Legal Framework and Practical Implementation of Sustainable Forest Management in Slovenia

Dušan Roženbergar

UNIVERSITY OF LJUBLJANA | BF Biotechnical Faculty

University of Ljubljana, Biotechnical Faculty
Department for Forestry and Renewable Forest Resources
Slovenia

Close-to-nature Continuous Cover Forestry in Slovenia

- The beginnings
- Legislation
- Implementation
- Challenges
- Conclusions

The beginnings

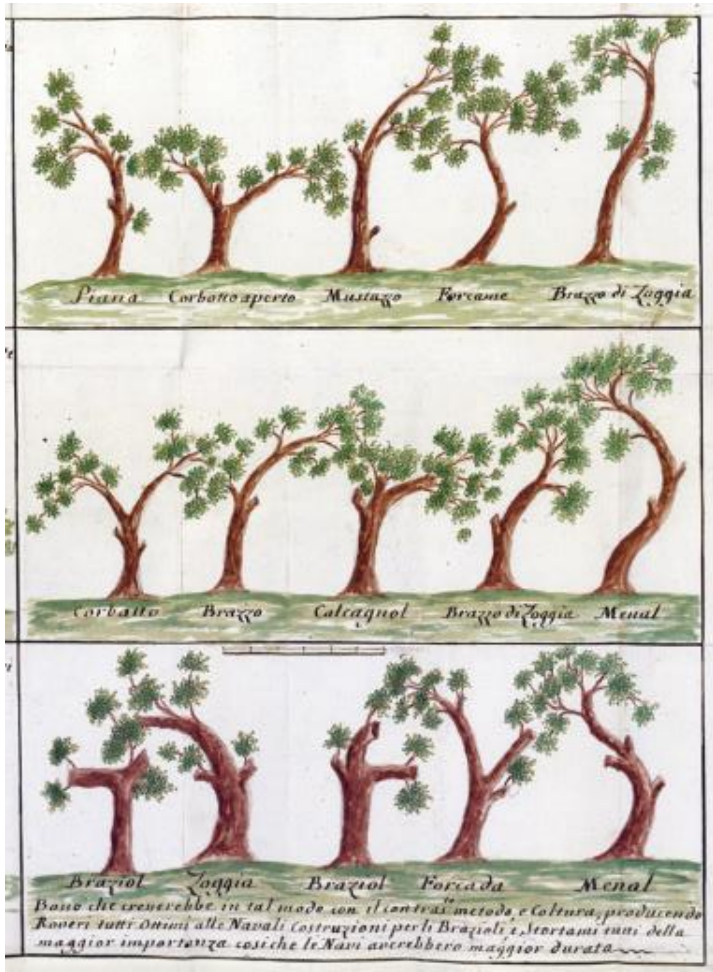
- Officially or legally Continuous Cover Forestry (CCF) implementation started in 1947 with a forest act

  - Prohibition of clearcut
  - Obligatory forest management and silvicultural planning

- WHY CCF?

The beginnings – WHY CCF?

- As a result of heavy land use in the past (Mediterranean, but also Alpine region of Slovenia) – total landscape degradation
  - burning, grazing, wood extraction



Heavy winds - Karst region of Slovenia

Valvasor, 1689

Around year 1800 - Karst region of Slovenia

- no vegetation
- desertification of the landscape

The beginnings – WHY CCF?

Foresters taking over “the stone dessert”

- Josip Ressel and Josip Koller – planting experiments
- different tree species
- first successful black pine planting in 1859 – Koller forest

sometimes before year 1900

The beginnings – WHY CCF?

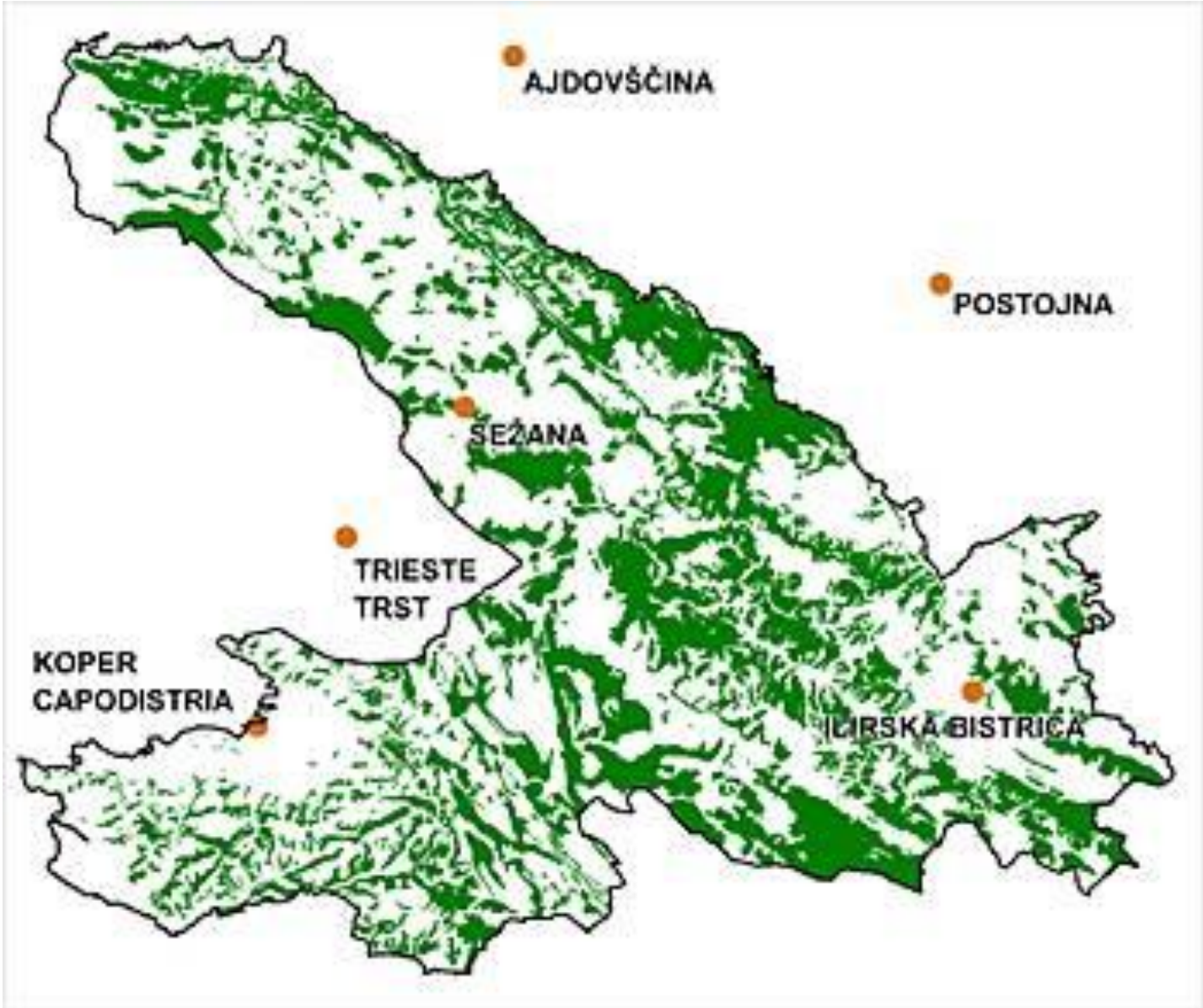
Leto 1830

(26.870 ha)

The beginnings – WHY CCF?

Leto 1960

(56.633 ha)



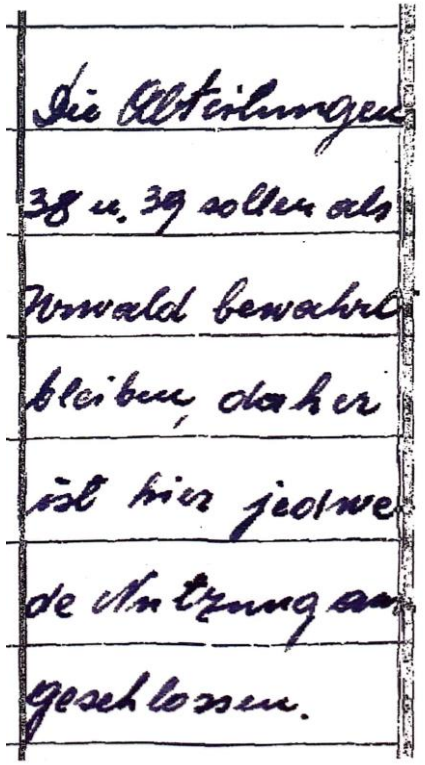
The beginnings – WHY CCF?

Leto 2000

(80.588 ha)

The beginnings – WHY CCF?

- the need for forest management planning
- first forest plan for fir–beech forests in Dinaric karst area in 1892
- Leopold Hufnagl – no clearcutting which is at the time prevailing
- single tree selection – why?
  - awareness of the importance of multilayered continuous forest cover for soil erosion prevention



The beginnings – WHY CCF?

History of Foundation of PROSILVA Europa 1989

PROSILVA was founded at Robanov Kot, Savinja valley, Slovenia, September 22th 1989.

From the 1960s to the 1980s there were regular meetings, more or less informal, of the perialpine Chairs of Silviculture from Universities advocating Close-to-Nature ideas (Ljubljana, Munich, Zürich and sometimes Nancy) discussing ways of implementing this form of forest management inspired from virgin forest dynamics.

Also during this time a group of forest practitioners ANW, in the wake of Alfred Möllers's movement, supported the implementation of Continuous Close-to-Nature Forest management.

The idea of Prof *Dušan Mlinšek*, recent past president of the IUFRO (International Union of Forest Research Organizations) was to merge both groups and expand it to welcome all Europeans foresters convinced of these ideas.

At the IUFRO world congress in Ljubljana 1986 Prof. Dušan Mlinšek for the first time presented his idea to establish a network for close-to-nature forestry in Europe.

So in 1989 Prof. Mlinšek invited, conjointly with *Hilmar Schoepffer* and *Brice de Turckheim*, leaders in this field at the time (see list of the founding members below) to Slovenia, to constitute a corresponding European movement.

Professor Dušan Mlinšek – Spiritus mentor for the foundation of PROSILVA Europe

download the **Declaration of Robanov Kot (French)** | go to **Declaration of Robanov Kot (engl.)**

Patient silviculture that respects natural laws promotes diversity, sustainable development, structural richness and natural regeneration of forests composed of local native species.

Group of founding members visiting Pecka (1989) (foto Franc Ferlin)

The beginnings – WHY CCF?

General Principles

With reference to sustainability in its broadest sense PROSILVA believes that forests provide four categories of benefit to society.

