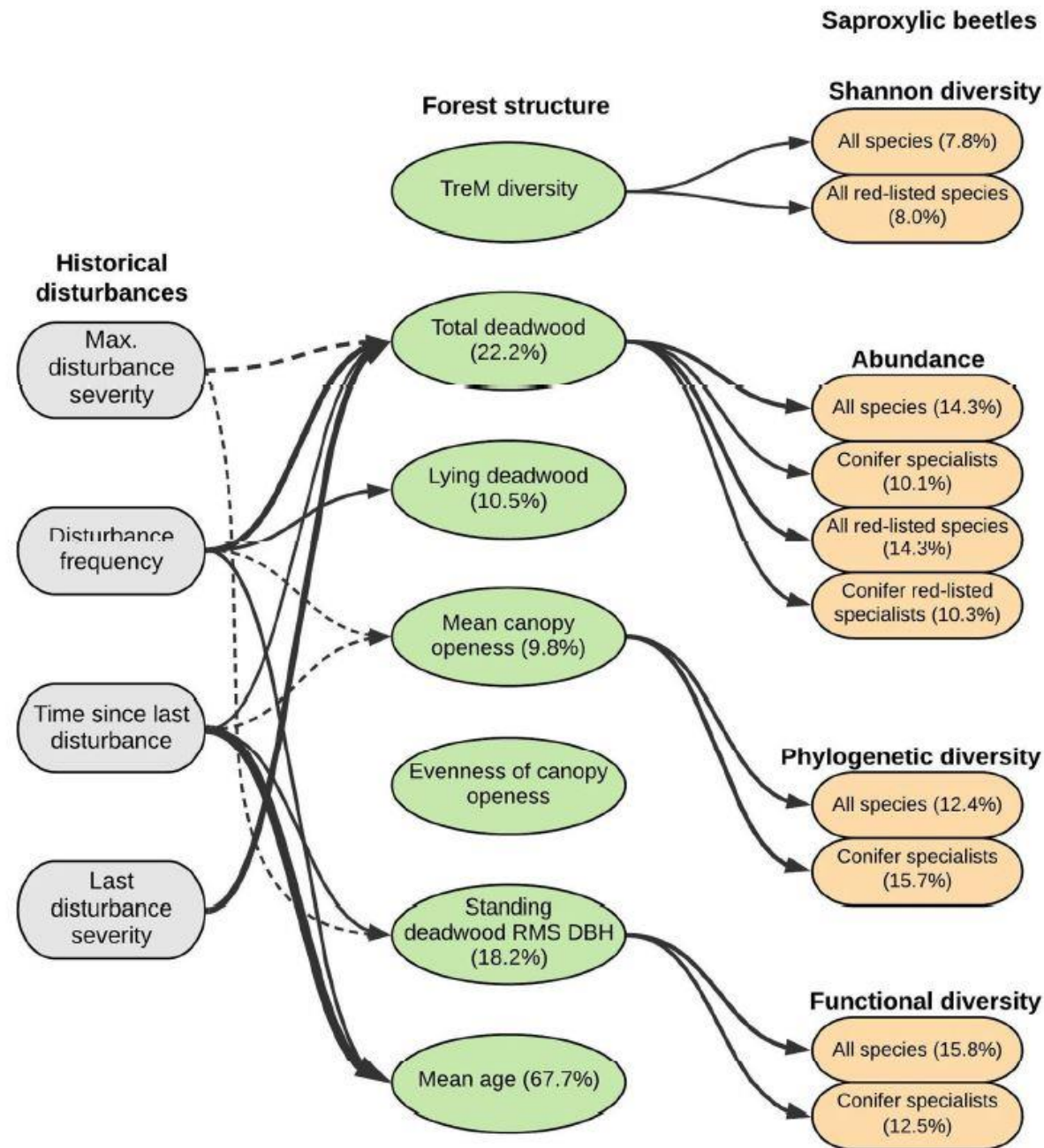


- Structural variables connected with recent disturbance are pointing to the same direction and are shaping the community
- Diversity and abundance remained unchanged – only species composition changed
- avoidance/preference of disturbance related structure of different intensity
- Red listed species were occurring also on disturbed plots- Eurasian Pygmy owl (*Glaucidium passerinum*), Three-toed woodpecker (*Picoides tridactylus*), Capercaillie (*Tetrao urogallus*)



