AGENTURA OCHRANY
PŘÍRODY A KRAJINY
ČESKÉ REPUBLIKY

NATURE CONSERVATION
AGENCY OF THE
CZECH REPUBLIC

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PŘÍRODA JE NAŠE DĚDICTVÍ I BUDOUCNOST

NATURE CONSERVATION AGENCY OF THE CZECH REPUBLIC

NATURE IS OUR HERITAGE AND FUTURE

Seminar on forest, forest management and protection of forest

Vladan Riedl
Nature Conservation Agency of the Czech Republic,
PLA Pálava

31. 10. – 4. 11. 2024, Moldova

Agenda:

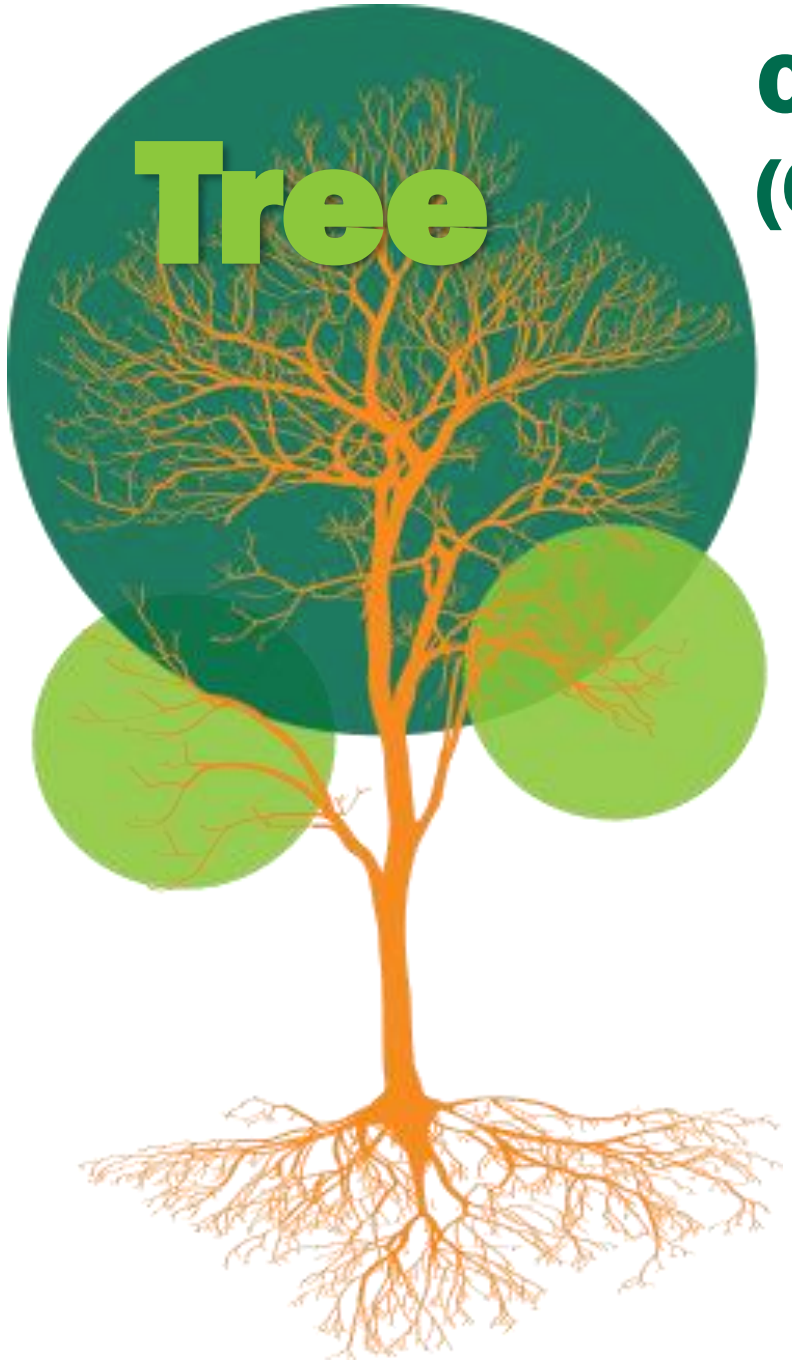
Introduction

Presentation 1: Forests of the World and World of the forests

Presentation 2: Silviculture and forest management

Presentation 3: Nature protection and forestry

World of the forests and Forests of the World



Crown (Canopy)

- volume is **25-50%** of the stem volume. e.g. 250 to 500 cubic meters per hectare in oak forest.
- 40-60 % of insect species can be found in the canopy layer

Stem (Trunk)

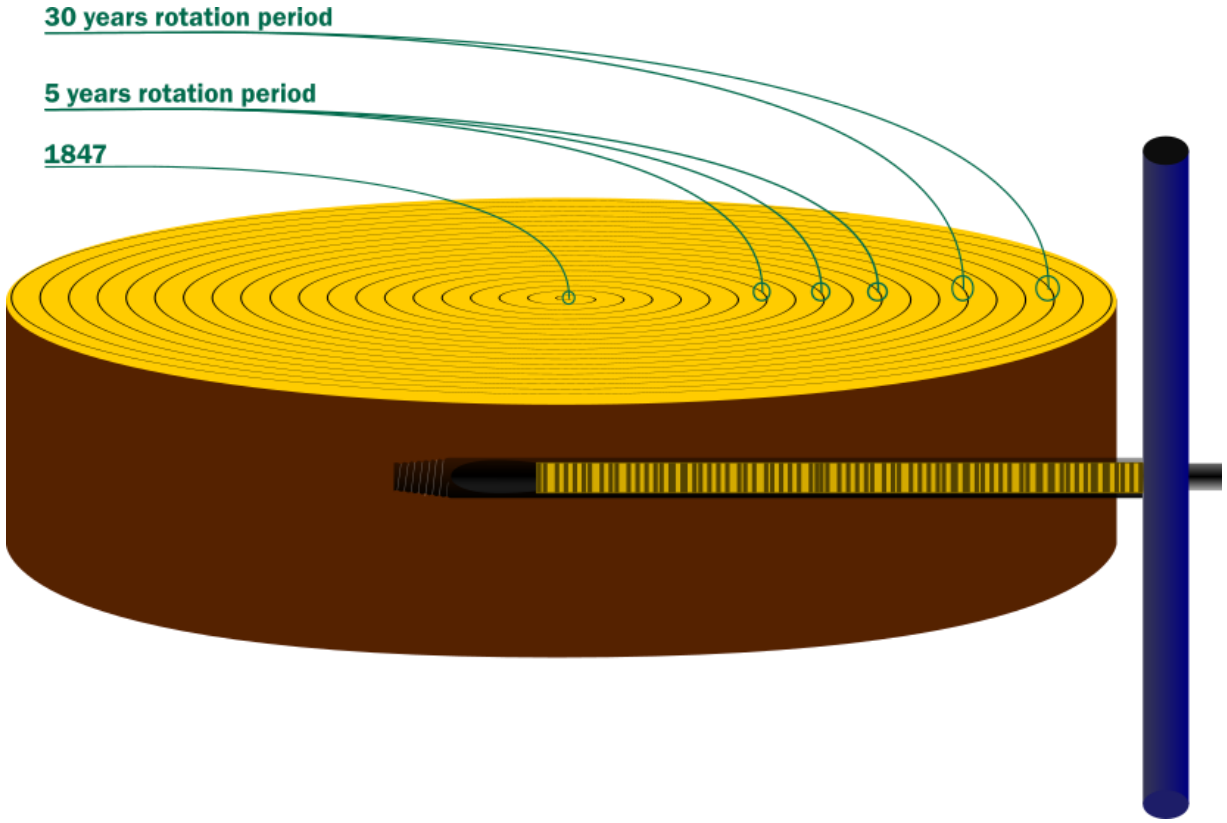
Mixed Temperate Forests: 300 - 600 m^3 / ha
Deciduous Temperate Forests: 250 - 500 m^3 / ha
Coniferous Temperate Forests: 400 - 800 m^3 / ha

Roots

Spruce 150 - 500 m^3 / ha
Beech: 150 - 600 m^3 / ha
Oak: 200 - 600 m^3 / ha

Stem

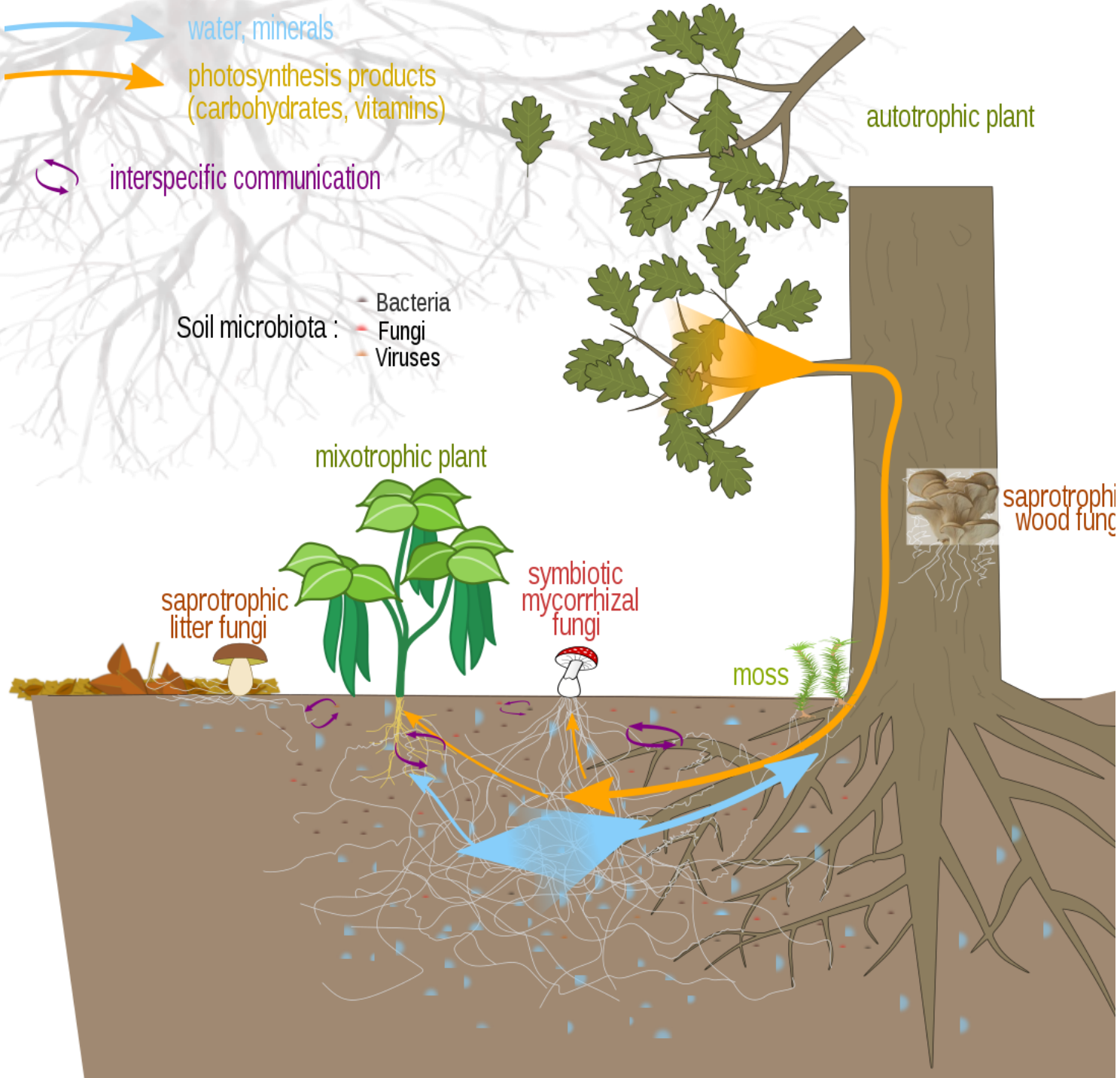
Data on historical forest management



Roots

- Well developed roots in coppice.

- Symbiotic mycorhizal fungi are very important for nutrient uptake in the root system. Avoid the use of biocides, especially fungicides

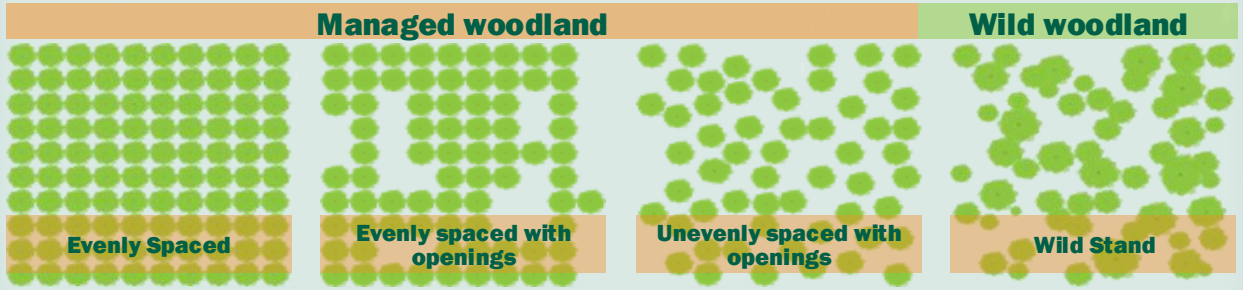


Forest

Share of land covered by forest

World 31,2 %
Europe 46 %
Czechia 34,7 %
Moldova 11,7 %

Horizontal structure of the forest



Temperate Forests

Oak, Maple, Beech and Elm.

precitipation 500-1500 mm | growing period 150-240 days | winter: −1 °C to 10 °C | summer: 15 °C to 30 °C

History of Europe forests

Medieval Period (5th – 15th Century)

Early medieval Europe: **heavily forested**,

Feudalism: property of landlord who reserved exclusive hunting and logging rights . Partly leased to comunities as a source of fuelwood

Deforestation for Agriculture

Renaissance and Early Modern Period (16th – 18th Century)