These are:
- conservation of ecosystems
- protection of soil and climate
- production of timber and other products
- provision of other ecosystem services - recreation, amenity, and cultural aspects

PROSILVA promotes forest management strategies which optimize the maintenance, conservation and utilization of forest ecosystems in such a way that the ecological and socio-economic functions are sustainable and profitable. The general approach to management which is advocated by PROSILVA, includes market and non-market objectives, and takes the whole forest ecosystem into consideration.

Legislation

- **Constitution of the Republic of Slovenia**: Article 67 - The law shall determine the manner in which property is acquired and used in order to ensure its economic, social and ecological function.
- The Resolution on the **National Forest Programme** - The programme is the basic strategic document for defining the national forestry policy.
- **Forest Act**: Article 5 - The right of ownership of the forest shall be exercised in such a way that its ecological, social and productive functions are guaranteed.

Legislation

- The Resolution on the **National Forest Programme** - The programme is the basic strategic document for defining the national forestry policy. 2 general goals:

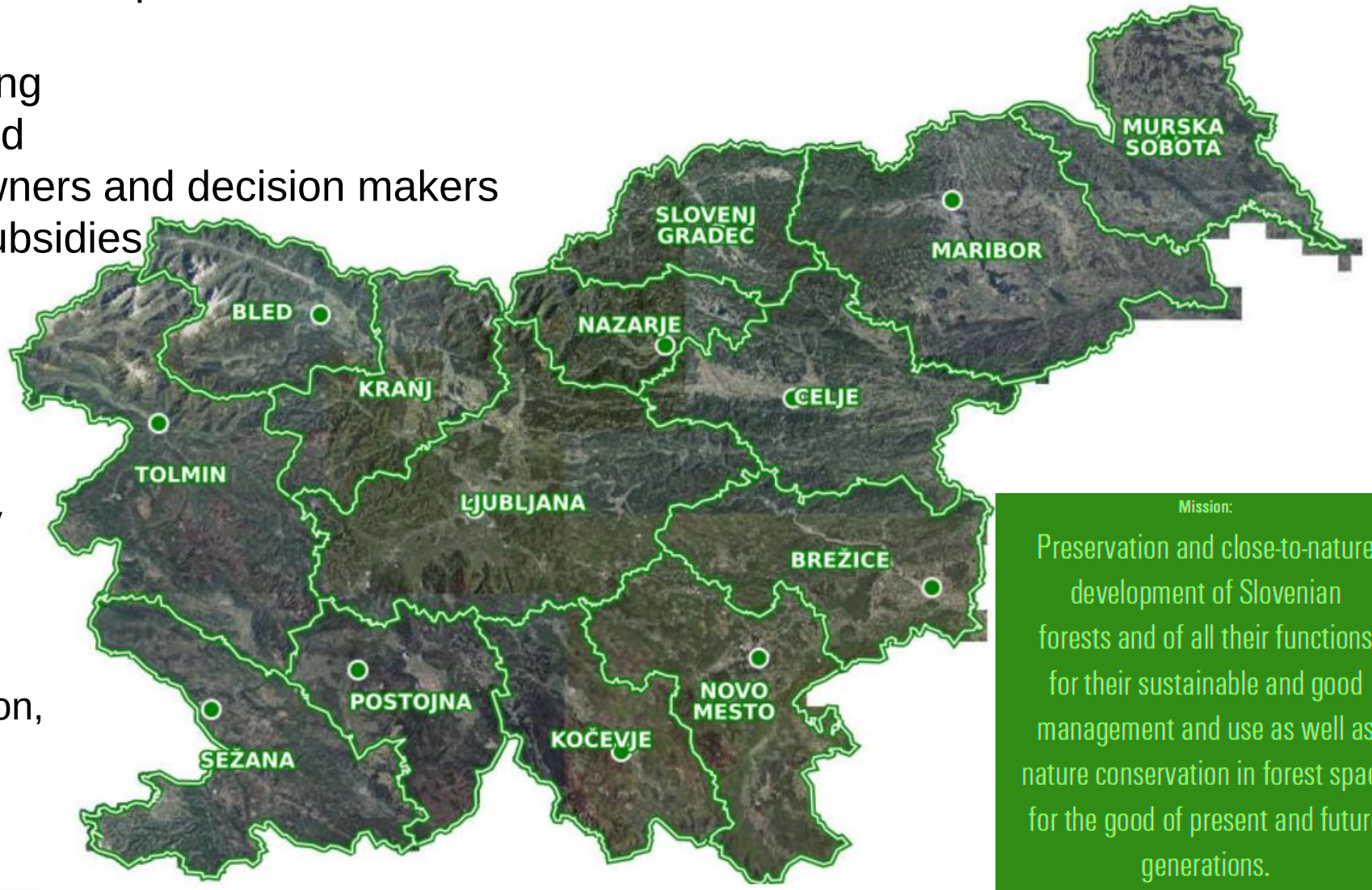
  - Sustainable development of forest ecosystems for provision of biodiversity and ecological, production and social ecosystem services
  - Conservation of natural environment and ecological balance of Slovenia landscape

Legislation

- **Forest Act** in 1993
  - All forests need to be managed according to Forest Management Plans (FMP)
  - FMP are adopted by the state after the input of all stakeholders – forest service, forest owners, local communities, NGOs.
- Slovenia Forest Service (SFS)
  - established in 1994
  - Performs public forestry service in all Slovenian forests, irrespective of ownership.

Implementation - Slovenia Forest Service (SFS)

- service for general public and private forest owners
  - monitoring of the state and development of Slovenia forests
  - forestry and hunting planning
  - marking all trees to be felled
  - advice service for forest owners and decision makers
  - controlling the system of subsidies



- central unit in Ljubljana
- 14 regional units
- 730 staff members, mostly forestry experts
- funded from the budget of the Republic of Slovenia
- not performing any felling, extraction, transport and selling of wood, nor forest trade

Mission:

Preservation and close-to-nature development of Slovenian forests and of all their functions for their sustainable and good management and use as well as nature conservation in forest space for the good of present and future generations.

Implementation - Slovenia Forest Service (SFS)

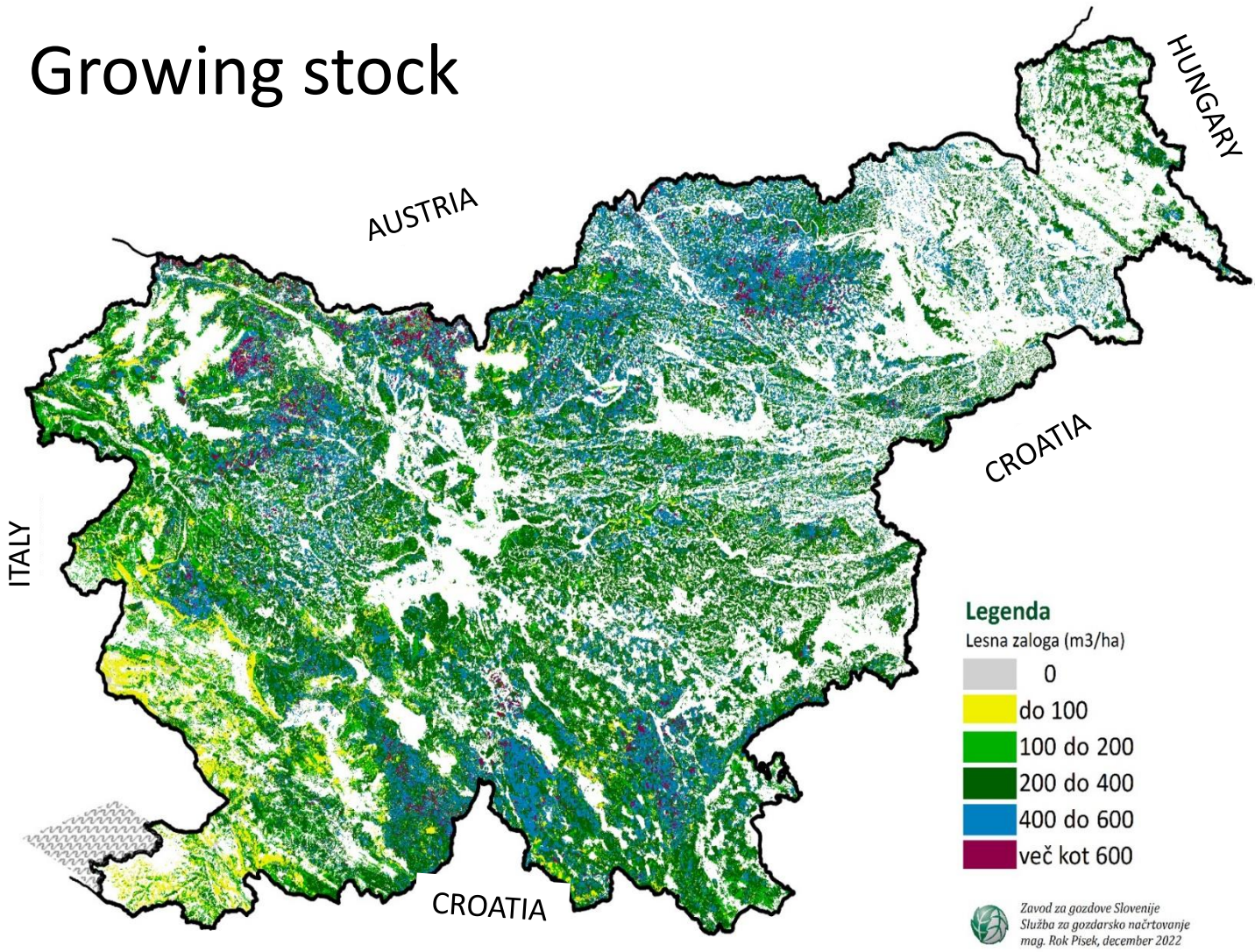
FORESTS COVER OVER 58% OF SLOVENIA.

The total forest area is **1.176.069 ha**:

1.067.815 ha	98.828 ha	9.426 ha
OF MANAGED FOREST	OF PROTECTIVE FOREST	OF FOREST RESERVES

- **Total growing stock:** 357 million m^3 - 304 m^3/ha, 54% broadleaves, 46% conifers.
- **Total annual increment:** 8,8 million m^3- 7.5 m^3/ha
- **Annual potential (allowable) felling:** 7.1 million m^3
- **Total felling in 2020:** 4.2 million m^3 (2.4 million m^3 **broadleaves** and 1.8 million m^3 **conifers**)
- In 2020, the total felling amounted to **59% of potential felling**.
- **Sanitary felling** represented **42%** of total felling (2020).