# Historical Disturbances Determine Current Taxonomic, Functional and Phylogenetic Diversity of Saproxylic Beetle Communities in Temperate Primary Forests

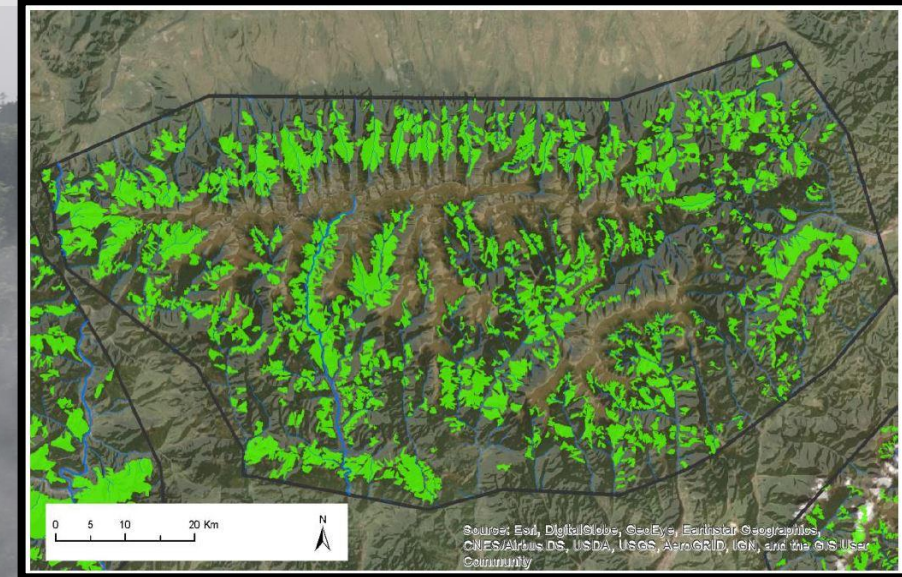
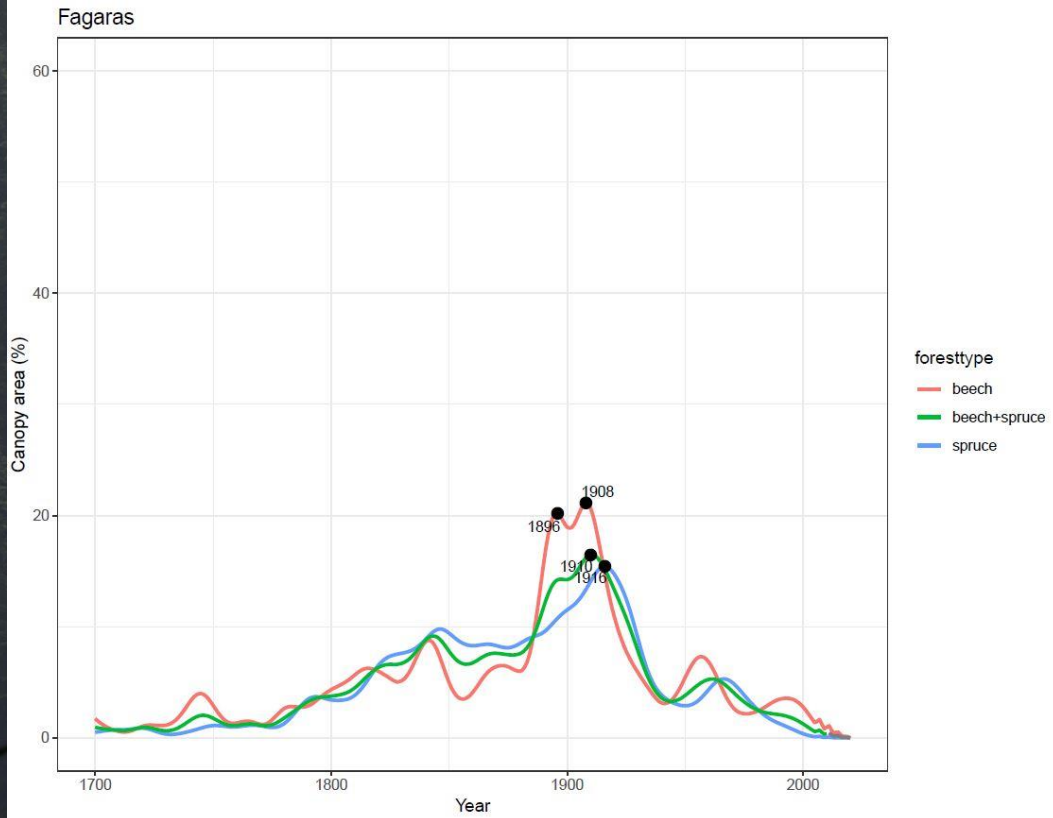
Daniel Kozák,<sup>1\*</sup> Marek Svitok,<sup>2,3</sup> Michal Wiezik,<sup>2</sup> Martin Mikoláš,<sup>1</sup> Simon Thorn,<sup>4</sup> Arne Buechling,<sup>1</sup> Jeňýk Hofmeister,<sup>1</sup> Radim Matula,<sup>1</sup> Volodymyr Trotsiuk,<sup>1,5</sup> Radek Bače,<sup>1</sup> Krešimir Begovič,<sup>1</sup> Vojtěch Čada,<sup>1</sup> Martin Dušátko,<sup>1</sup> Michal Frankovič,<sup>1</sup> Jakub Horák,<sup>6</sup> Pavel Janda,<sup>1</sup> Ondrej Kameniar,<sup>1</sup> Thomas A. Nagel,<sup>1,7</sup> Joseph L. Pettit,<sup>1</sup> Jessika M. Pettit,<sup>1</sup> Michal Synek,<sup>1</sup> Adela Wieziková,<sup>2</sup> and Miroslav Svoboda<sup>1</sup>