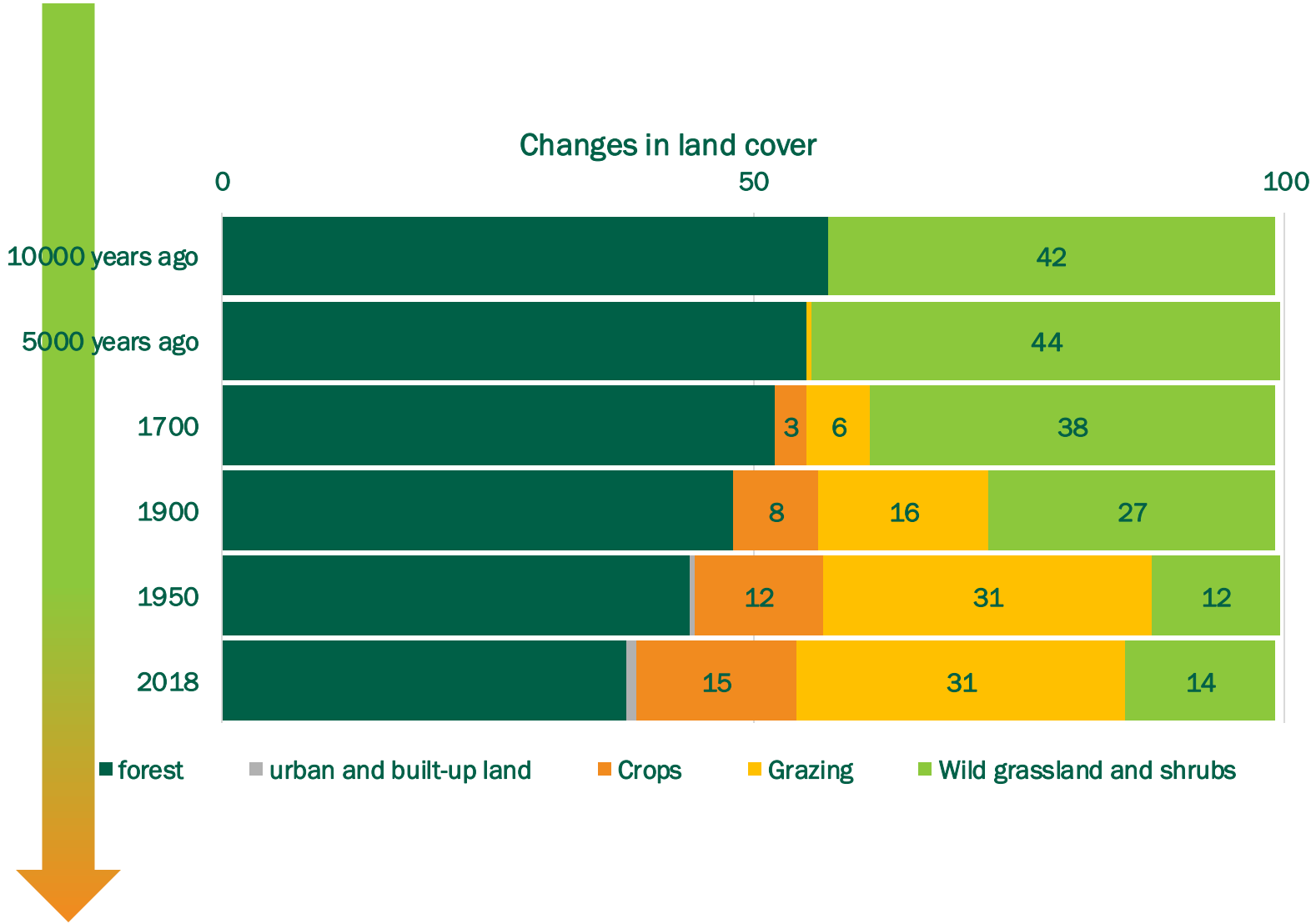
Increased demand for fuel wood and construction timber - railway construction, shipbuilding, glassmaking, iron production = massive deforestation even in inaccessible areas

Forest Management: concerns about overexploitation of forests was recognized as a problem. Efforts on Regulation on forest conservation and reforestation

Codex Carolinus (1350-1617) – ban on forest cutting in Czechia (not accepted)

Teresian Forest Patent (1754) – ban on forest grazing, appointing of professional forest manager, forest regeneration regulations

History of European forests



Clearing – removal of wood and using it for fuel or constructions

Slashing: common approach whereby trees were chopped down and left where ever they fell to dry out and later be burned.

Girdling: the bark of the tree including bast (floem) was removed and than the man waited until the tree dies. Then it was cutted or burned.

Grubbing (stump removal) - removal of stumps by hand, in earlier times with an axe, saw and horse– source of fuel

Slash-and-burn

Grazing and pannaging of sheeps and pigs in oak forests

Raking of litter – livestock bedding

History of European forests

Industrial Revolution (18th – 19th Century)

Abandon of traditional forest practices = the industry has switched to the use of coal, the forests gradually thickened and became shady

20th Century: Wars, Reforestation, and Conservation

World Wars: a profound impact on Europe's forests = heavily exploited for timber

After the wars, large-scale reforestation programs. Founding of national parks to preserve what remained of their natural forests.

Environmental Movement: new attention to the importance of forests for biodiversity, climate regulation, and recreation.

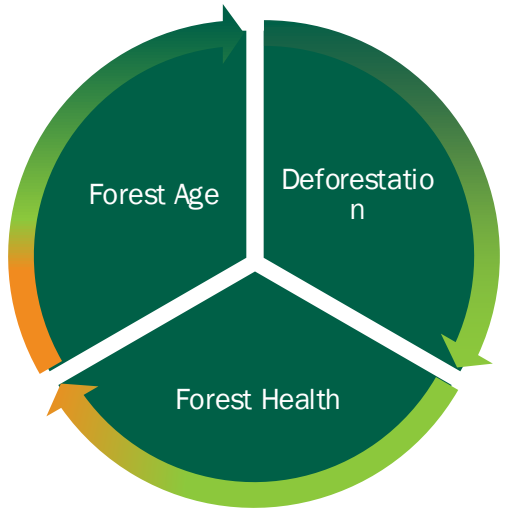
Nationalisation of forests and central forest management: specific to countries under Russian influence. Central FM planning has led to afforestation with unsuitable tree species (e.g. Norway spruce in the Czech Republic) and the use of heavy machinery.

Forest today ... that helps us

Natural Carbon Sink: Forests act as one of the most efficient natural systems for removing CO2 from the atmosphere, slowing the impact of **climate change**.

Forests absorb **about 7.6 billion metric tons of CO2** annually, accounting for **30% of global emissions**.

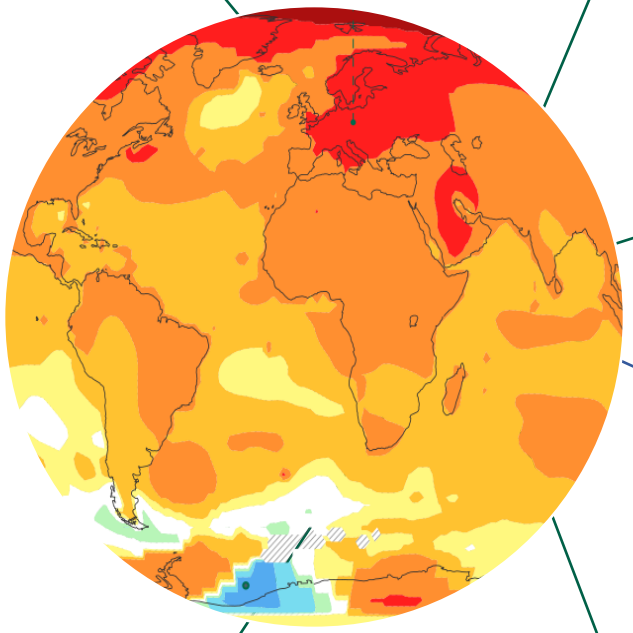
Country	Total Forest Area (ha)	Total CO_2 Sequestration (t/year)	CO_2 Sequestration per ha (t/year)	Population	CO_2 Sequestration per Capita (t/year)
Moldova	408 200	1 329 000	3,25	2 650 000	0,50
Czech Republic	2 680 000	8 848 000	3,30	10 700 000	0,83
Ukraine	10 310 000	18 700 000	1,81	41 000 000	0,46
Romania	6 800 000	18 000 000	2,65	19 000 000	0,95



Forest today ... facing climate change

Rising Temperatures
- Effects on Growth
- Species Shift

Altered Precipitation Patterns
- Drought
- Flooding



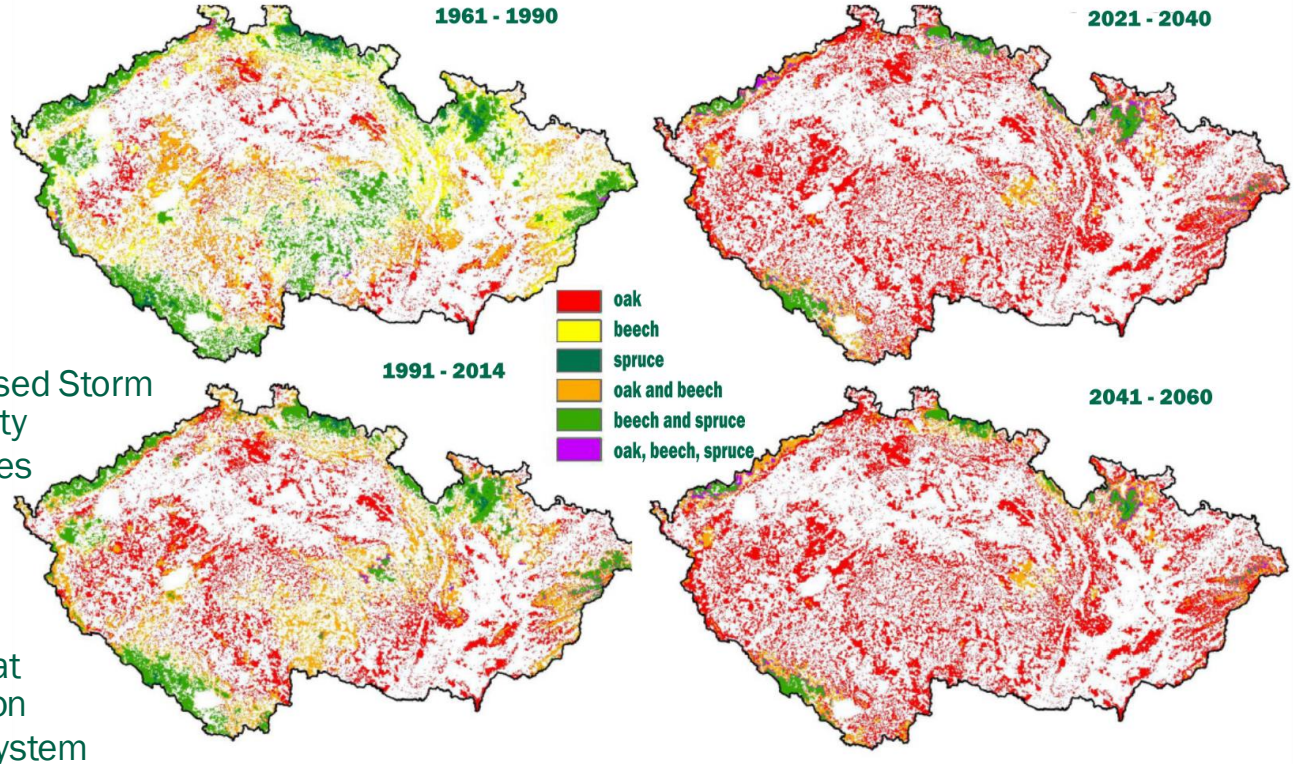
Extreme Weather Events
- Increased Storm Intensity
- Wildfires

Biodiversity Loss
- Habitat Fragmentation
- Altered Ecosystem Dynamics

Soil Degradation
- Nutrient Loss
- Carbon Storage Impacts

Pest and Disease Outbreaks
- Increased Infestation
- Forest Health Decline

Tree growing conditions defined by the Multivariate Statistical Random Forest Method (GCM IPSL)