Growing stock



Continuous cover silvicultural systems (uneven-aged)

- selection cutting based usually on target diameter distribution.
- predominantly trees of large dimensions are cut

Single-tree selection

- scattered individual trees of multiple age classes are harvested

Group selection

- small openings created by the removal of several adjacent trees
- gap size is typically under 0.3 ha

Irregular shelterwood = Femelschlag (Multicohort system)

- multicohort uneven-aged forestry with permanent retention of legacy trees constituting ≥10% of preharvest basal area

Free style silviculture

- highly locally adapted silviculture using approaches from different silvicultural systems

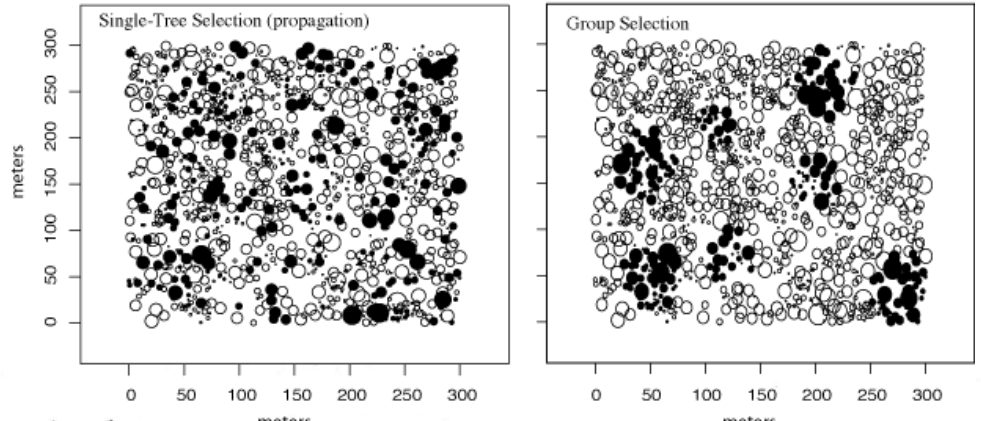
New silvicultural developments

- adapted silviculture for provision of a large spectrum of ecosystem services

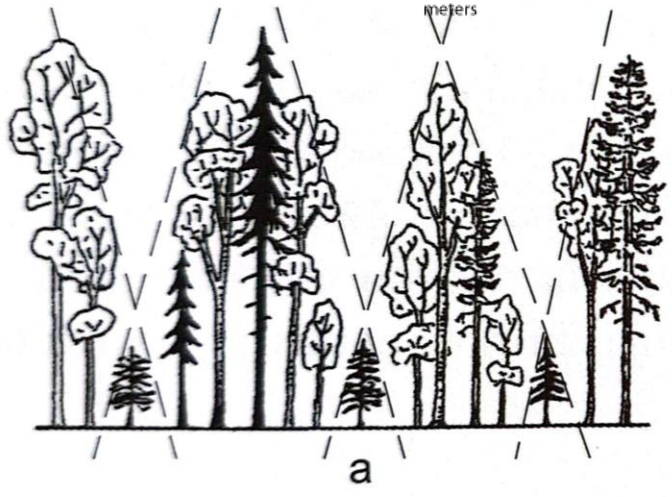
Implementation – single tree and group selection

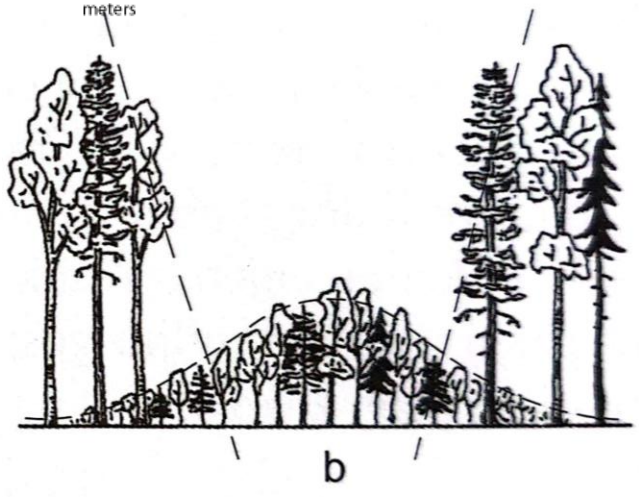
- first silvicultural system used – single tree selection – J shaped dbh distribution
- today:

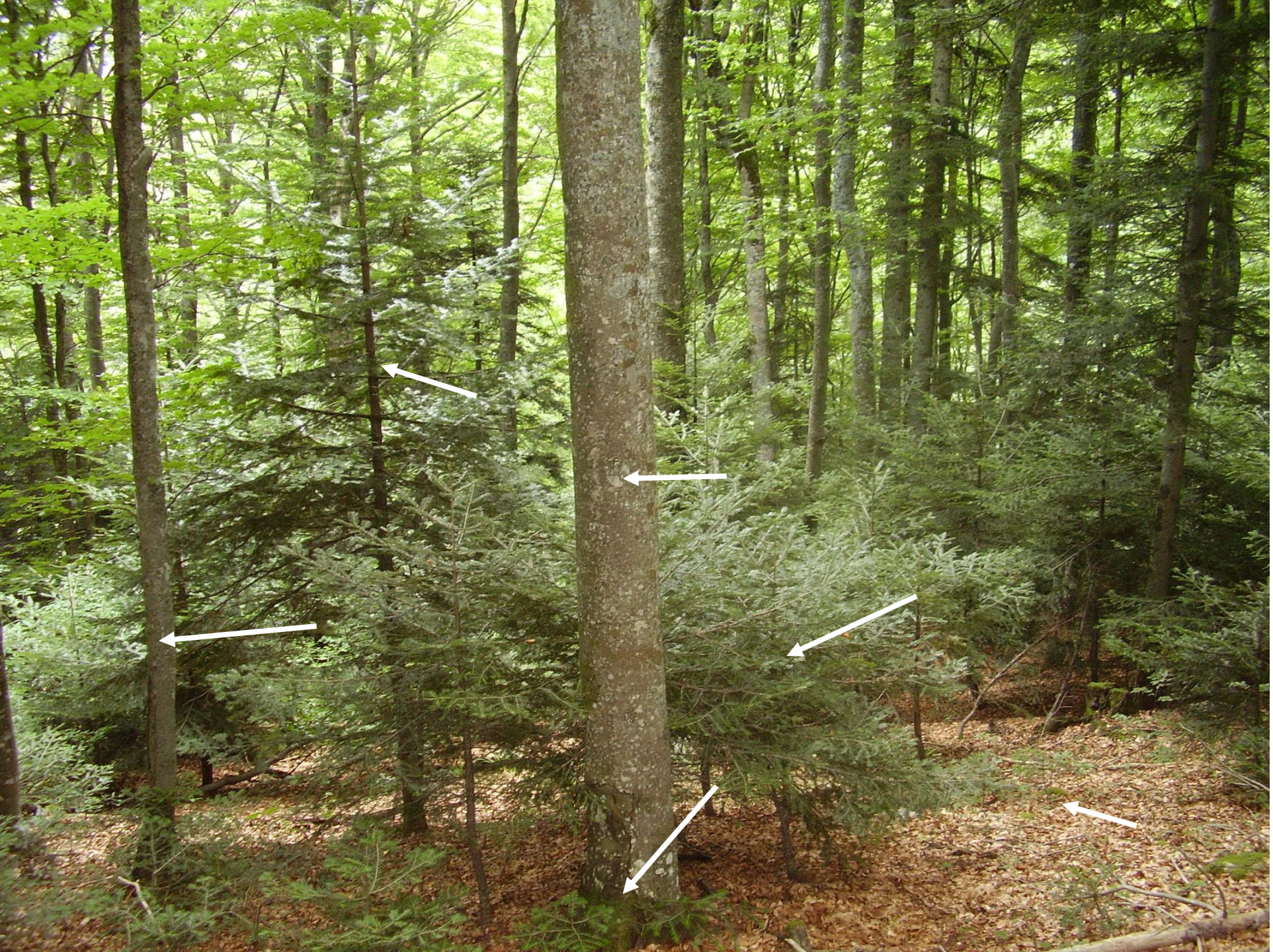
single tree selection



group selection







- constant recruitment of young trees
- structure
- stocking
- unstable system
- interventions

Implementation - single tree and group selection

Selection sylviculture: suitable for shade tolerant tree species (beech, silver fir, Norway spruce)

BUT less effective for light demanding species + problems with quality of beech logs

Implementation – irregular shelterwood

- irregular shelterwood
- larger canopy gaps
- higher density for the young beech stands
- more light demanding species
- advanced beech regeneration

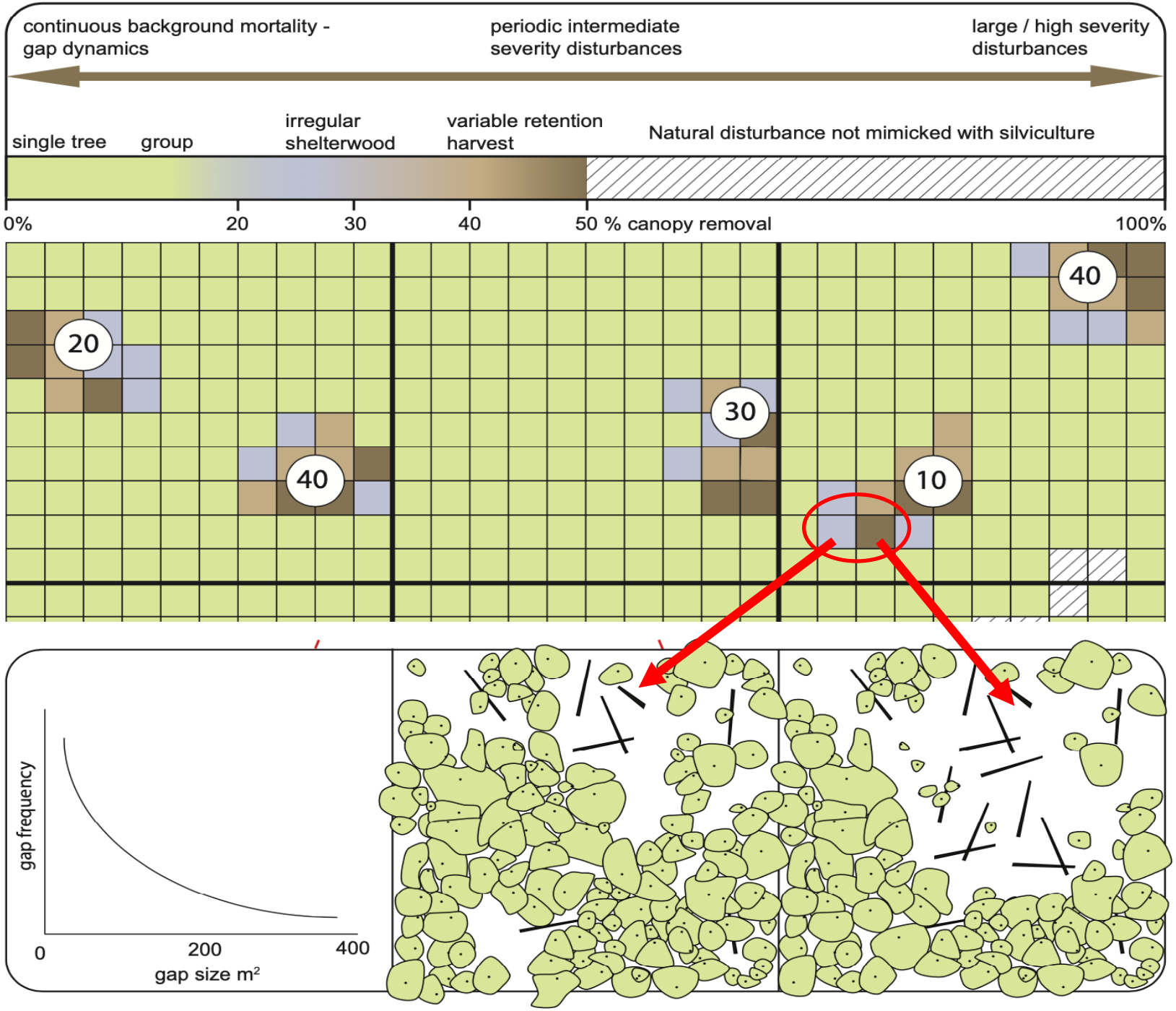
Implementation – free style silviculture