# Current work: Disturbance regime of Fagaras Mts.

More than 200 plots in mixed beech and Norway spruce forest- unique opportunity to explore disturbance regime in large natural forest complex





# Fagaras mts. – the best of the Wilderness in Carpathians





# Documentary about Fagaras mts.

Arolla film, Aevis foundation and Fundația Conservation Carpathia (FCC)



















- My sme les (We are the forest)- public initiative to strengthen protection of national parks and stop the destruction of natural forests
- **70 440 people, 111 scientists,**
- We communicate important topics (supported with science) and create **public pressure**



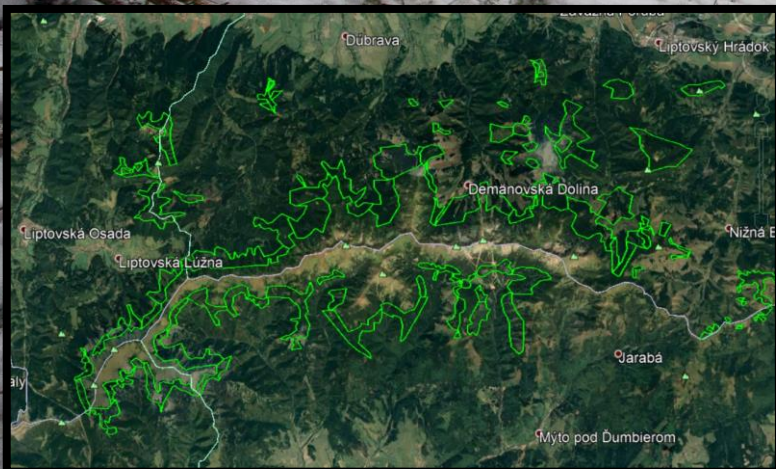
One picture can tell more than thousands of words...





# Monitoring of logging in the capercaillie biotopes

Cca 20 complains to Environmental Inspection of Slovakia and to Forest Office. We documented that our authorities are not solving the problem in Natura 2000 sites (despite claiming opposite...). The result- EC filed a lawsuit against Slovakia on European Court of Justice.