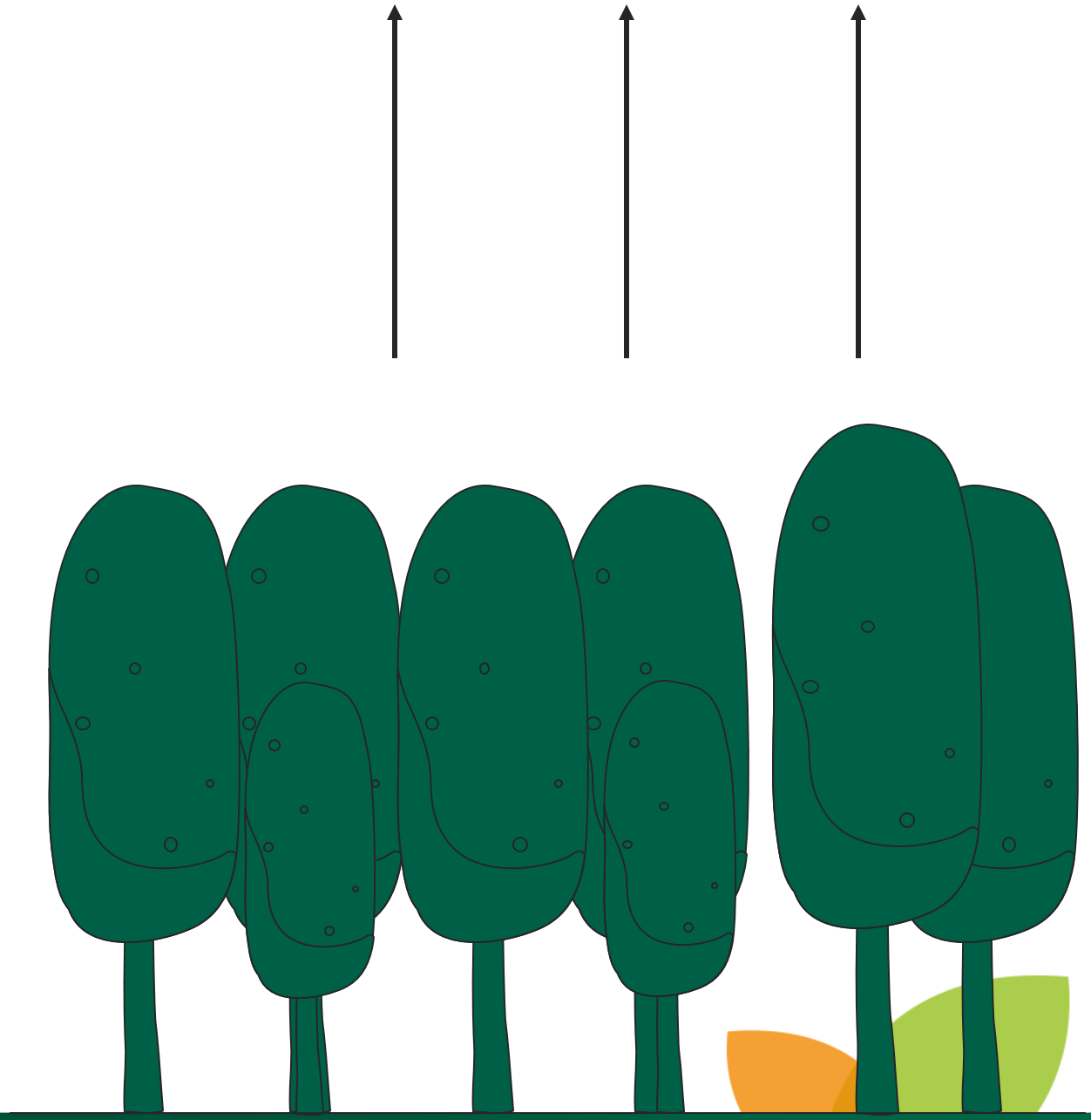


Rising temperatures will cause a shift in forest vegetation altitudinal belt

Forest today ... that are attacked by pests

Pest	Region	Host Trees	Total Area (Hectares) Destroyed	Impact
European Spruce Bark Beetle *(Ips typographus)*	Germany, Czech Republic, Austria	Norway spruce	~100,000 ha/year	Widespread destruction of spruce forests, particularly after droughts and storms.
Oak Processionary Moth *(Thaumetopoea processionea)*	UK, Netherlands, Germany	Oak trees	100,000+ ha affected annually in	Defoliation of oak trees and health hazards due to toxic caterpillar hairs.
Pine Processionary Moth *(Thaumetopoea pityocampa)*	UK, Netherlands, Germany	Pine species	~50,000-100,000 ha	Expanding northward due to climate change; defoliation weakening forests.
Ash Dieback *(Hymenoscyphus fraxineus)*	Throughout Europe	Ash trees	Millions of ha at risk, 70%	Projected to kill up to 95% of European ash trees, leading to major biodiversity loss.
Asian Longhorned Beetle *(Anoplophora glabripennis)*	Central Europe (Germany, Italy)	Hardwood (maple, elm, willow)	~5,000 ha	Eradication programs in place to prevent spread; threat to urban and natural hardwoods.
Dutch Elm Disease *(Ophiostoma novo-ulmi)*	Across Europe	Elm trees	Millions of ha since the 1970s	Wiped out most of Europe's elm populations, with ongoing outbreaks in elm species.
Gypsy Moth (Spongy Moth) *(Lymantria dispar)*	Hungary, Romania, Bulgaria	Oak, birch, beech	~500,000 ha/year	Defoliates large areas, leaving trees vulnerable to other diseases and environmental stress.

Silviculture and forest management



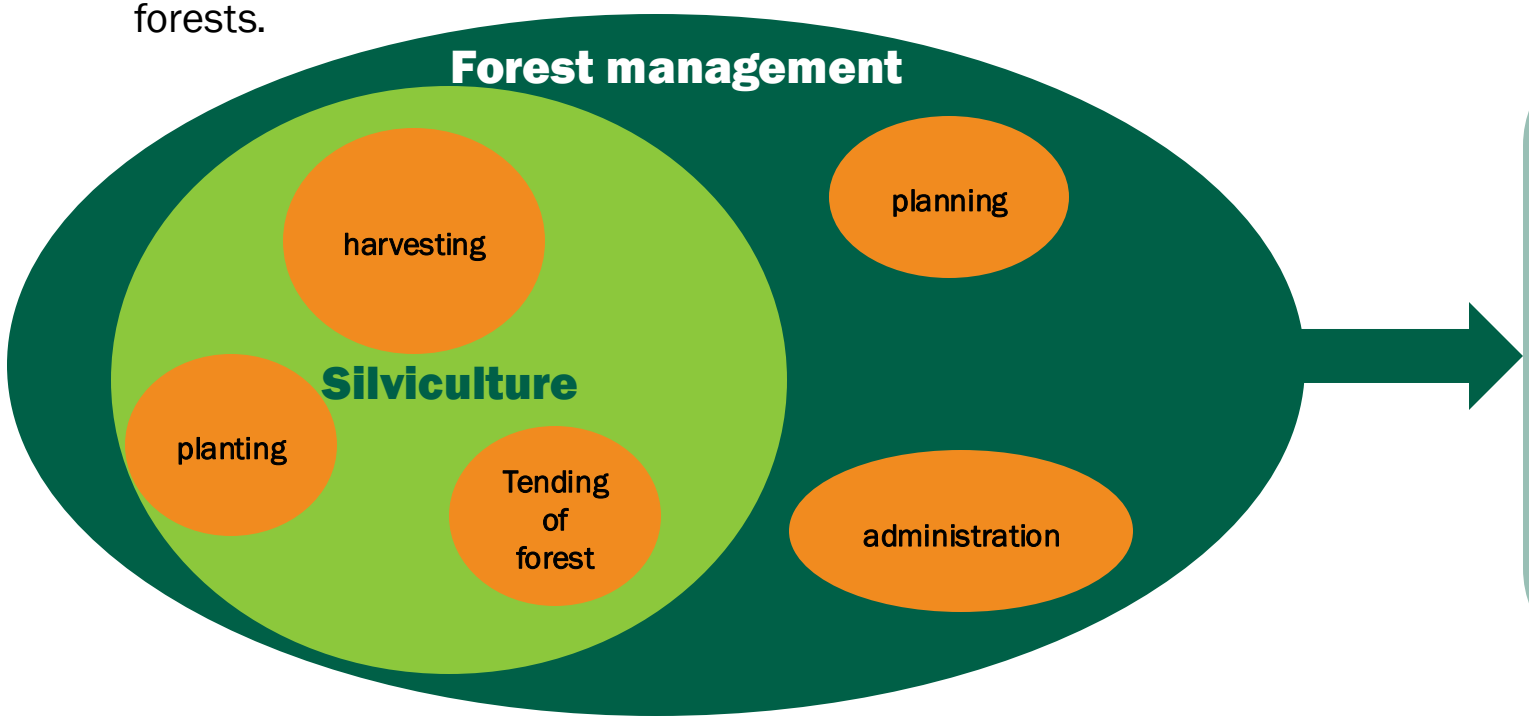
What is silviculture and forest management?

Silviculture

- practice of managing and cultivating forests to control their growth, composition, and quality. The term comes from the Latin "silva," meaning "forest," and "culture," referring to cultivation.
- subfield within the broader framework of **forest management**, focusing on the biological manipulation of forest ecosystems.

Forest management

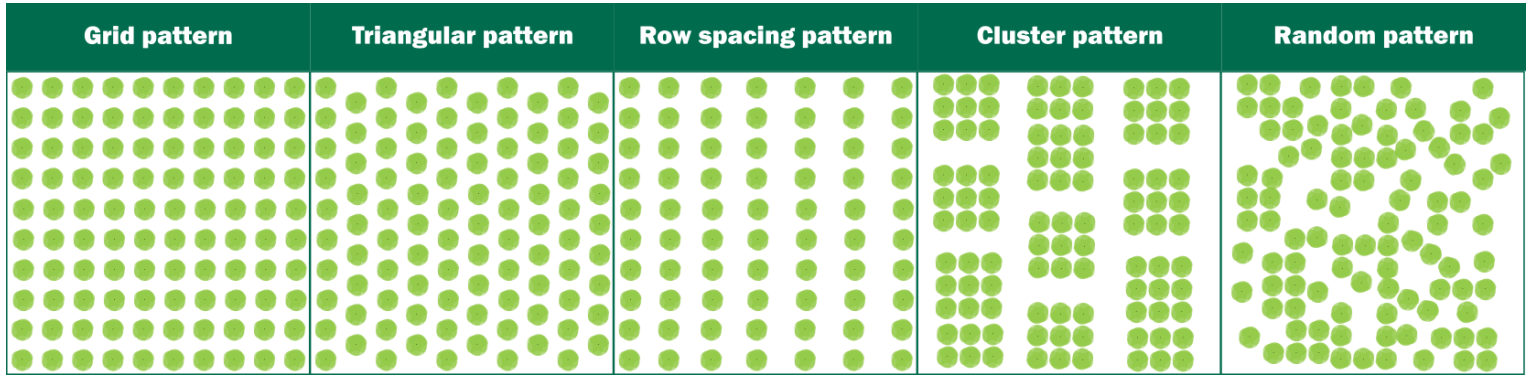
- process of planning and applying practices to oversee and regulate the use, conservation, and sustainability of forest ecosystems. It involves a wide range of activities aimed at balancing ecological, economic, and social benefits provided by forests.

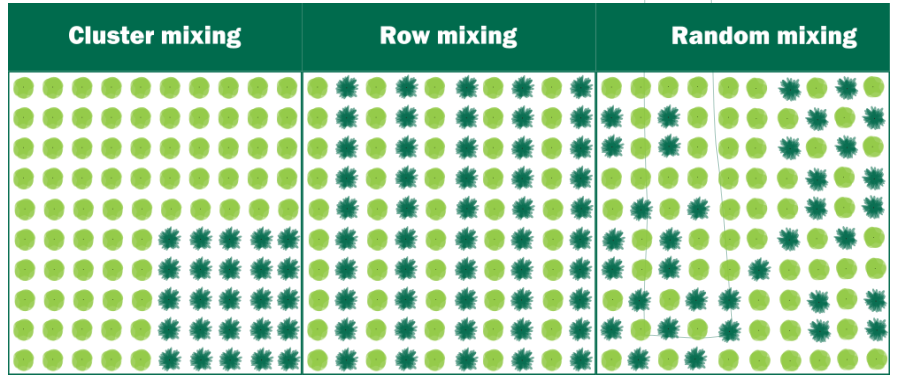


- Sustainable Timber Harvesting
- Conservation of Biodiversity
- Reforestation and Afforestation
- Fire and Pest Management
- Water and Soil Conservation
- Recreation and Public Use

Silviculture ...planting

Planting Method	Cost Range (in €)	Best-Suited Tree Species
Direct Seeding	€100–€300	Fast-growing species (pines, oaks)
Manual Tree Planting	€500–€2,000	High-value species (oaks, maples) and slow-growing trees.
Mechanical Tree Planting	€300–€1,500	Timber species (pines, spruces).
Aerial Seeding	€50–€200	Pioneer species like (pines, firs)
Agroforestry	€1,000–€5,000	Multipurpose species like fruit trees (apple tree, pears) or fast-growing trees for fodder.
Enrichment Planting	€700–€2,500	High-value or endangered.
Natural Regeneration with Assisted Planting	€200–€1,000	Native tree species (oaks, beeches).
Cluster Planting	€400–€1,200	Mixed species: conifers (pines, firs) and hardwoods (birch, oak).
Natural regeneration	€0	All species under proper silviculture system





Silviculture ...generative natural regeneration

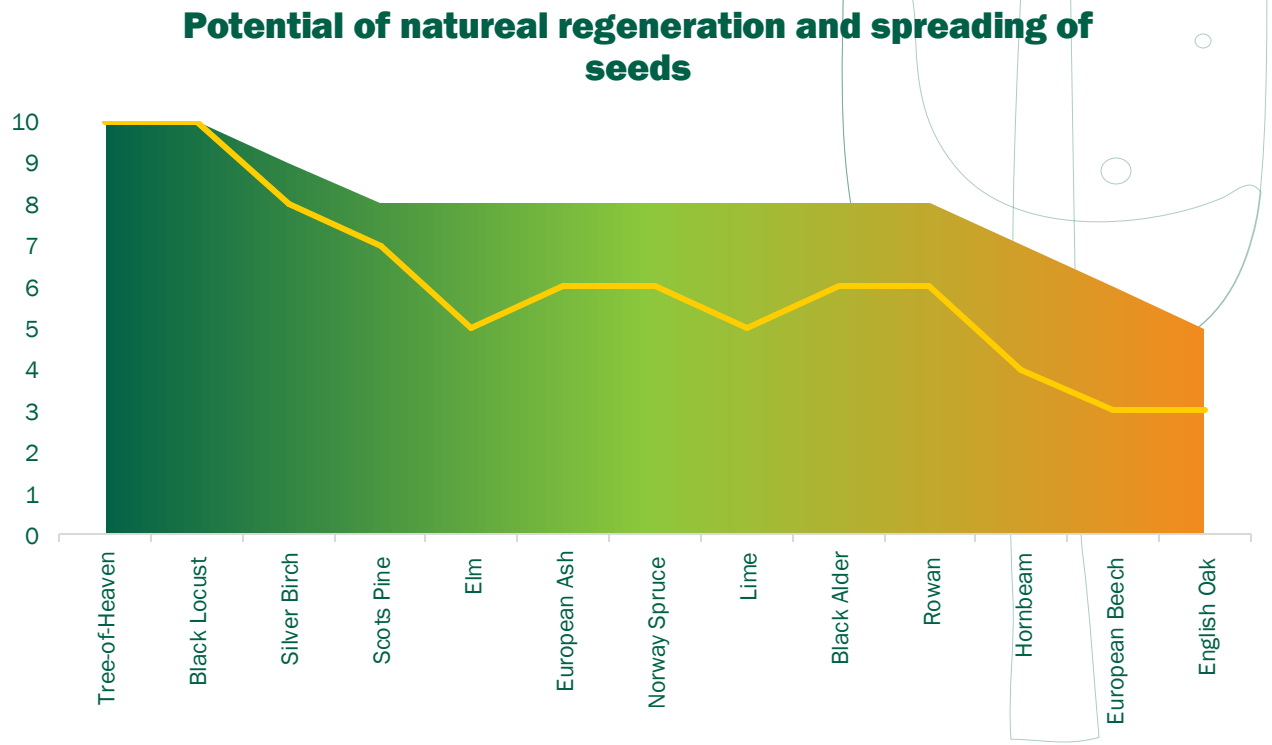
Natural regeneration refers to the process where forests recover and grow without human intervention, relying on existing seeds, seedlings, and vegetative growth.