- highly locally adapted silviculture
- free choice of silvicultural systems
- small scale
- based on natural regeneration
- applied on productive, but also degraded site conditions

NEW DEVELOPMENTS

Ecological silviculture – beech dominated forest

- a combination of different silvicultural approaches
- single tree and group selection, irregular shelterwood
- variable retention harvest
  - natural disturbance regime
  - landscape level
- systematic deadwood retention / creation



Nagel et al. 2024

Challenges

natural disturbances

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structure and function

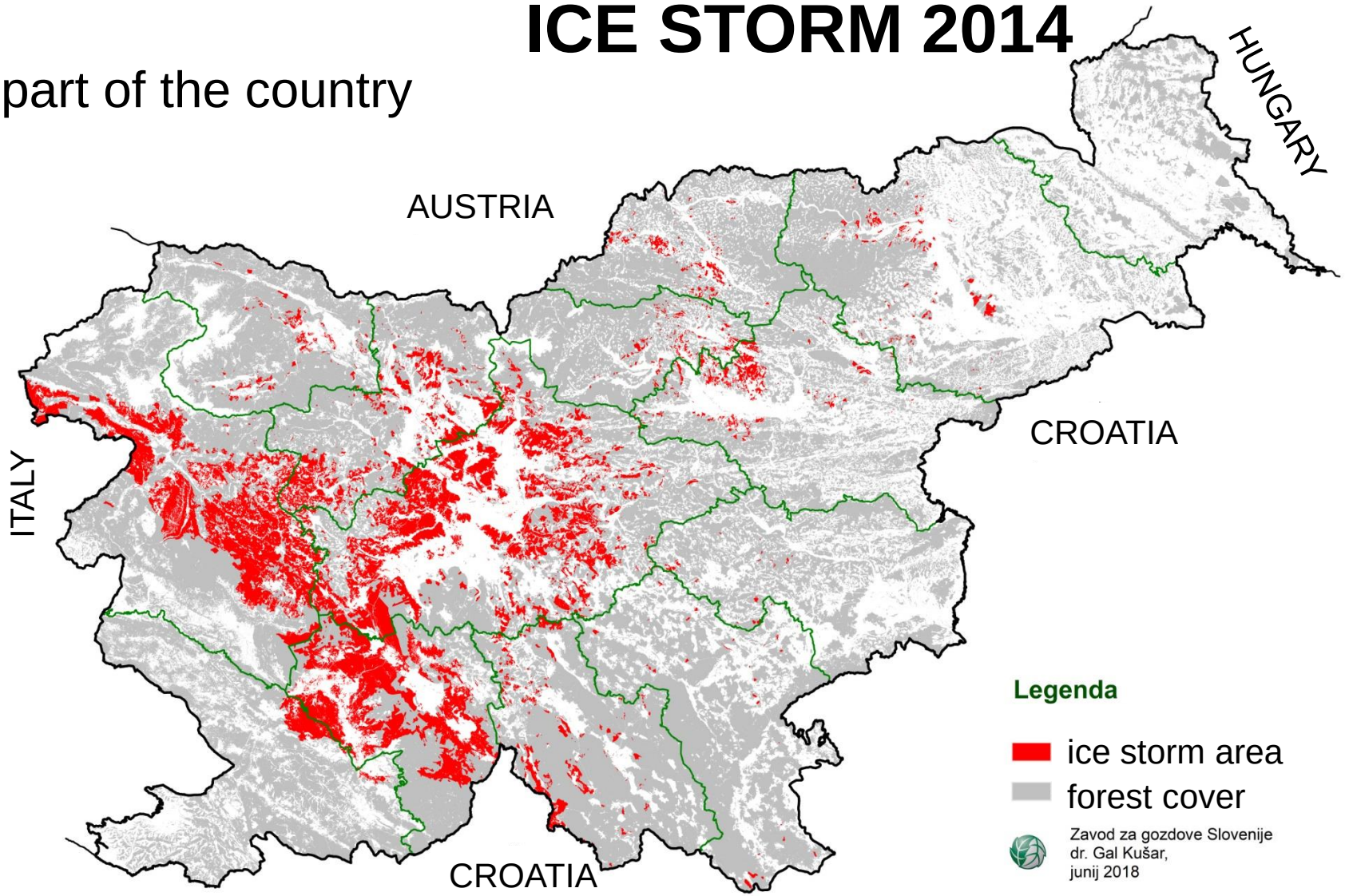
↓

ecosystem services

- different agents

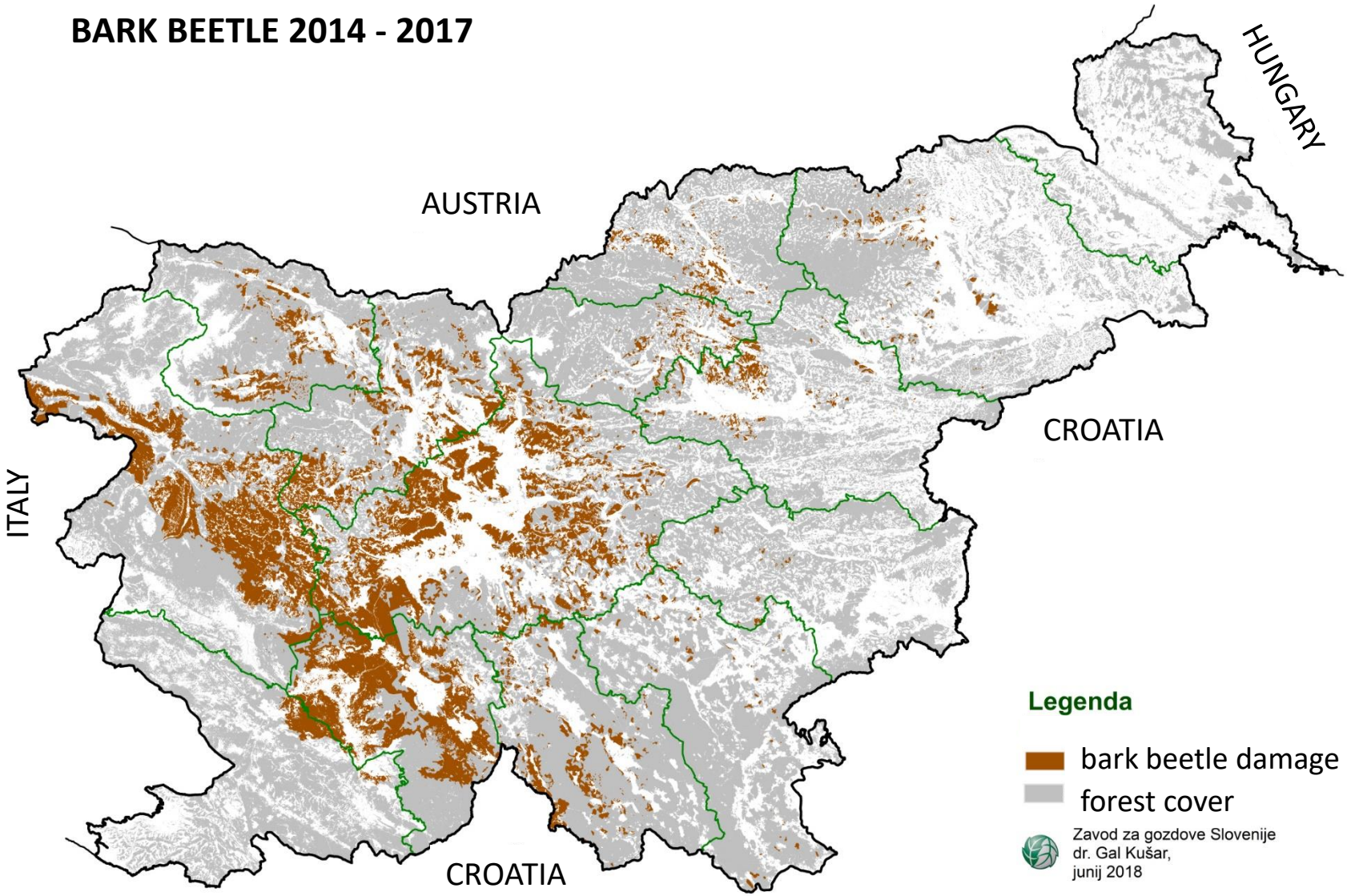
Challenges - ice

- large severity and scale
- 400 – 1000 m a.s.l.; central part of the country



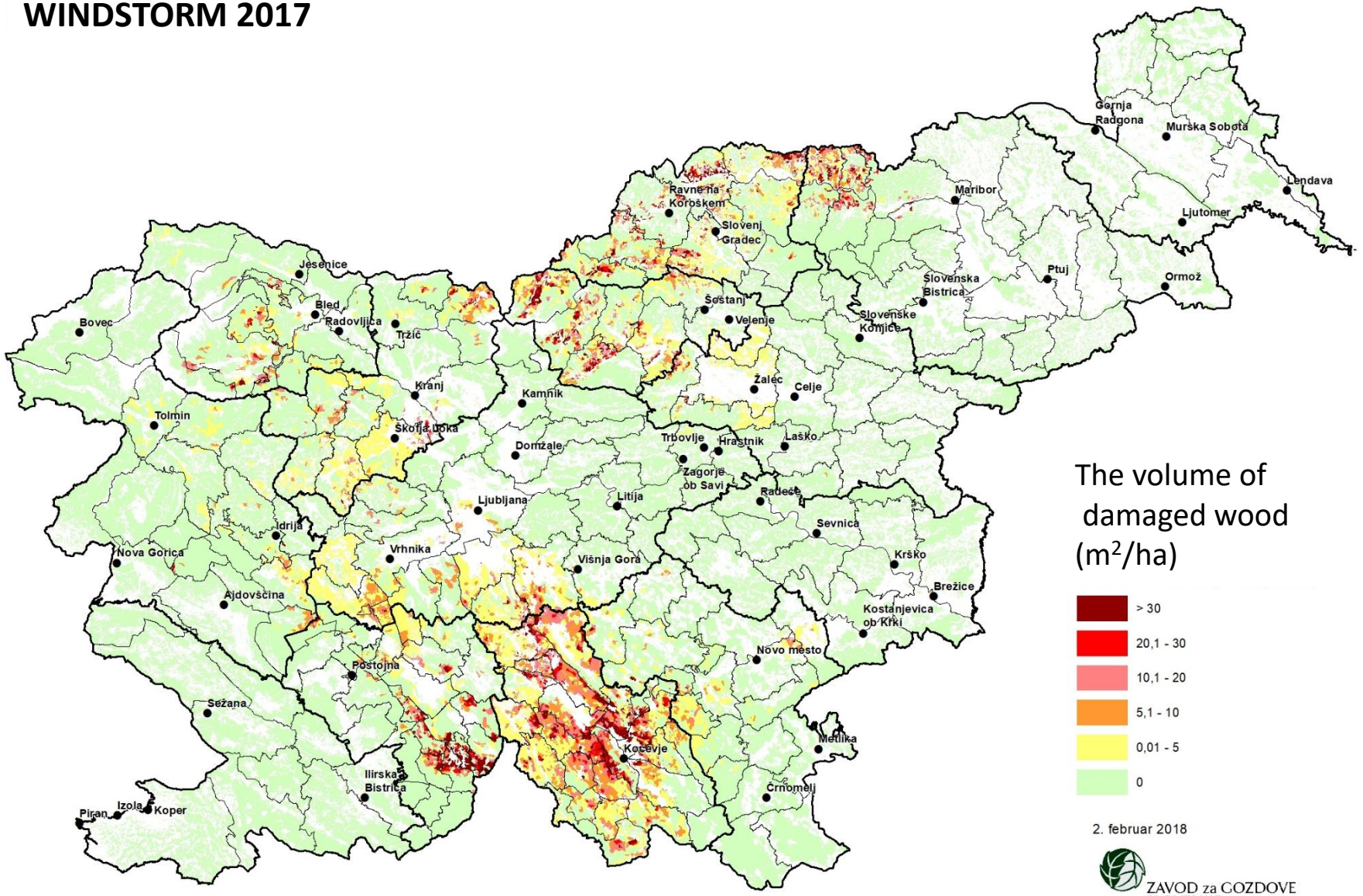
Challenges – bark beetle

- change of stand climate after ice-storm