# Medialisation of forest-protection issues- fieldtrip with GEO magazine





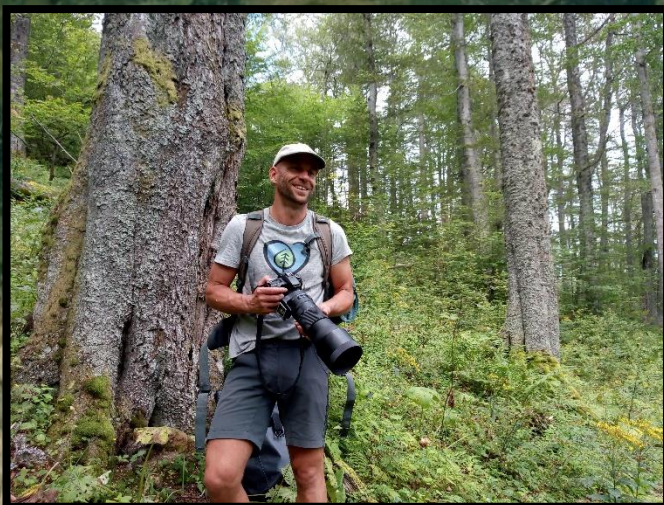


MINISTERSTVO  
ŽIVOTNÉHO PROSTREDIA  
SLOVENSKEJ REPUBLIKY





# Tichá and Kôprová valleys- Largest strictly protected area in Central Europe – 100 km<sup>2</sup> – return of wild nature



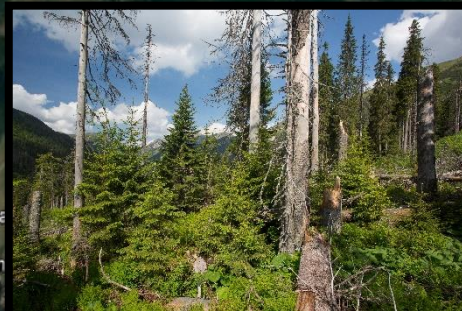
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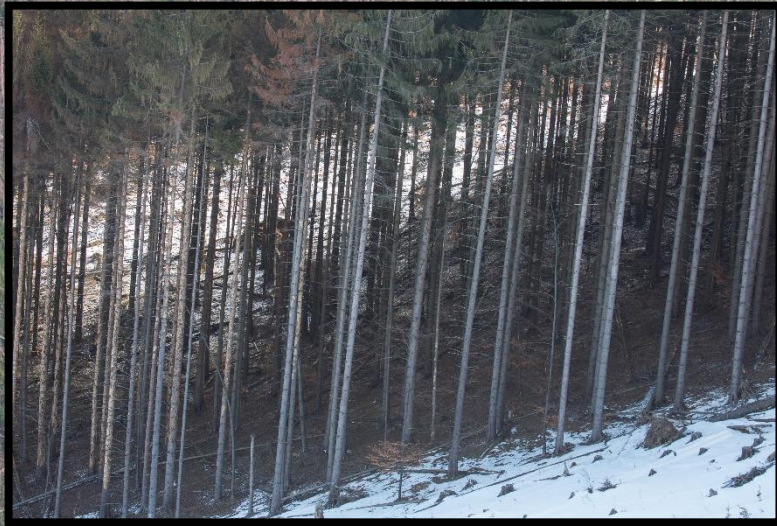
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SLO\_KOP\_188  
SLO\_KOP\_124



Google Earth



# Spruce monocultures are changing to natural forest





# Some big recent achievements

- Results of work of different people and NGOs (WWF Slovakia, Prales, VLK, SOS Birdlife Slovakia, to name few)
- Nature reserve Primary forests of Slovakia- 6400 ha of strict protection
- Nature reserves Vihorlat primary forest and Rydošová (more than 2200 ha, mostly in strict protection), another strict reserve in beech forests of Eastern Slovakia on the way (almost 1000 ha)
- Stopped logging in Capercaillie habitats (thousands of hectares)
- Overall: increased interest of public (and politics) and trend to positive change



# Summary: the key points

- Disturbances are part of ecosystem functioning- it is the time of „ecosystem actualisation“ on actual climate conditions
- Biodiversity is adapted to dynamic nature of forest
- With increasing global temperature we expect also an increase in disturbance activity
- Only large, strictly protected areas can save (most of) biodiversity and ecosystem functions
- We need to transfer the knowledge and understanding to public to achieve change



Thank you for your attention!