Advantages

- Cost-effective: No planting or nursery costs.
- Promotes diverse species composition.
- Resilience: Forest adapts naturally to local conditions.

Challenges

- Gentle to surface
- Ensurance of next growth: multiplied numbers of seedlings
- Slower recovery process.
- Requires careful protection and monitoring.
- Spreading of invasive species
- Requires proper management of the parent forest stand



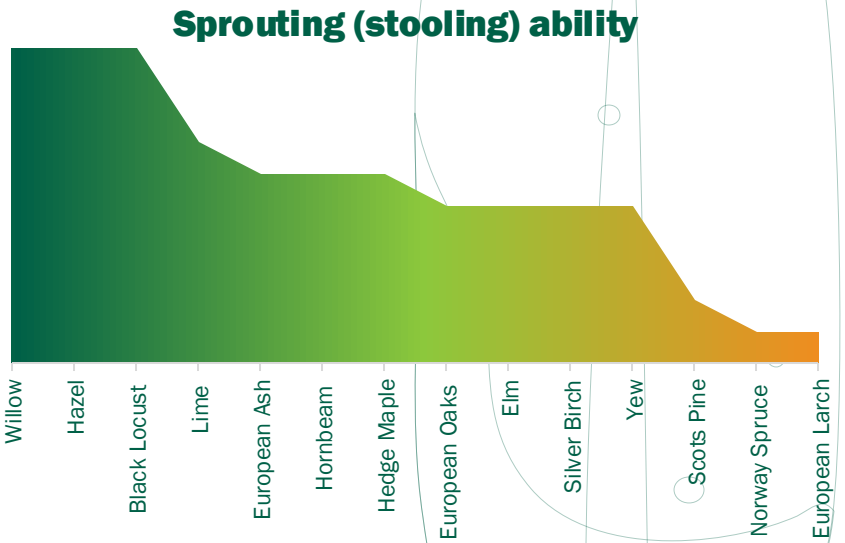
Silviculture ...vegetative natural regeneration

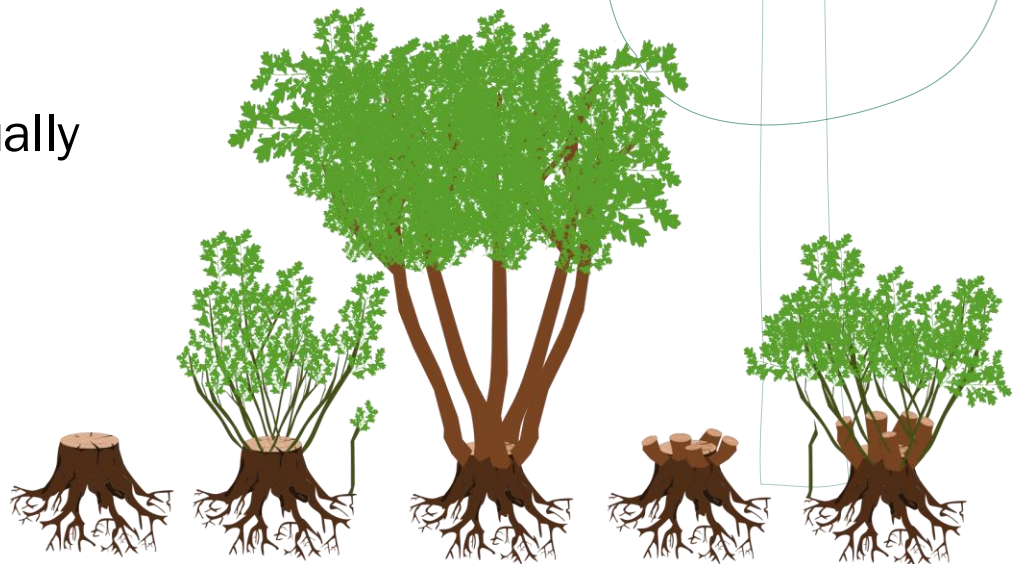
Advantages

- Zero costs
- Fast growing
- Remaining habitats for wildlife.
- Resistant to weather fluctuations due to established root system
- Gentle to surface: Minimal soil degradation.
- Cultural woodlands and traditional agroforestry systems.

Challenges

- Some tree species are dominant and eventually dominate in the subsequent stand.
- Space for non-native invasive species

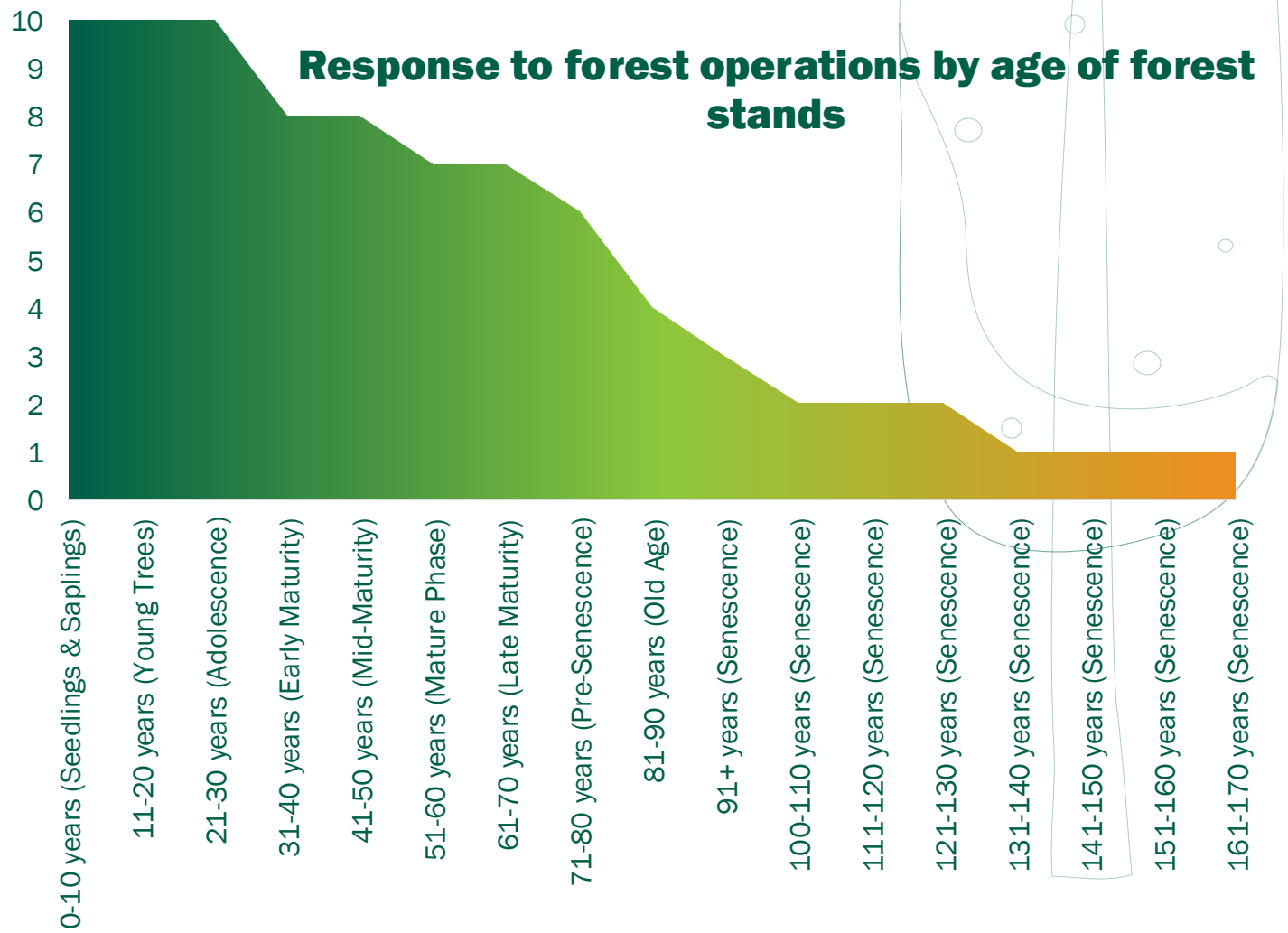




Silviculture …tending of forest

Forest tending = care of forest ecosystems to promote health, growth, and biodiversity. The purpose of forest tending is to enhance timber production, improve habitat quality for wildlife and maintain ecological balance and resilience.

Thinning = practice of selectively removing trees from a forest stand to reduce competition for resources such as light, water, and nutrients. It enhances growth and health of remaining trees, improves forest structure and biodiversity and increases economic returns from timber production. The right time to thin depends on tree species, stand density, and growth rates

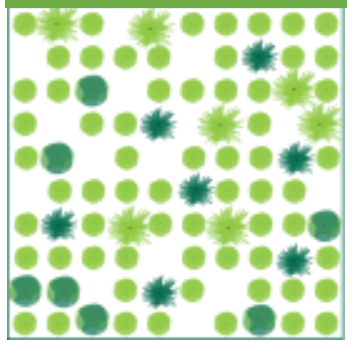
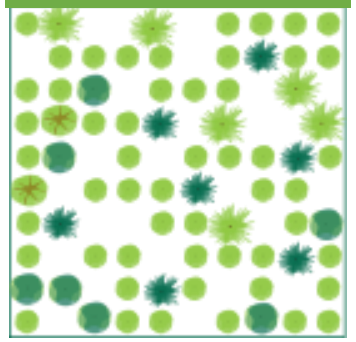
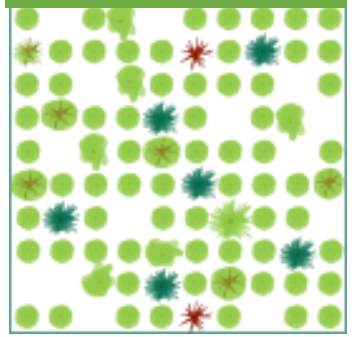
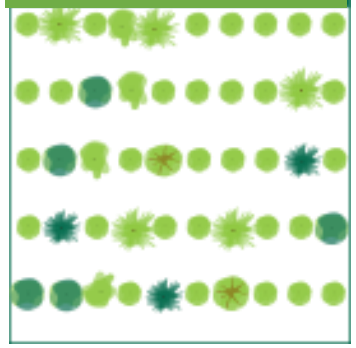
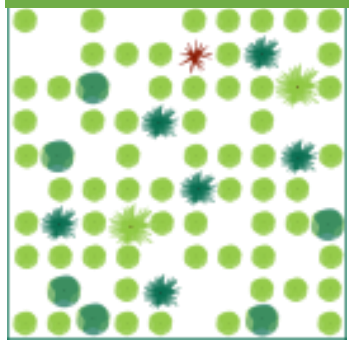
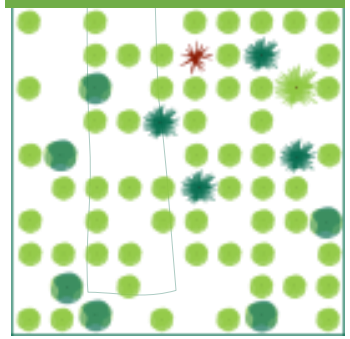


Silviculture ...thinning

Thinning in advance growths and young plantations (0-10 years)

- thinning of advanced growth (by tree scissors)
- thinning of advanced growth by hands

Thinning in young forests (small pole stage stands and pole stage stands)

Selection thinning	Uniform (Even) Thinning	Crown thinning	Row thinning	Free thinning	Variable density thinning
Selects and removes poor-quality trees (regardless of their size) to favor the best specimens.	**Thinning from Below** - smaller, suppressed trees in the lower canopy to reduce competition for dominant trees	**Thinning from Above** - Removes trees from the upper canopy, that crowding the crowns of desirable trees.	**Mechanical Thinning** - removes trees in a predetermined pattern, in rows or strips, used in plantations.	No fixed pattern or size class is targeted; removal of trees is based on overall stand conditions.	focuses on creating a more heterogeneous stand by thinning unevenly across the area.
					

Silviculture ...tending of forest

Tending planning is the determination of cultivation objectives, ways to achieve them and the necessary costs, based on biological (ecological), economic and technical grounds. Cultivation planning basically takes two time horizons. Long-term planning sets management objectives in accordance with the silviculture system - it goes beyond the decade horizon, while short-term planning covers planning periods of several years.