- bark beetle outbreak – 2014 - 2017



Challenges - wind

WINDSTORM 2017



The volume of damaged wood (m^2/ha)

- > 30
- 20,1 - 30
- 10,1 - 20
- 5,1 - 10
- 0,01 - 5
- 0

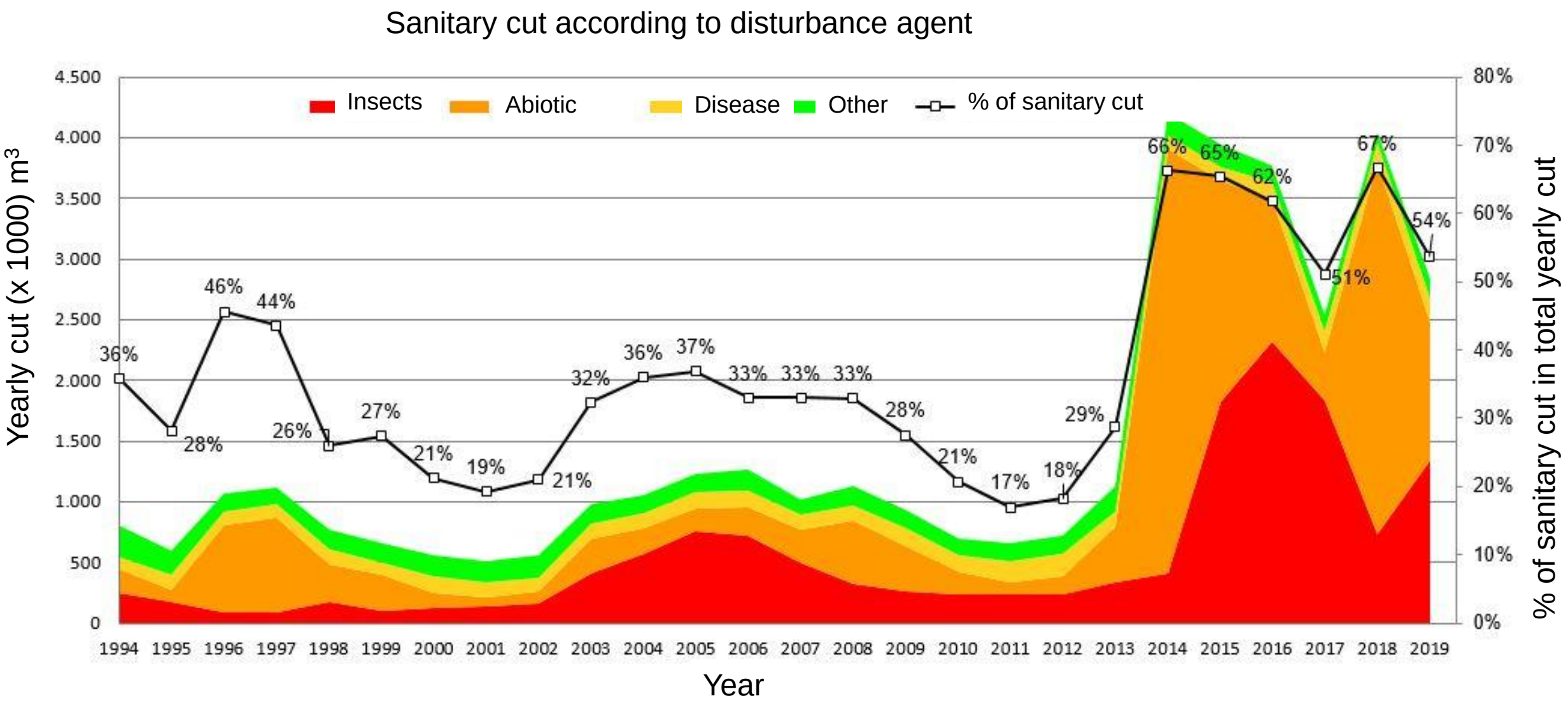
2. februar 2018

ZAVOD za GOZDOVE SLOVENIJE

Fire – karst region, Slovenia, Italy, July 2022 – 4500 ha

http://www.zgs.si/aktualno/sporocila_za_javnost/news_article/zacetek_obnove_pogorelih_gozdov_na_krasu_ze_v_letosnjem_letu_895/index.html

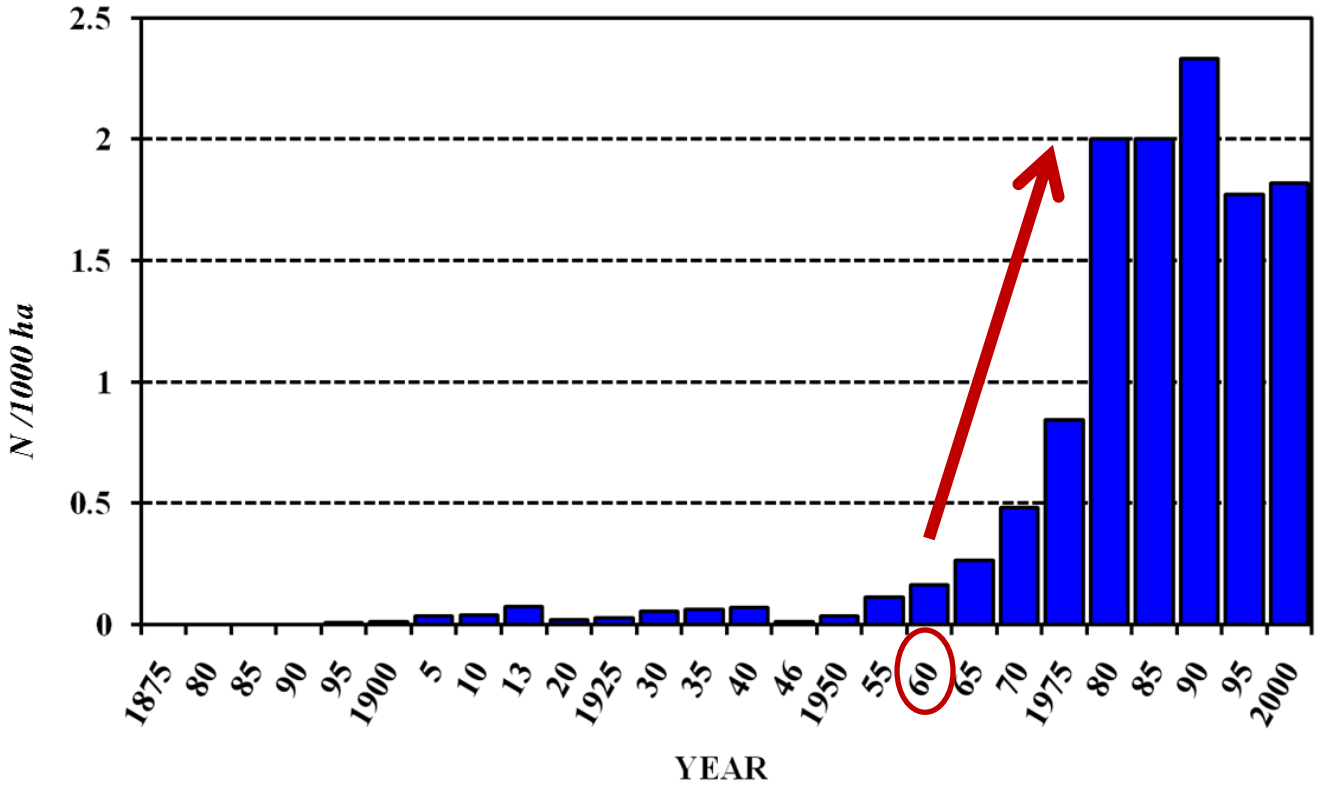
Challenges


Sanitary cut according to disturbance agent
Insects
Abiotic
Disease
Other
% of sanitary cut
Yearly cut (x 1000) m³
% of sanitary cut in total yearly cut
Year
4.500
4.000
3.500
3.000
2.500
2.000
1.500
1.000
500
0
80%
70%
60%
50%
40%
30%
20%
10%
0%
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019
36% 28% 46% 44% 26% 27% 21% 19% 21% 32% 36% 37% 33% 33% 33% 28% 21% 17% 18% 29% 66% 65% 62% 51% 67% 54%