Thinning type – which trees to remove and which ones to favor

Thinning intensity – how many trees, or how much of volume will be removed

Thinning cycle – the interval between succesive thinning

Distribution of remaining trees – should this be even or not

Impact of thinning – presence of threatened species, occurance of invasive species nearby

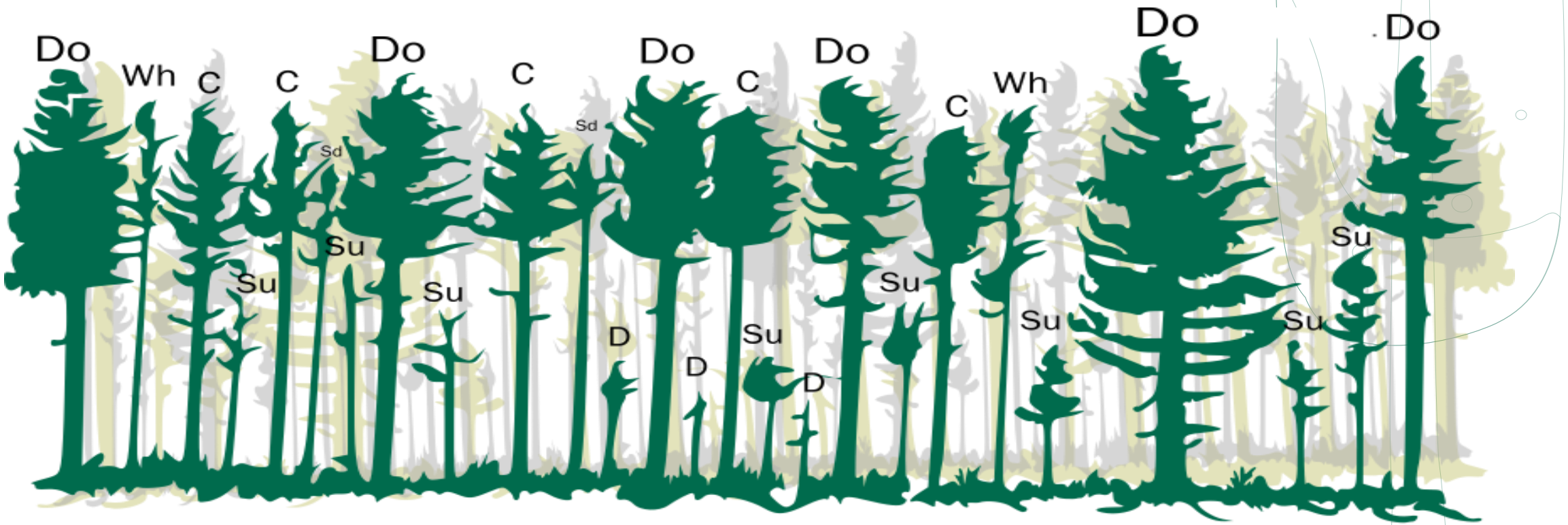
Thinning methods in the Czech Republic:

1. Even
2. Crown
3. Low-intensity
4. Medium-intensity
5. High-intensity
6. Very High-intensity
7. Releasing
8. Graded
9. Bohdaneckého
10. Borggeveho
11. Francouzká
12. Konšelova
13. Němstěrovova
14. Schadelinova
15. Sucheckého
16. Voropanova
17. Slective
18. Wagnerova

Silviculture ...tending of forest

Thinning planning based on tree classification within uniform thinning method

- Remaining trees should be able to compensate for loss in increment of removed trees
- Estimation of optimum stocking for a given site and species
- The development of crown and stem are the deciding factor for classification



Do = dominant, C=co-dominant, Sd = sub-dominant, Su = suppressed, Wh=whip, D = dead and dying

Silviculture …integration of natural processes

Integrating natural processes into thinning

- reduces management input,
- fosters natural forest dynamics,
- ensures the forest remains ecologically balanced and resilient.

Mimicking Natural Distaurbances

Opens gaps in the canopy = support of light-demanding and pioneer species.

Increasing forest stand stability against windstorms

Promoting Natural Regeneration

Ensures a forest structure that closely resembles natural growth patterns.

Selective Thinning for Ecosystem Balance

Enhances resilience to pests, diseases, and climate change.

Silviculture …use of natural forces

Natural Tree Mortality

- Promotes the growth of healthier trees.
- Reduces competition
- Encourages regeneration
- Saves your money

Self-Pruning

- Improves timber quality by encouraging straighter, taller trees.
- Reduces pest and disease risks from dense, low-hanging branches.

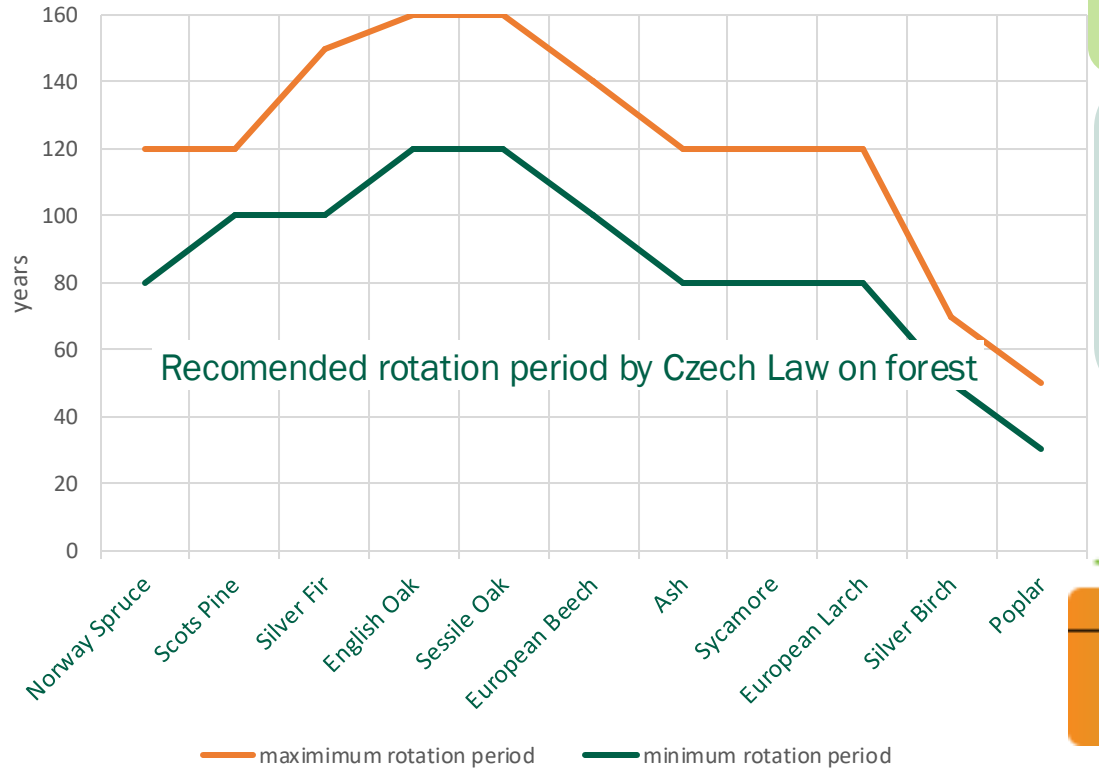
Succession and Species Competition

- Supports species that are better adapted to local conditions.
- Enhances biodiversity.

Silviculture … harvesting

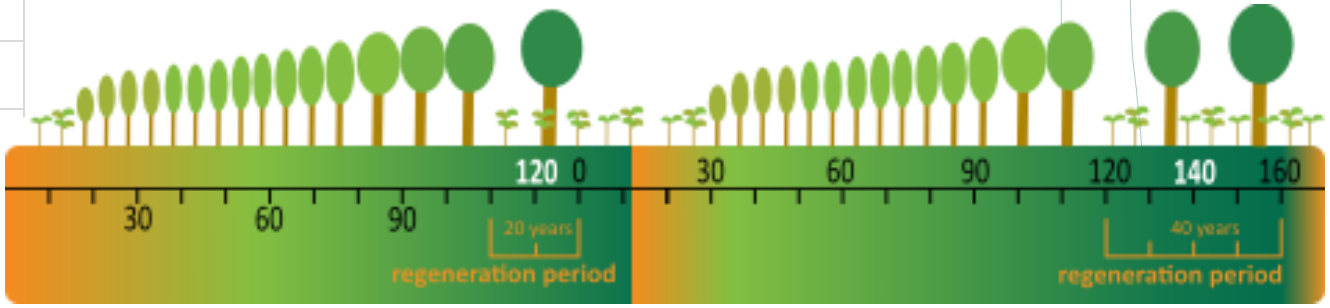
Rotation period = The planned time interval between the establishment of a forest stand and its final harvest or maturity. It is a comprehensive decision that combines economic, ecological and legal aspects of forest management to maintain sustainable timber production while preserving forest health.

Regeneration period = The time required for a new forest stand to establish itself after harvesting or disturbance.



Rotation period has increased over the last centuries due to the use of new technologies

- Forest became shady
- Risk of sudden events
- Was developer C-o-C based on bigger dimension trees

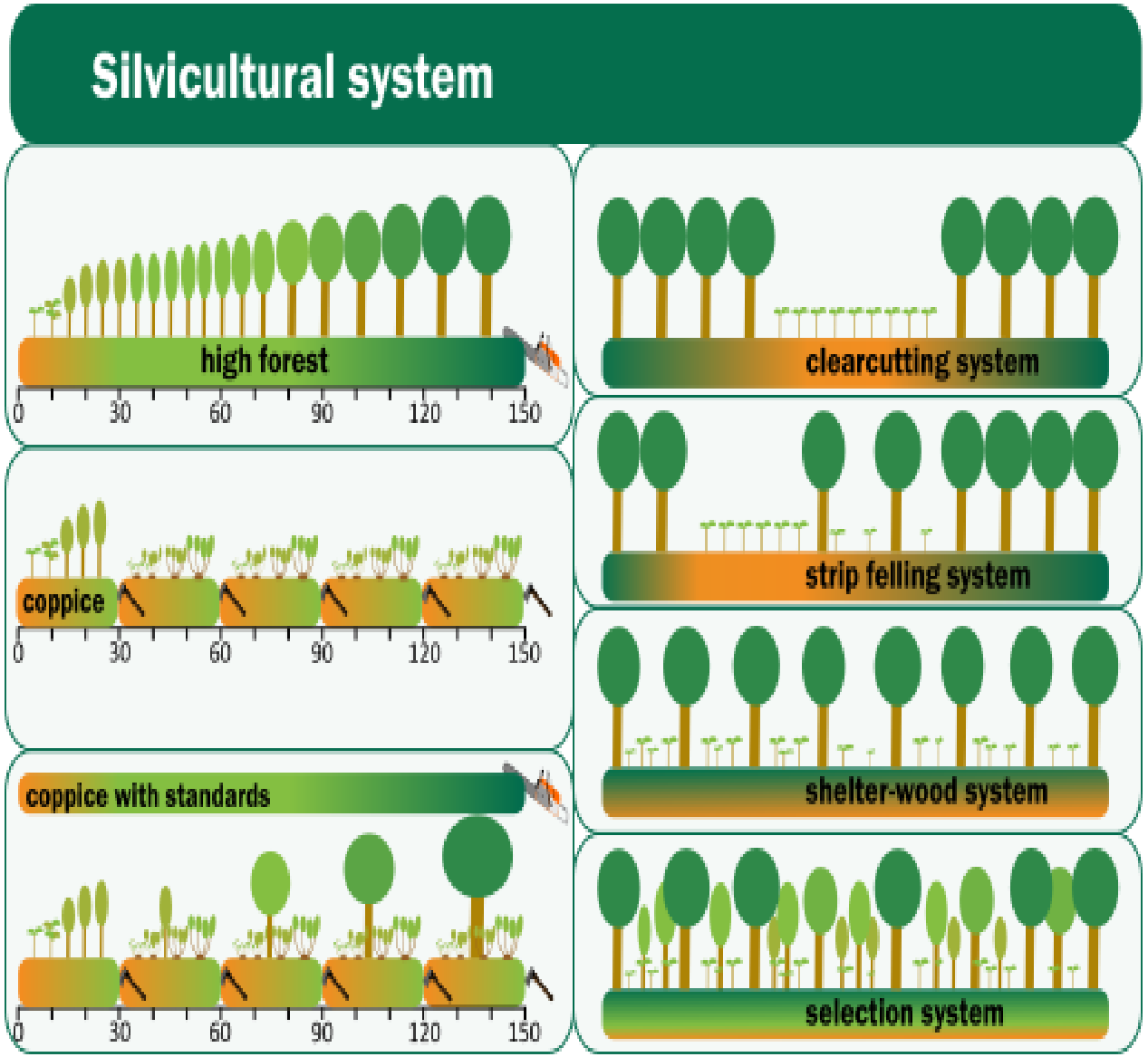


Silviculture … harvesting

Factors for determining rotation period

Species composition of the forest:	• Coniferous species (e.g. spruce, pine) have a shorter maturity period because they grow faster. • Deciduous species reach a higher timber value at an older age.
Economic objective:	• If the priority is ecosystem services (nature conservation, biodiversity), the harvesting period may be longer than in commercial forest.
Soil quality and climatic conditions:	• In poorer soil conditions the rotation period may be longer.
Ecological requirements:	• Prolongation of rotation period and regeneration period to support natural processes as tree decaying etc. .
Legal standards and recommendations:	• Not every time in accordance with nature protection of forest.

Silviculture ... harvesting



Silviculture … harvesting

Dauerwald = eternal forest

- Sustainable forest
- natural
- mixed
- uneven-aged forest
- continuously managed without the need for clear-cutting.
- The aim is to maintain a permanent forest cover and to achieve a high ecological and economic value of the forest

Uneven aged forest

Close-to-nature forest management

Small scale forest operations

Continuous forest shelter

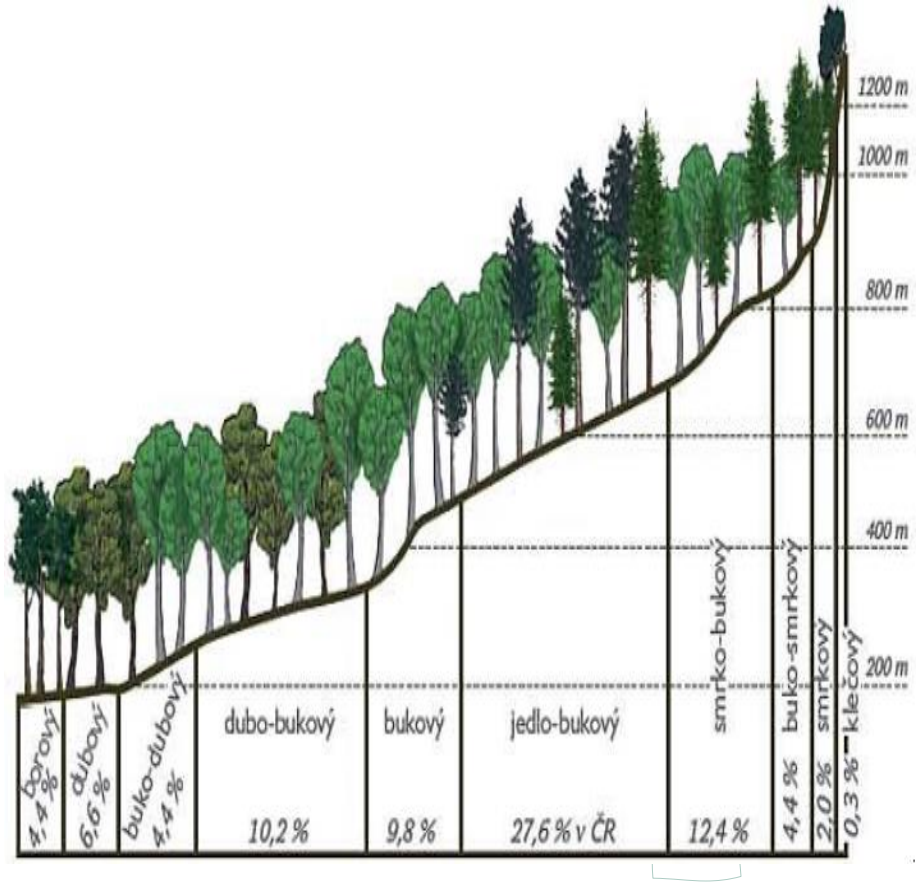
Economic and ecologic sustainability

Forest management ... forest bound in forestry tables

Forest typology = clasiffication of forest into forest types. The typological system is based on the horizontal and vertical division of natural conditions

- **Vertical zonation** = classification into **forest vegetation stages**, which are distinguished on the basis of the relationship between climate and biocenosis. In the systematics, they are characterised numerically by 1-9 (and by the group - 0) and verbally by the most important native tree species of a given altitude zone, e.g. dbBK = oak beech.

Code	Forest vegetation stage	Altitude	Climatic Characteristics	Dominant Tree Species
1	**Oak (lowland)**	up to 250 m	Warm, dry areas	Oak, hornbeam, field maple
2	**Oak-Beech**	250–350 m	Mildly warm	Oak, beech, maple, linden
3	**Beech-Oak**	350–450 m	Mildly cool	Beech, oak, linden, maple
4	**Beech**	450–600 m	Cool, humid	Beech, Norway maple, elm, silver fir
5	**Fir-Beech**	600–800 m	Cooler, higher precipitation	Beech, silver fir, Norway maple
6	**Spruce-Fir-Beech**	800–1,000 m	Cooler, moist	Norway spruce, silver fir, beech
7	**Spruce**	1,000–1,200 m	Cold, high precipitation	Norway spruce, mountain pine
8	**Dwarf Pine**	above 1,200 m	Very cold, alpine-like conditions	Mountain pine, Norway spruce
9	**Subalpine**	above 1,300 m	Harsh, high-altitude climate	Dwarf pine, juniper, alpine flora



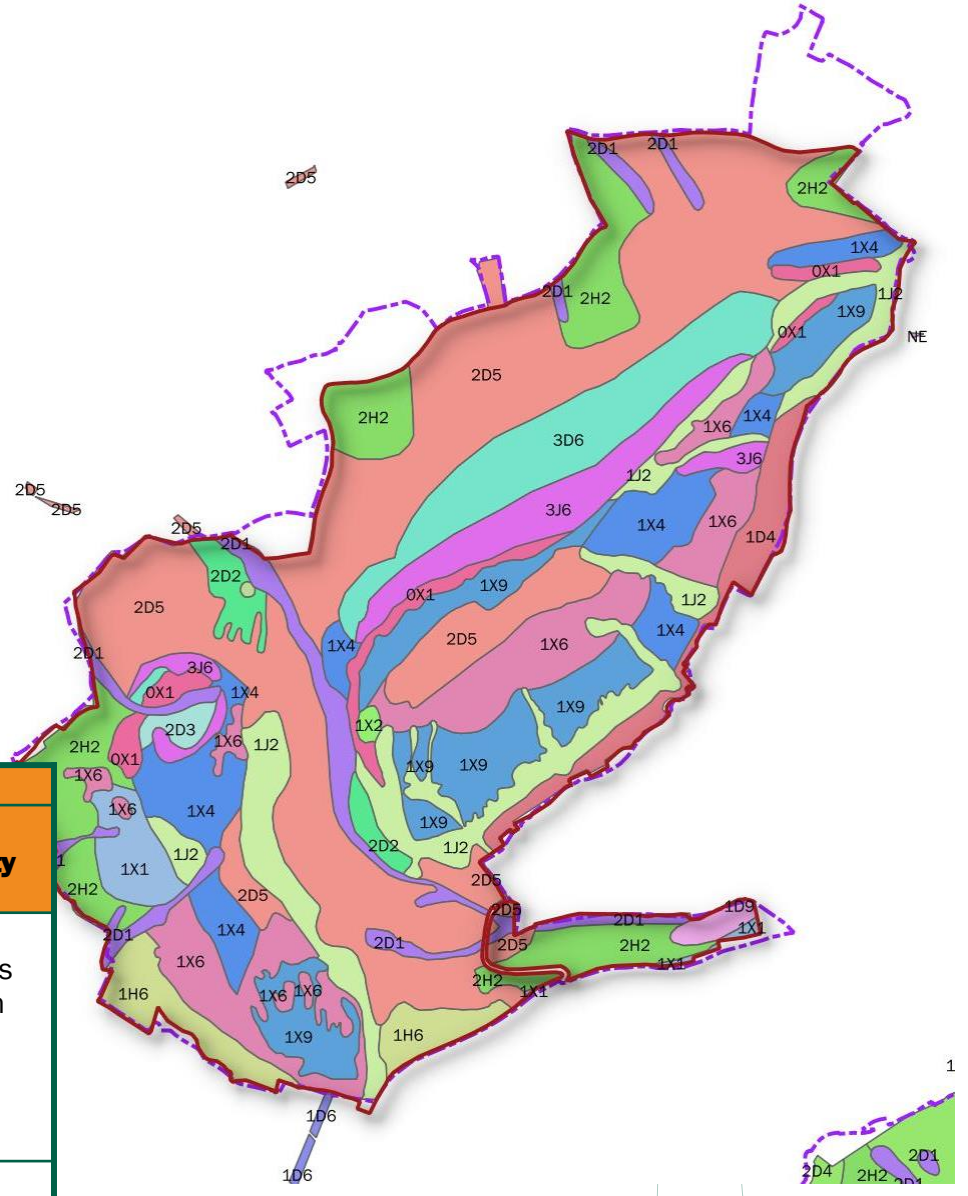
Forest management ... forest bound in forestry tables

- **Horizontal zonation** = based on ecological series and categories, expresses the differentiation of growing conditions according to habitat differences, especially soil differences.
- **Forest Type** and **Forest Type Group** = a distinctive combination of species of the relevant phytocenosis, soil characteristics, position in the terrain (in forest vegetation stages), the potential credibility (value) of tree species

1 K 1 — **Acid oak grow with fescue-grass**
„Kyselá doubrava kostřavová“

- Characteristic type of phytocenosis
- Edaphic (soil) category
- Forest vegetation stage

Code	B	K	Z	J	I	P	G	R
Edaphic category	**Nutrient-Rich**	**Acidic**	**Extreme**	**Enriched with humus**	**Water-Rich**	**Gleyed**	**Waterlogged**	**Peaty**
Soil and Site Characteristics	Rich in nutrients, humus-rich, and well-structured soils	Acidic, sandy or rocky soils	Soils with extreme conditions (e.g., very dry or very wet)	More developed nitrophilic soils	Soils with a permanent excess of water, enriched with minerals	Gley soils, often waterlogged with characteristic features	Soils with permanent waterlogging, poorly drained	Peat soils with high organic matter content
Typical Tree Species	Beech, ash, lime, maple	Scots pine, English oak	pine, oak	Spruce, pine, oaks, maples, elms	Alder, willow, poplar, oaks	Alder, willow, poplar	Alder, birch, willow	Alder, birch, swamp pine



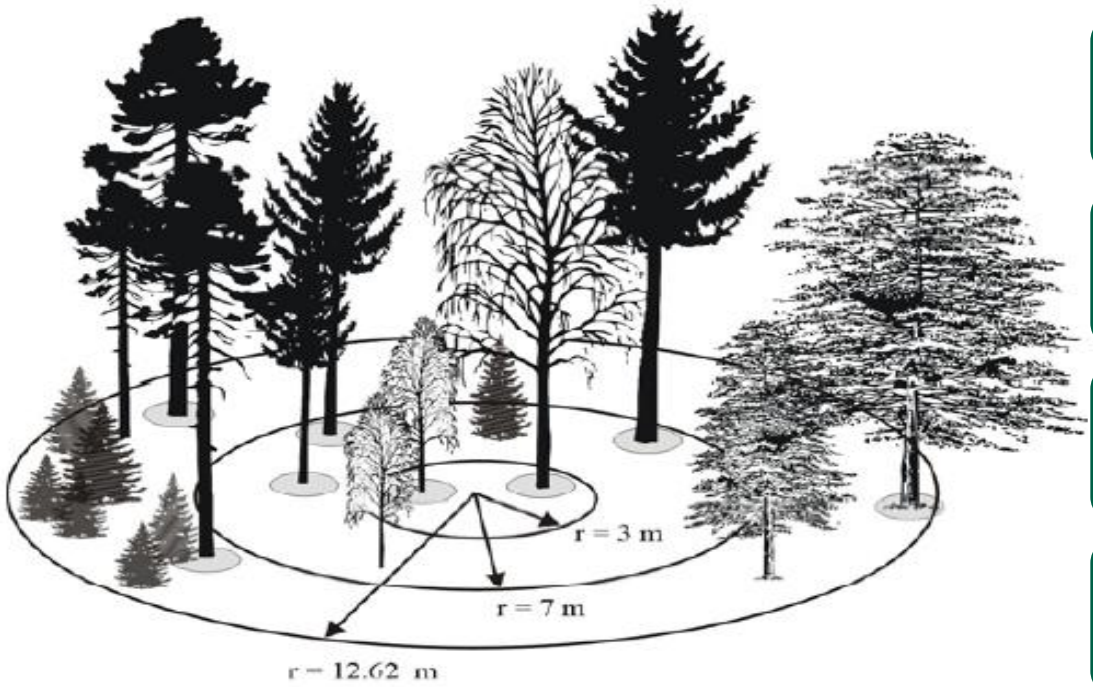
Forest management ... forest bound in forestry tables

Regional Plans of Forest Development (RPFD) are a methodological tool of the state forestry policy. Czech Republic is divided into 41 nature forest areas. For each area is developed RPFD with 20 years validity developed by The Forest Management Institute

Forest management ... forest bound in forestry tables

National Forest Inventory (NFI)

= independent survey on the actual state and development of forests.



Forest Structure:	• Tree species composition • Tree age • Tree height + Trunk diameter (DBH) • Timber stock (volume of wood per hectare)
Forest Condition:	• Tree health and vitality • Presence of diseases and pests (e.g., bark beetle infestations) • Deadwood presence (standing dead trees, fallen logs) • Natural regeneration (young seedlings, saplings)
Soil and Site Conditions:	• Soil type and composition (e.g., clay, sand) • Moisture regime (soil moisture levels) • Geographic data (coordinates, altitude, slope) • Site conditions (light availability, temperature, humidity)
Forest Management Interventions:	• Type of harvesting (clear-cutting, selective thinning) • Harvesting intensity • Forest treatments (fertilization, pest control, artificial planting)
Biodiversity:	• Species diversity of plants and animals • Presence of endangered or protected species • Ecological value (protected areas, natural habitats)
Forest Changes and Development:	• Historical data (comparison to past inventories) • Changes in forest composition and structure over time • Long-term trends in forest growth, health, and biodiversity
Carbon Balance:	• Carbon sequestration in forest biomass (trees, deadwood) and soil • Carbon emissions from the forest (harvesting, decay of deadwood, wildfires)

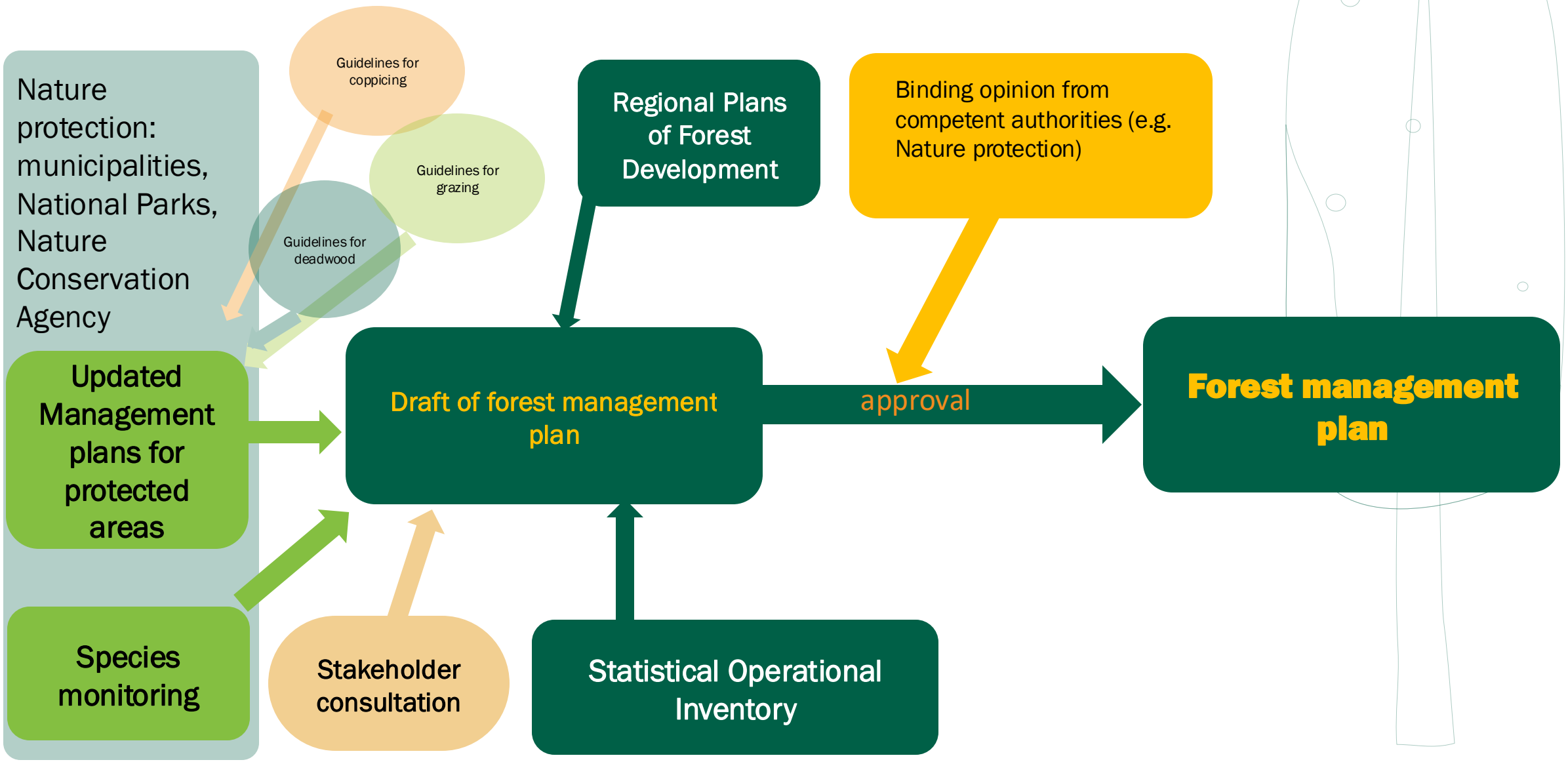
Forest management ... development of the Forest Management Plan

Text book	• Description of FM goals • Description of mandatory tresholds • Description of FM guidelines development • FM guidelines
Management book	• Description of forest stands: area, age, forest type group, tree density, volume by tree species, health condition, felling volume, mandatory proportion of eco-stabilising tree species for planting
Maps	• Map of forest boundaries • Forest stand map with forest age

Mandatory tresholds of forest management in the Czech Republic

- Maximum total volume of allowable cut
- Minimal volume of pre-commercial and commercial thinning
- mandatory proportion of eco-stabilising tree species for planting

Forest management ... development of the Forest Management Plan



Nature Conservation and its application in forest management

Conservation can help to bring about changes in forest management that will help to cope with current climate change.