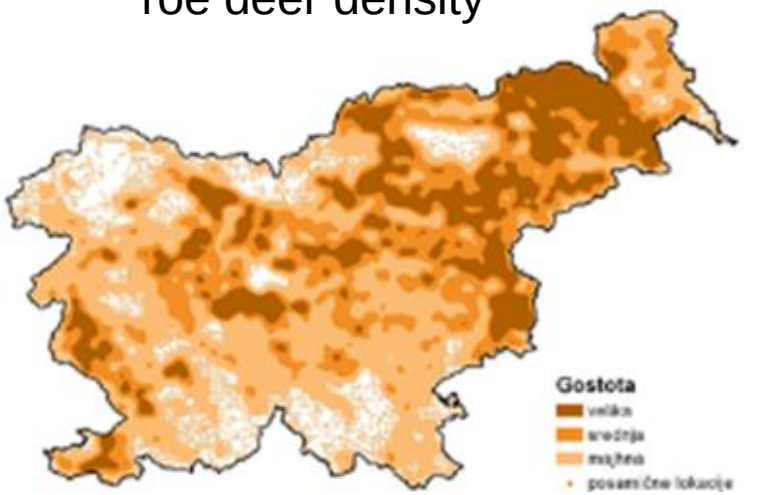
Challenges – deer

- an biotic agent with a long term effect – deer - changed structure and tree species composition
- rapid increase of population density of red deer after 1960

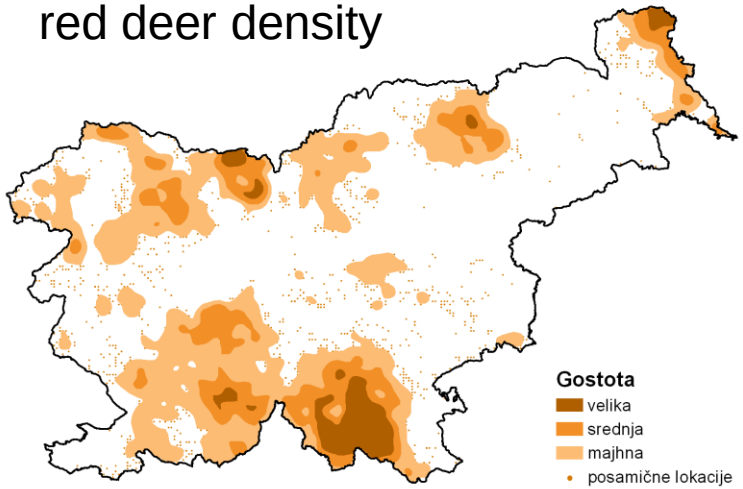
Removal of red deer (N/1000 ha) in Slovenia in years 1875-2000



roe deer density



red deer density



Challenges – deer

REDUCTION OF DEER POPULATION + SILVICULTURAL TREATMENTS

- decreased browsing pressure
- improved food supply for ungulates
- improved growing conditions for palatable tree species
- a window of opportunity => recruitment to higher stand layers

Challenges – forest ownership

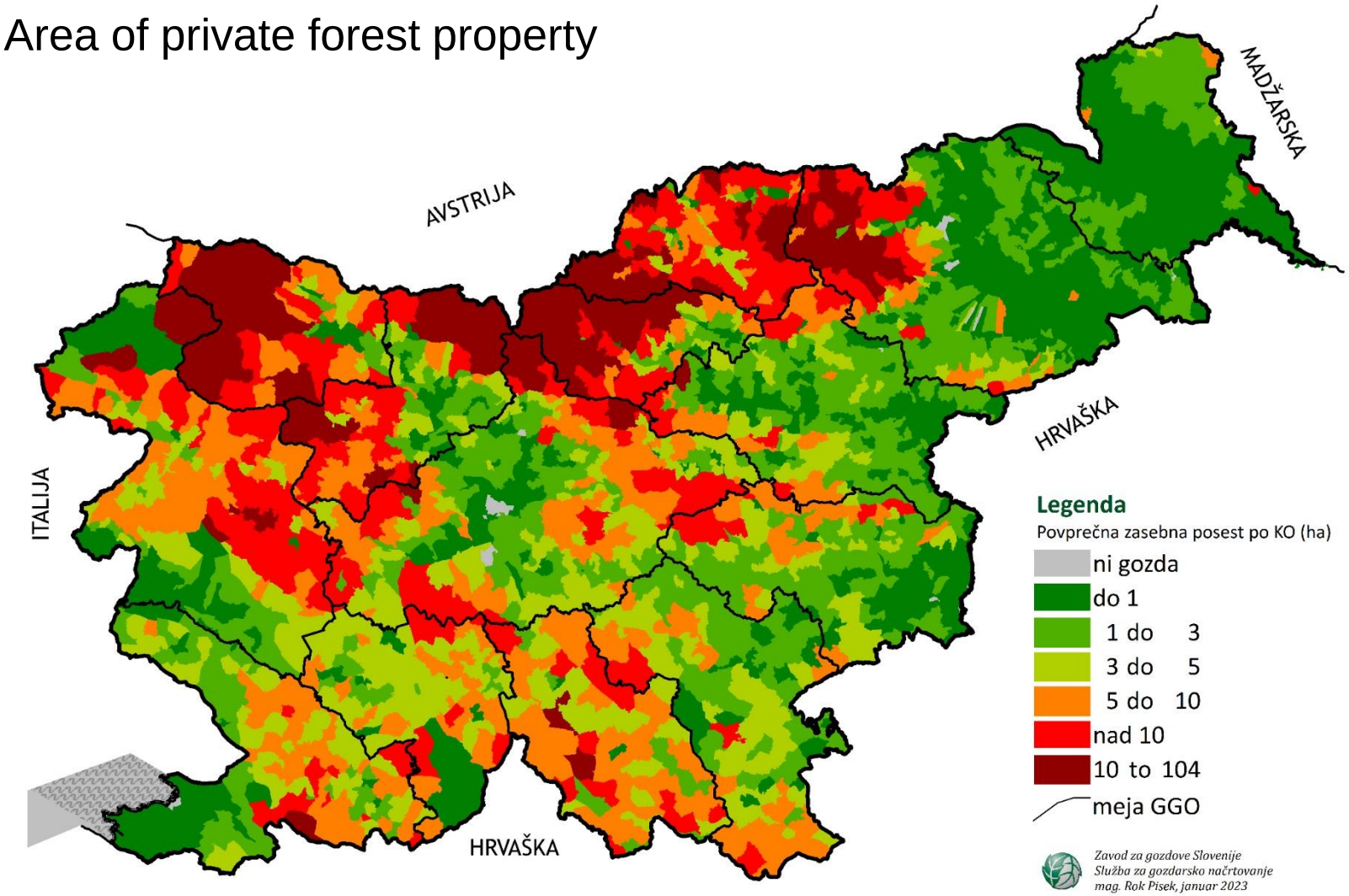
Every fifth Slovenian is a forest owner.

Forest ownership:

- **75 %** privately owned
- **21 %** state owned
- **4 %** local communities

- over 300.000 forest owners
- average area of forest property 3 ha
- divided into several parcels
- problematic implementation of forest management

Area of private forest property



Challenges

increase in occurrence and scale of major disturbances

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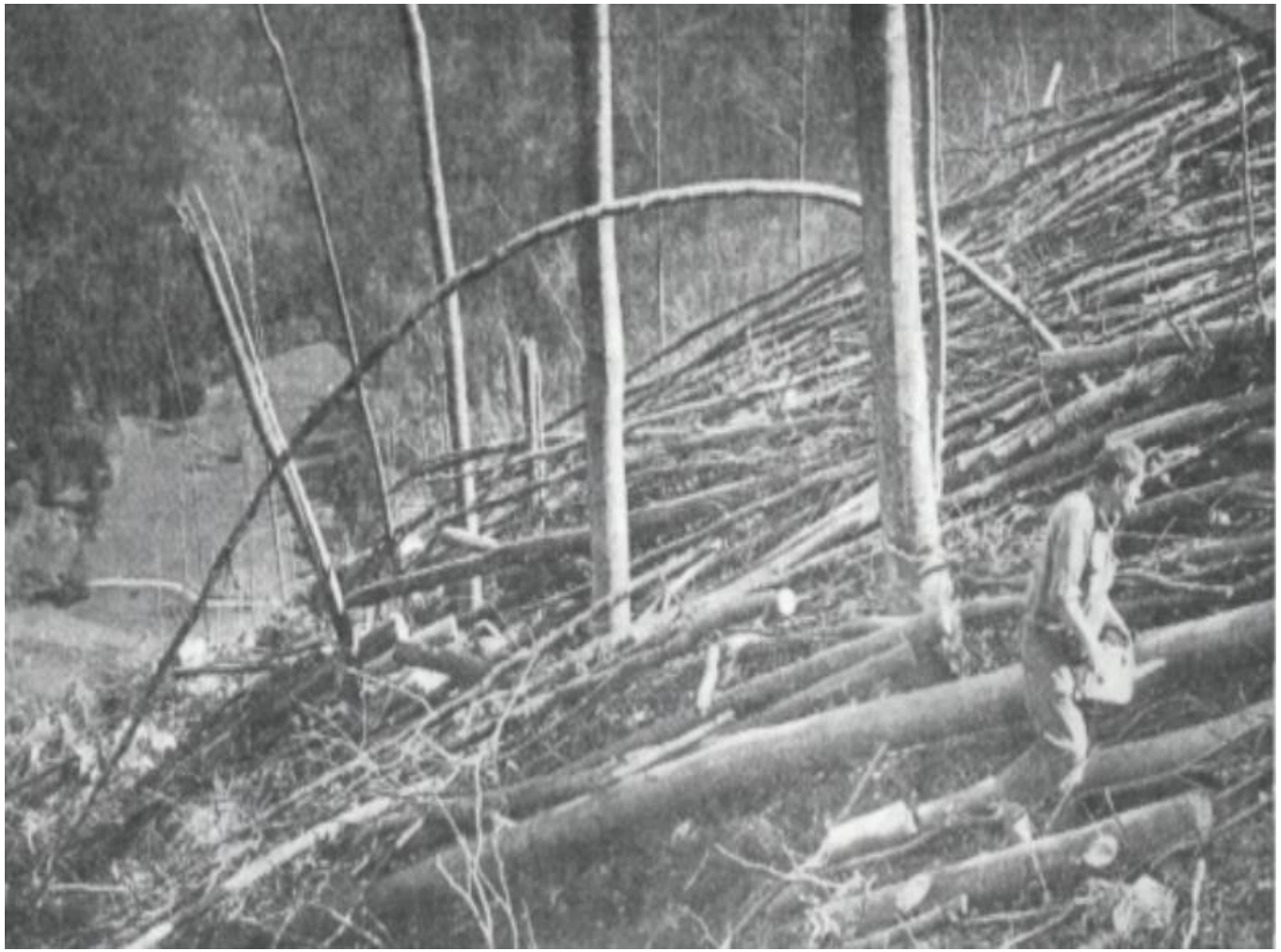
part of natural forest dynamics