200 Million

Hectares Certified

Forest Certification: FSC (Forest Stewardship Council)

Environmental Sustainability:	• Protect biodiversity, ecosystems, and forest integrity..
Social Responsibility:	• Respect indigenous peoples' rights • Ensure fair labor practices
Economic Viability:	• Ensure a fair and transparent market • Connection to new customers

- **Forest Management Certification**
- **Ecoysystem services Certification**
- **Chain of Custody Certification**

Nature protection and forestry

System of Nature Protection on the EU Level

Key Frameworks and Policies

EU Biodiversity Strategy:
- Aims to protect natural habitats, species, and ecosystems.
- Targets to restore degraded ecosystems and enhance biodiversity.

Habitats Directive (92/43/EEC):

Birds Directive (2009/147/EC):

Natura 2000 Network

European Green Deal: Climate-neutral Europe by 2050.
Sustainable land use and biodiversity restoration.

Nature Restoration Law (2022):
- Restoration of Ecosystems
- Biodiversity Enhacement
- Climate Change Mitigation
- Better Monitoring

EU Forest strategy

- Sustainable forest management
- financial incentives
- carbon storage and sequestration
- alternative forest industries
- education and training

System of Nature Protection in the Czech Republic

the national legislation

- Delays in the Czech Republic's commitments to the EU

Strategy documents for nature conservation

- Not all requirements of Nature Conservation implemented in the FMP

Forest management plan

- Only 3 indicators from the LHP are binding for the forest manager, active interventions are not obligatory

Forest managenent

Nature Protection and Forest management

- Based on long-term monitoring of habitats and species.
- Data on species are collected by nature conservation experts and by public too.

- Information System for the Protection of Nature
- Based on continuous species monitoring and habitats maping strategic documents are developed. This has impact on forest management strategy.

System of Nature Protection in the Czech Republic

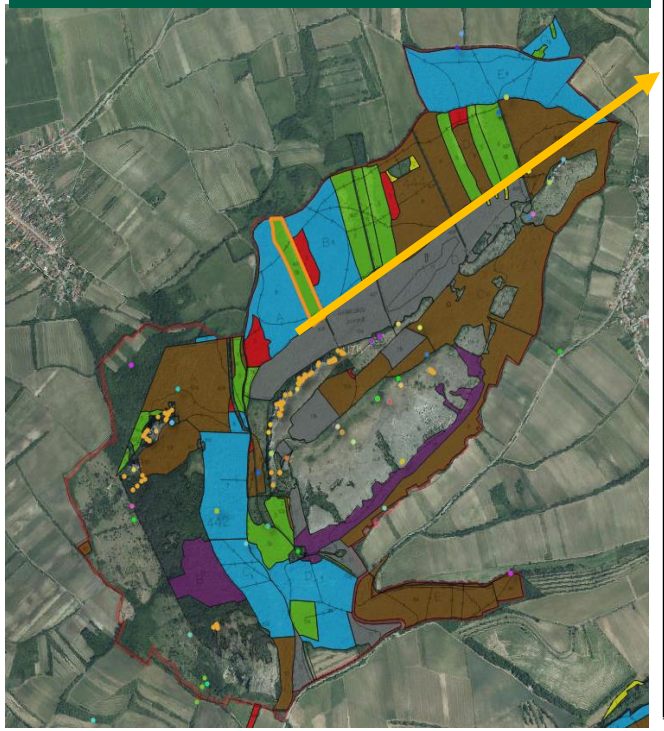
Based on continuous species monitoring and habitats maping strategic documents are developed. These are then implemented into FMP.

SCI Děvín	• Summary of recommended measures for SCI Děvín, which includes forest management guidelines
SPA Pálava	*To carry out all harvesting and pre-commercial thinning and silviculture operations in forest stands in the vicinity (200 m) of occupied honey-buzzard*)
PLA Pálava	• Nature protection management plan for Protected Landscape Area Pálava includes general Forest Management Guidelines
NNR Děvín	• Nature protection management plan for National Nature Reserve Děvín. The most detailed document with proposals for each forest stand Black locust occurence Sparrow-hawk nest

This area is also Dolní Morava Biosfere Reserve (MaB), Transregional biocentre within the Territorial System of Ecological Stability which has no real impact on forest management

Forest management planning ...with regards to nature protection

Forest map with spatial distribution of forest stand (for each age of forest is different colour) and with overlap of RTE species occurance (each species different colour)



Forest management guidelines from management plan of protected areas

No	category of forest	Group of Forest Types (GFT)
1	31c – special purpose forest	1H - loess hornbeam oak forest

Estimated target tree species composition

GFT	Tree species and their indicative share in the target tree species composition (%)
1H	Sessile oak 60%, Pubescent oak ±20 %, small-leaved lime ± 20 %, hornbeam ±10 %, hedge maple +, maples +, cornelian cherry +, wild service tree +, shrubs +

Forest stand type A	Forest stand type B
oak - deciduous	black pine, horse chesnut

Basic decision

Silvicultural system (form)		Silvicultural system (form)	
Selection system – individual and/or group		Shelterwood system (Slection - individual and/or group)	
Rotation period	Regeneration period	Rotation period	Regeneration period
Stand age - decay	continuous	Stand age - decay	continuous

Long-term objective of forest management

Gradual singling and tending of the existing over-aged coppices, support of seed origin trees of all alochtonous tree species, especially oaks and high quality trees of oaks, hornbeams, and limes of coppice origin. Spare all elms, cherry trees and wild service-tree. Support the formation of richly age- and spatially-structured forest stands with a natural species composition.	Conversion of non-native tree plantations to plantations with a natural species composition, while ensuring soil protection functions.

Regeneration method and regeneration procedure, including recommended technologies

Gradual reduction of poor quality individuals of sprouting origin. Release cutting of coppice converted into high forest stands with the aim of promoting individuals of seed origin of all alochtonous tree species, especially oaks and quality trees such as oak, hornbeam and lime of coppice origin. Spare all elms, cherry trees and wild service trees. Support of natural regeneration and additional support of vegetative oaks, hornbeams and limes. In case of natural regeneration failure, possibility of reinforcement planting. Systematically remove undesirable tree species from stands, especially black pine, tree of heaven and locust tree, in a way that reduces root soroutino capability.	Gradual reduction of non-native tree species (black pine, horse chesnut, black locust). In justified cases it is also possible to use clear cutting with the retention of standard trees of target deciduous trees. Mainly artificial regeneration. In the case of natural regeneration, promote good quality seedlings of alochtonous tree species.

Method of reforestation, determination of species and percentage of ameliorative and reinforcing trees in reforestation

Reforestation shall be carried out by planting or under-planting, it is desirable to use local natural regeneration of oaks, hornbeams, limes, ashes and other trees of natural tree composition. Artificial regeneration with seedlings from this national nature reserve. Allow exemption from §38 of Act No 289/1995 Coll., of the minimum number of seedlings, exemption from the rotation period and period for establishing plantation. If necessary and exemption from stand density below 0.7. Ameliorative tree species share 100%.

Method of reforestation, determination of species and share of percentage of amelioration tree species share (%)

GFT	Tree species	Comments on the use of tree species in artificial regeneration
1H	sessile oak 60%, pubescent oak 20%, small-leaved lime 20%	In the case of artificial regeneration, other tree species from the natural species composition (especially rare species (elm, cherry tree, wild service tree, etc.)) may also be used, up to a maximum of 20% of the reforestation.

Management of natural seeding, advance growth and tending of young stands, including recommended technologies

Support of quality oaks hornbeams, limes and rare tree species with preference for individuals of seed origin. Support height - spatial diversity of forest stands and support devecopment of large canopy trees. Predominantly single or group selection to remove undesirable tree species (tree of heaven,black pine, locust-tree) in a way that limits root sprouting. Chemical reduction of black locust seedling and grouwths with glyphosphate-based products (necessary exception), protection of regeneration and planting of native tree soecies against forest weed and game.

Forest protection measures including recommended technologies

No intensive interventions (risk of drough and dieback). Individual mechanical or chemical protection is possible for future crop trees of vegetative or generative origin. Compliance with the estimated standard game density. In the event of an of pests outbreak, protective measures shall be permited by the SPA Administration.

Implementation of sanitary (salvage) felling, including recommended technologies

Do not implement, except for the removal of non-native tree species.	When carrying out salvage felling, leave dead standing trees and deadwood to decay.

Black locust occurence

Forest management book with prescribed forest interventions implemented from management plan of protected areas

Extract of Forest Management Book (part of Forest Management Plan)

FMU: 616000 Šidlochovice | Validity: 01.01.2020 - 31.12.2029

Compartment: 444 | Area: 3,60 | Description of compartment:

Subcompartment: A | Area: 3,60 | Description of subcompartment:

Forest stand: a | Area: 3,60 | Kategory/overlap: 32f,31c,32a | Specific statute: | pollution-damage zone: D

Code of property: 11000 | Enterprise: 500 RP Jižní Morava | Organisation: | Section:

Forest region: 35 | Zone: | Target zone:

Forest stand group.: 05b | Area: 3,60 | Forest type: 2D4 | ground type:, not stated | forest vegetation altitudinal zone: 2 beech-oak | Forest administration:

Cadastral area: 718394 Pavlov u Dolních Věstonic | Silvicultural system: 4 Selection | Area aligned on the cadastre: | Approximate distance:

National Nature Reservation: 2475 Děvín-Kotel-Soutěska | National Nature Monument: not stated | Site of community interest (NATURA 2000): Not determine

Forest story: 5b | Cadastre area: 3,60 | Real area (ha): 3,60 | Cutting percentage model (%): | Beginning of renewal: 121 | Rotation period/regeneration period: 150/ 50 | amelioration tree species share: 80

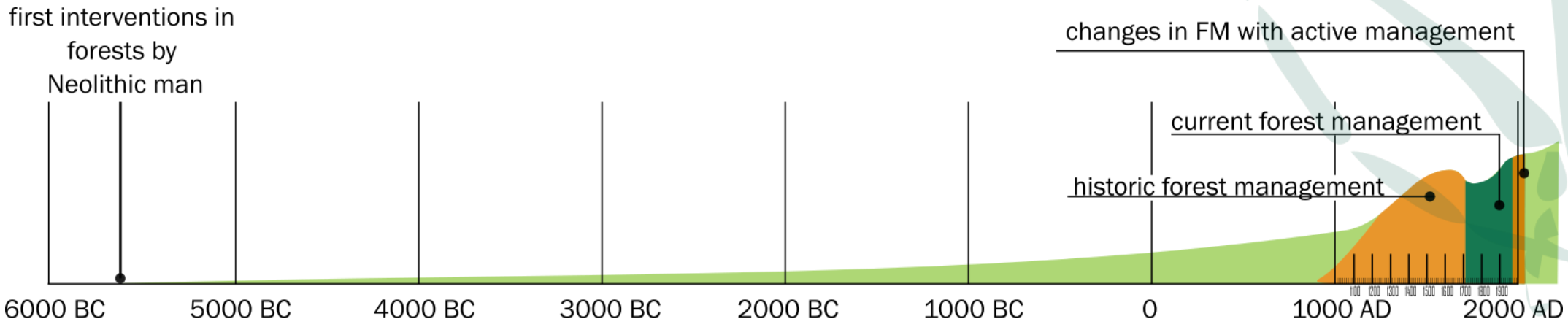
Forest stand group	Target forest stand group	Age	Stand density	Tree species	% of tree species share	Breast-height diameter (cm)	Hight (m)	current total volume (m3/ha)	Absolute tree species class	Relative tree species class (forest code)	Generic classification	Damage		Pollutants damage	Growing stock (m3)		improvement cutting				regeneration cutting		thinning				Refforestation			
												Type	Share of damage %		1 ha	total	tree species	volume	ha	m3	ha	m3	tree species	volume	ha	type	Tree species	species composition %	ha
		45	10	lime	62	12	12		26						72	260					3,60	243							
				ash	15	12	13		26		C				13	48						39							
				Aspen	10	18	19		26						15	53						53							
				Hornbeam	7	9	10		16						4	16						7							
				Oak	2	15	11		26		c				2	7						0							
				Locust	2	9	9		12						1	3						3							
				Birch	1	16	14		22						1	3						3							
				Horse chesnut	1	18	10		24						1	3						3							