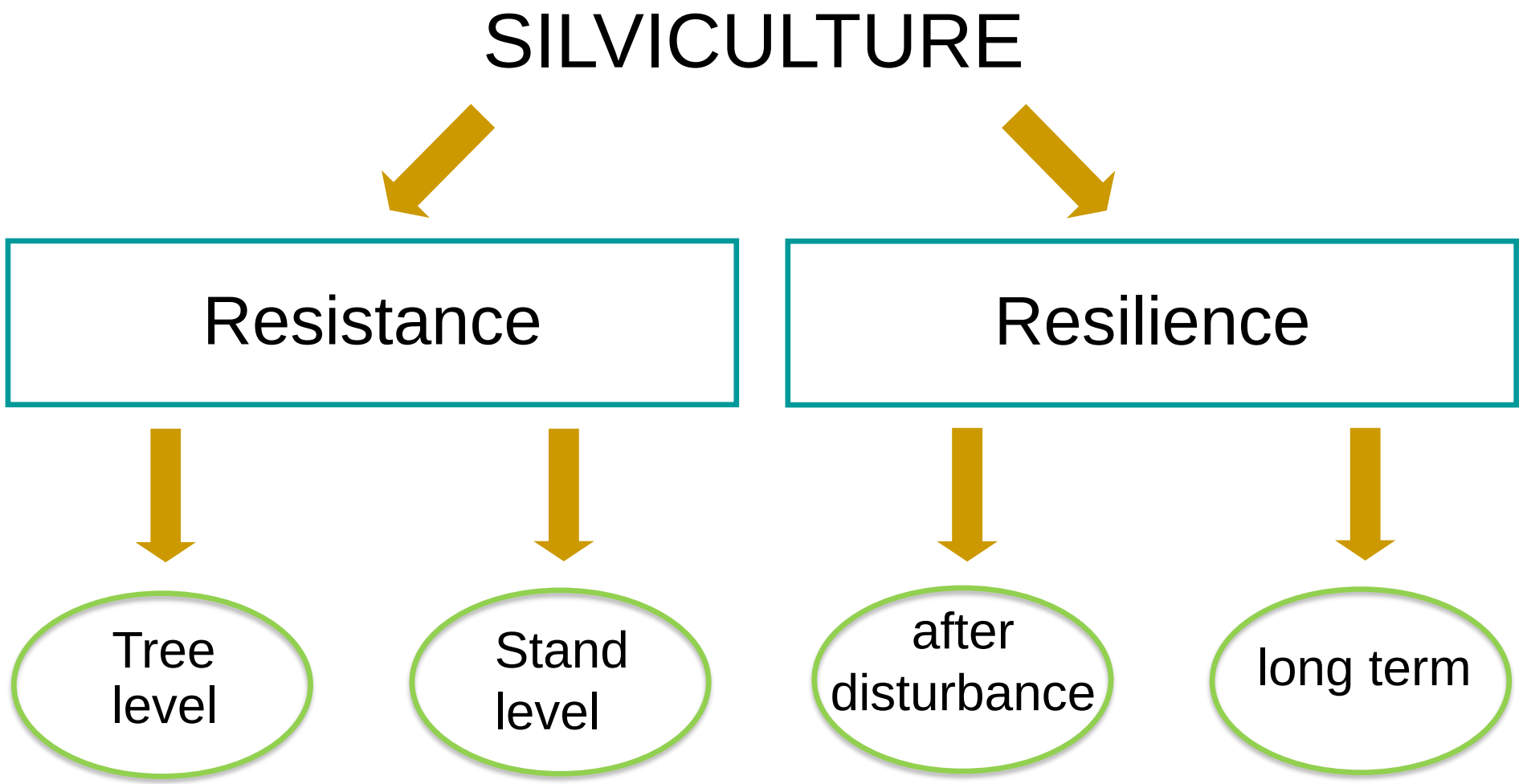
↓

negative impact in managed forest

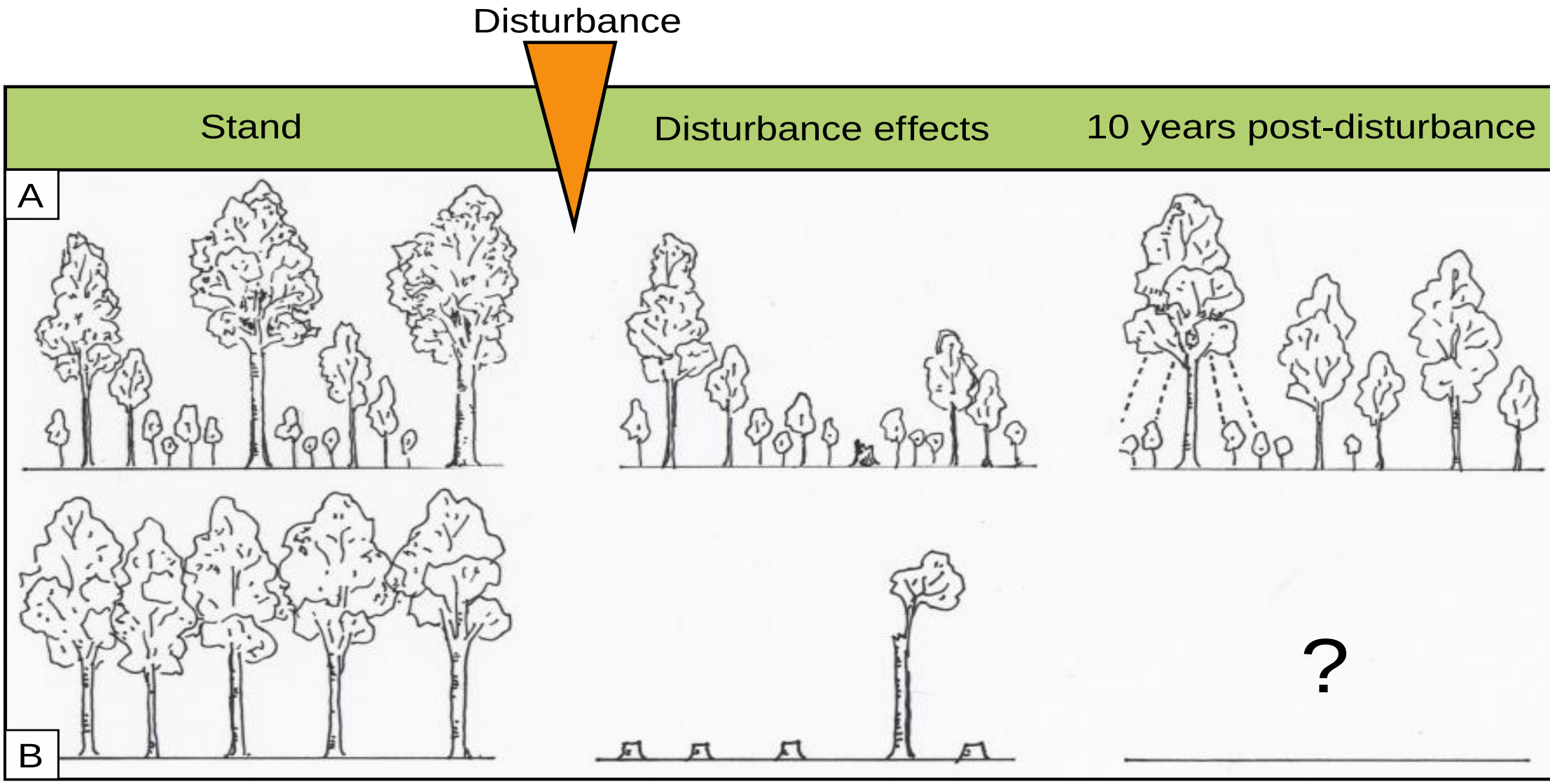


Challenges

Need for development of silvicultural tools to reduce the susceptibility of individual trees and stands and increase forest resistance and resilience?



Resilience level after disturbance



(A) unevenaged stand – reduced management risks
(B) evenaged stand

Conclusions – knowledge transfer

- Transformation of forest management to continuous cover and closer to nature forestry?
  - Adaptation of forests to climate change?
  - Need for increased resistance and resilience of forests?

How do we address these challenges?

Inside EU: - a lot of monitoring programs
- many good scientists
- educated green NGO‘s

BUT

None of them can change the state of the forest - **only those who make dots on the trees and decide which trees will be harvested, promoted or planted, etc. can do that.**

(Vrška, 2024)

Conclusions – knowledge transfer

Forestry experts – a pool of practical knowledge

this knowledge needs to be transferred

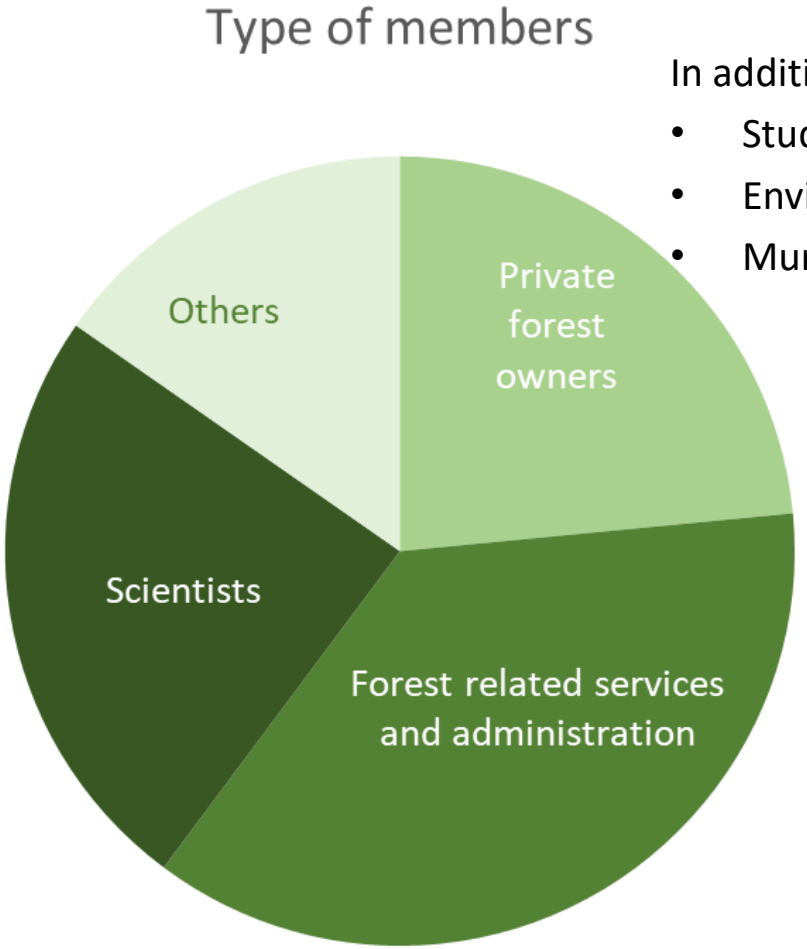
TO

- younger forest managers and practitioners
- forest owners

Conclusions – knowledge transfer - ProSilva

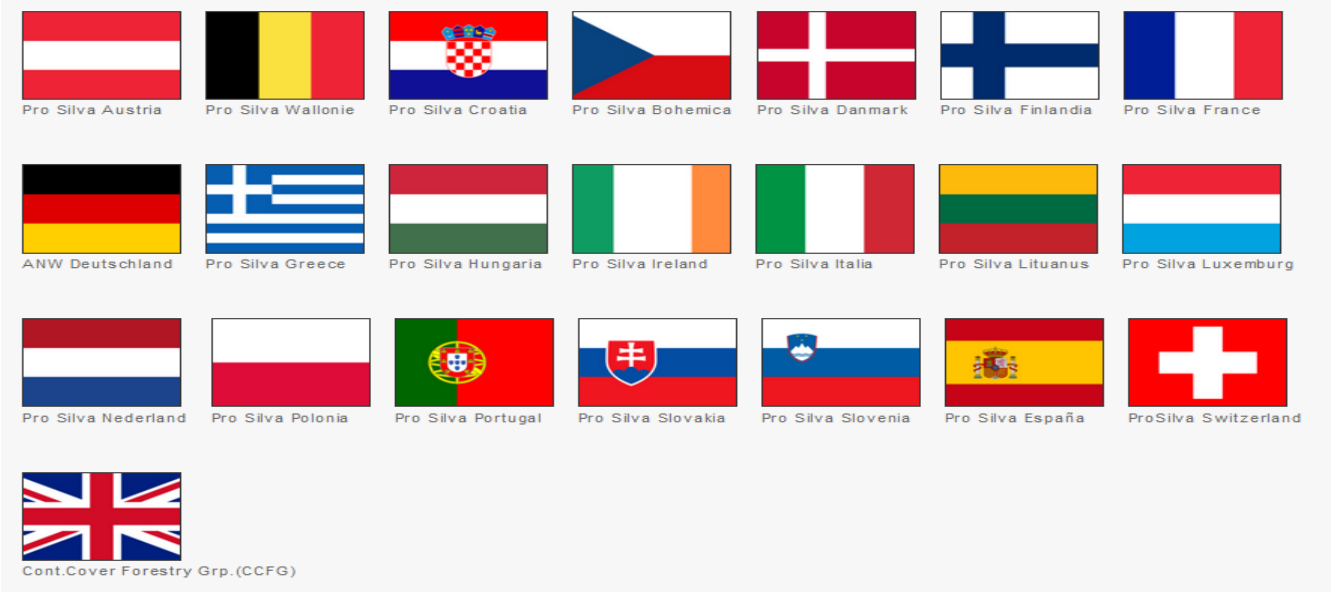
Pro Silva non-profit NGO

Association of people who advocates forest management based on natural processes.



In addition:

- Students
- Environmental NGO
- Muncipalities



- 23 full member countries - Europe
- 10 member countries under development in Europe
- 8 associated member countries outside of Europe
- individual members – approx. 6.186

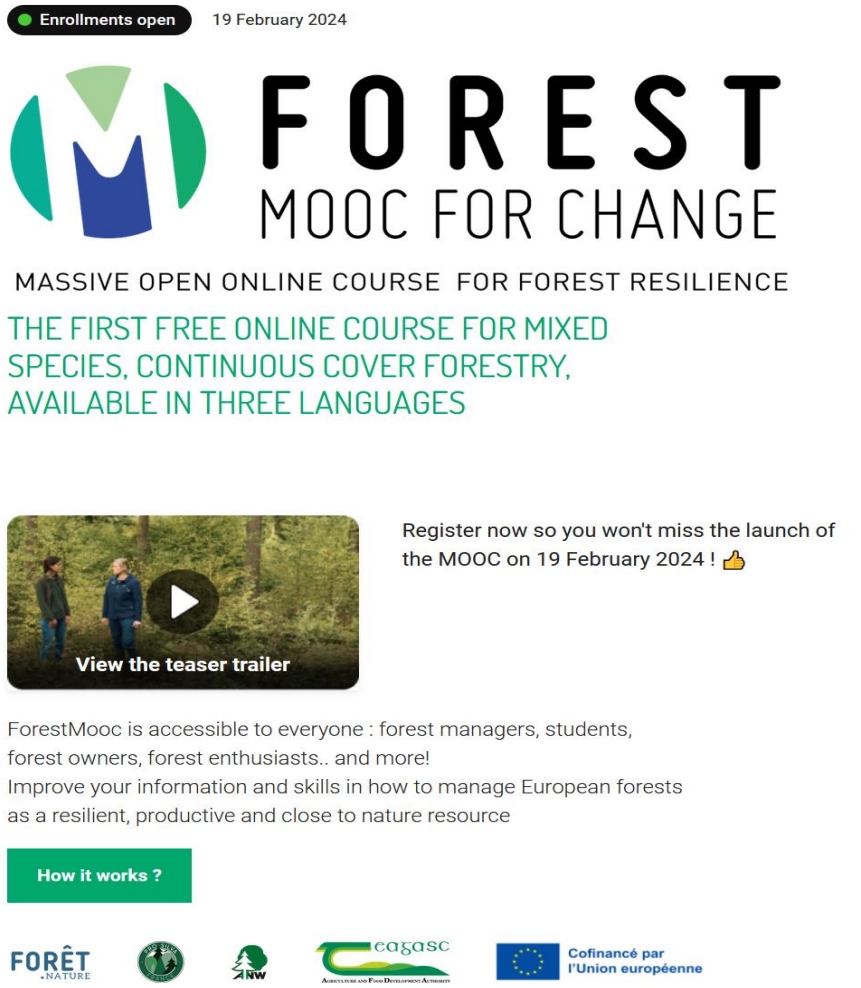
Practice of small-scale, natural and uneven-aged forest management

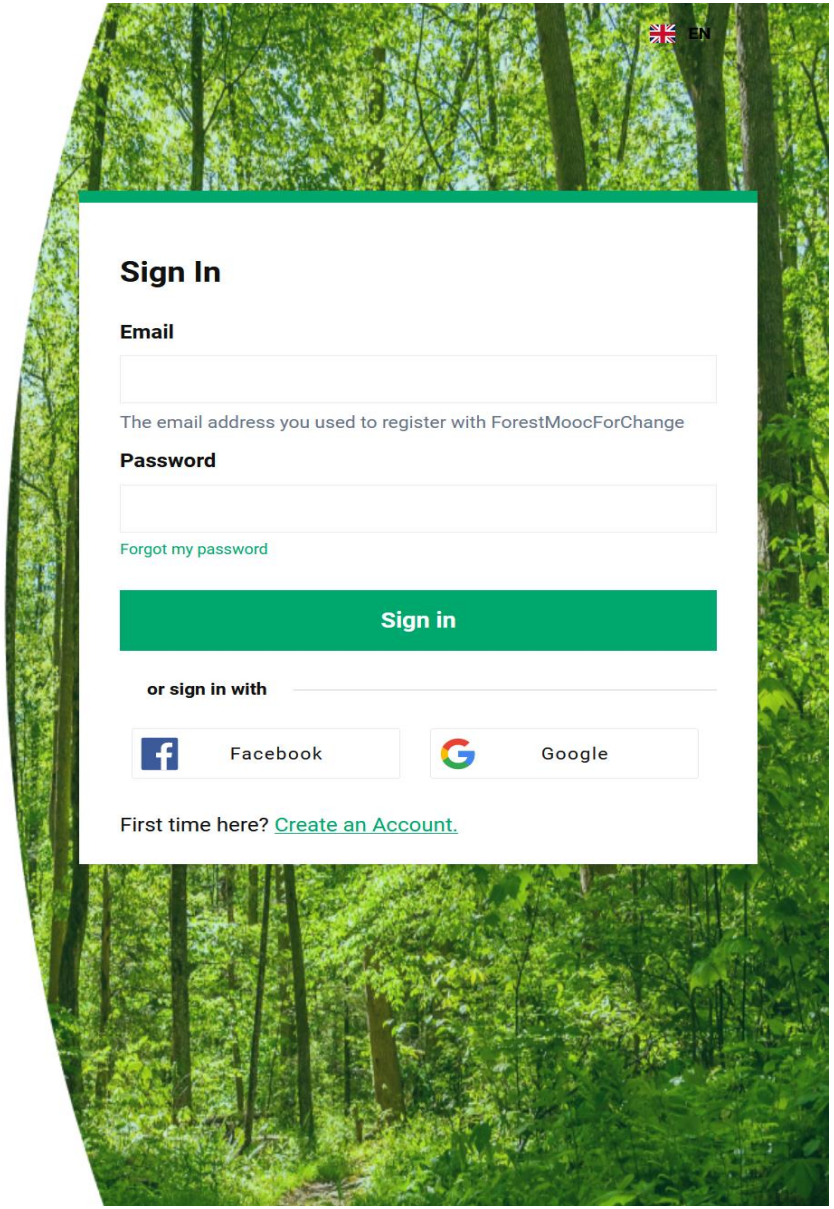
- Exchange of ideas and experiences within Pro Silva
  - Annual meetings
  - Cross Border Excursions
- Promotion of close-to-nature forest management
  - Internet homepage and social media
  - Online lectures
  - Workshops
  - Publications
  - Exemplary forests network

Challenges – knowledge transfer

4 partners + EU

- Die Arbeitsgemeinschaft Naturgemäße Waldwirtschaft (ANW) in Germany,
- Pro Silva France
- Teagasc Forestry Development Department in Ireland and
- Forêt-Nature in Belgium as lead partner
- co-financed by the European Union





EU should support such programs and practical training

LARGE IMPACT

- good tree species diversity
- diverse structure
- good resistance and resilience
- wide range of ecosystem services
- including.....

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