Sparrow-hawk nest

Black locust occurence

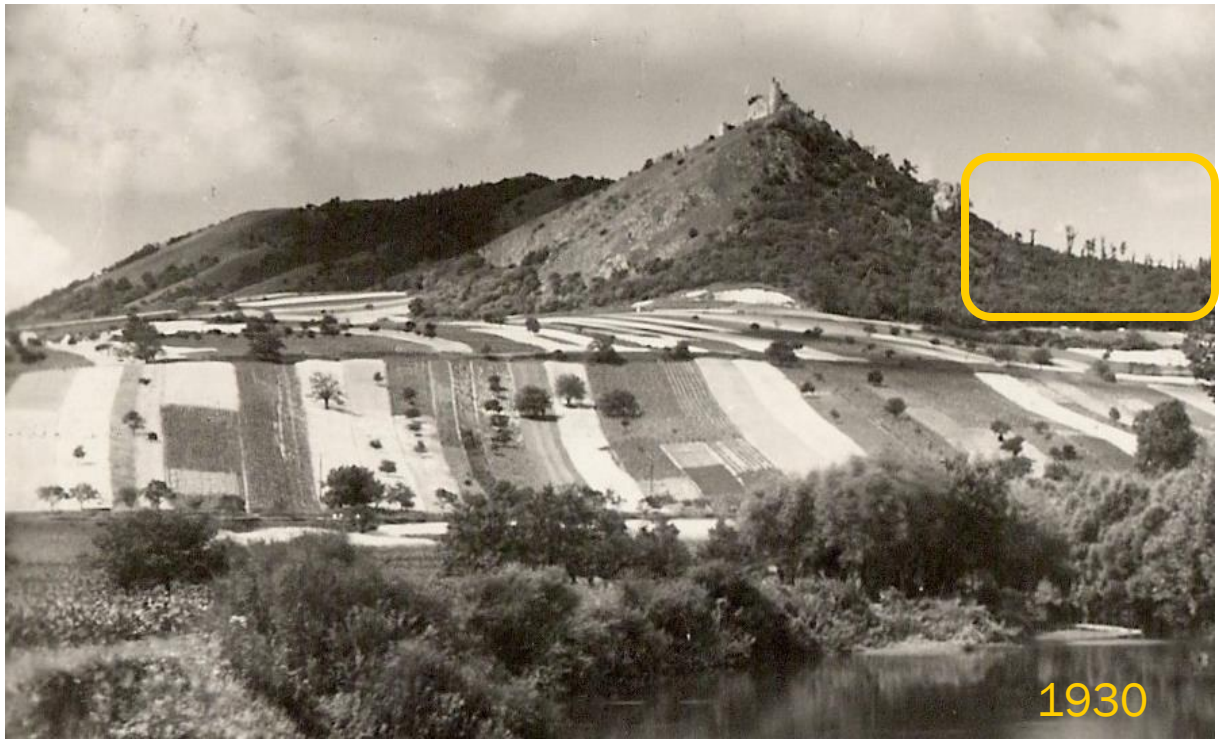
Forest management and change in Nature Conservation paradigma

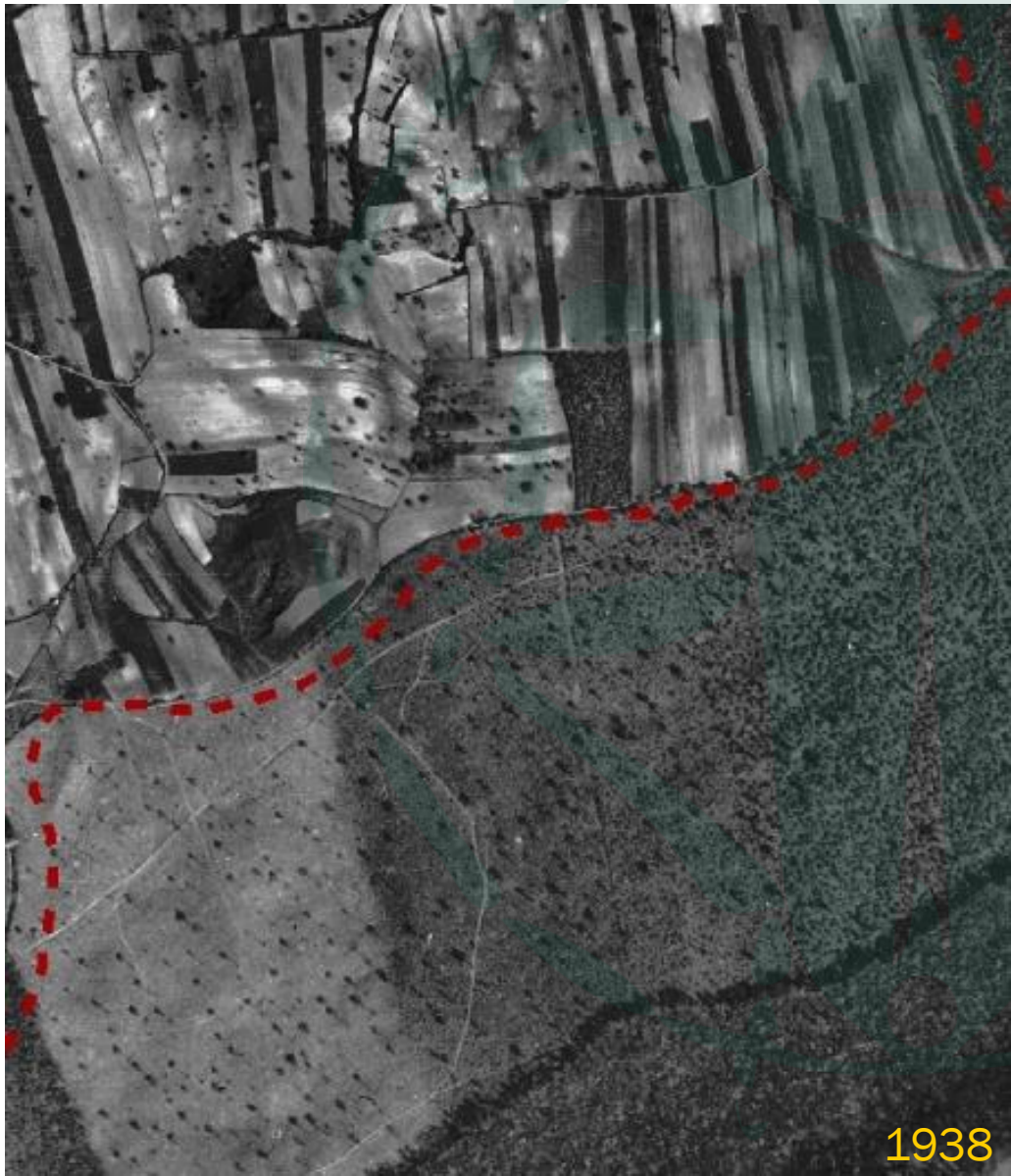
- After the Second World War, nature conservation applied mainly a conservation approach.
- Forest management has been abandoned and forests were left to their own development in protected areas .
- This led to a decline in light-demanding species, especially in lowland forests.
- Declining of rare and threatened species populations led to changes in nature conservation approach.



Forest management and change in Nature Conservation paradigma

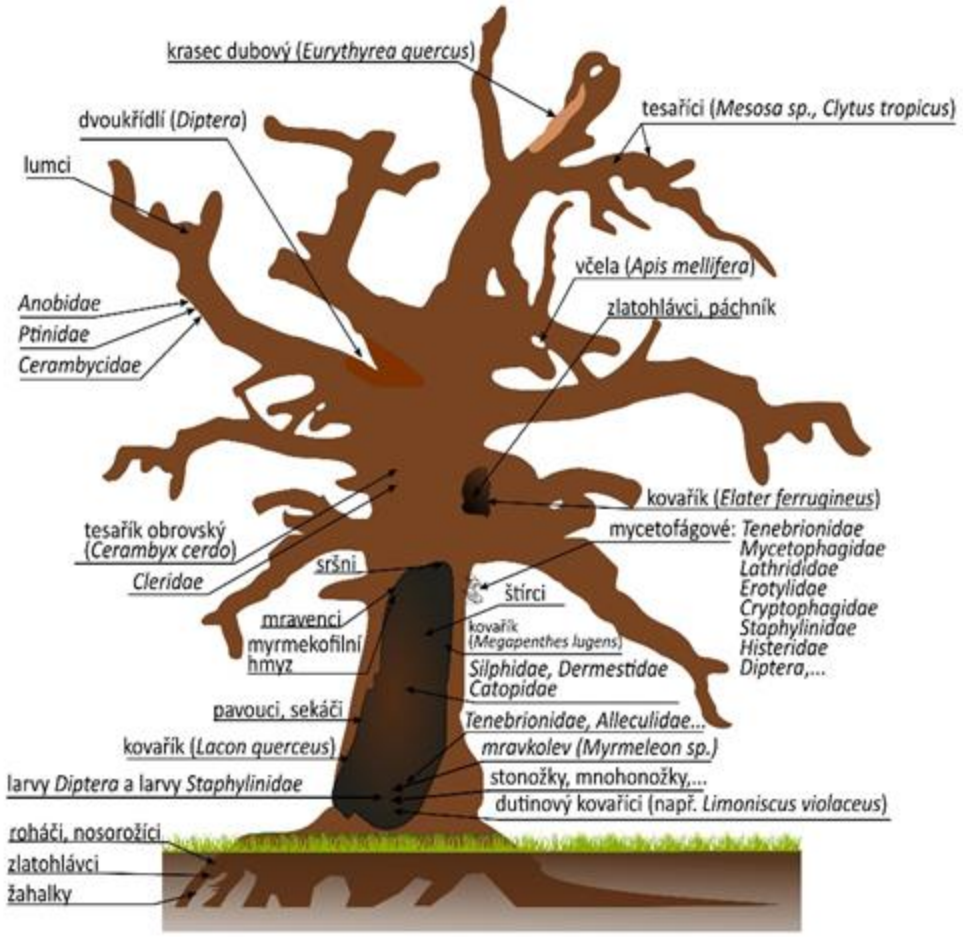
- At present, nature conservation promotes active forest management with regard to the occurrence of rare species and their requirements.
- Historic aspects of FM management are taking into account during strategies development

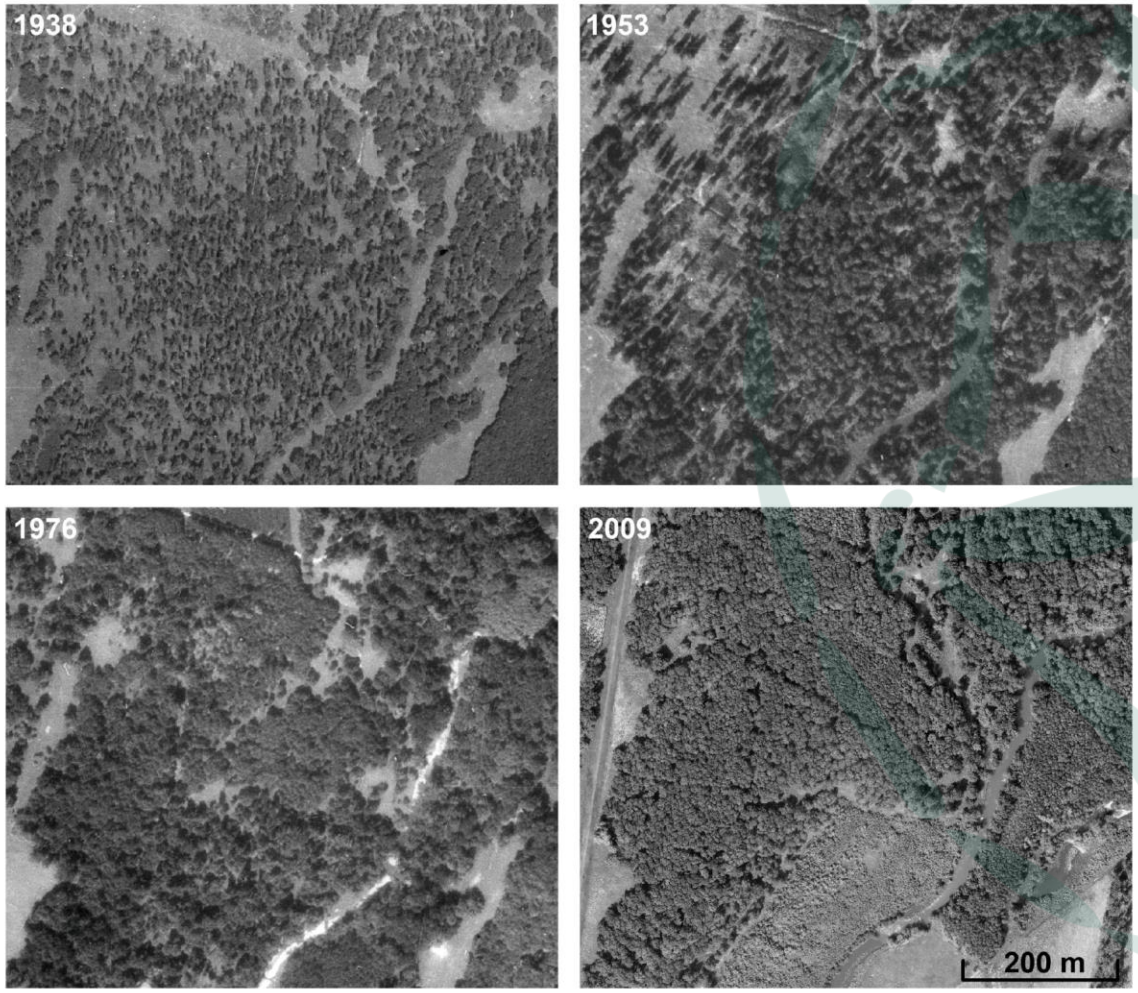




Nature Conservation and its application in forest management

Especially the old massive trees are a biodiversity hot spot. However, these cannot arise in a dense forest.





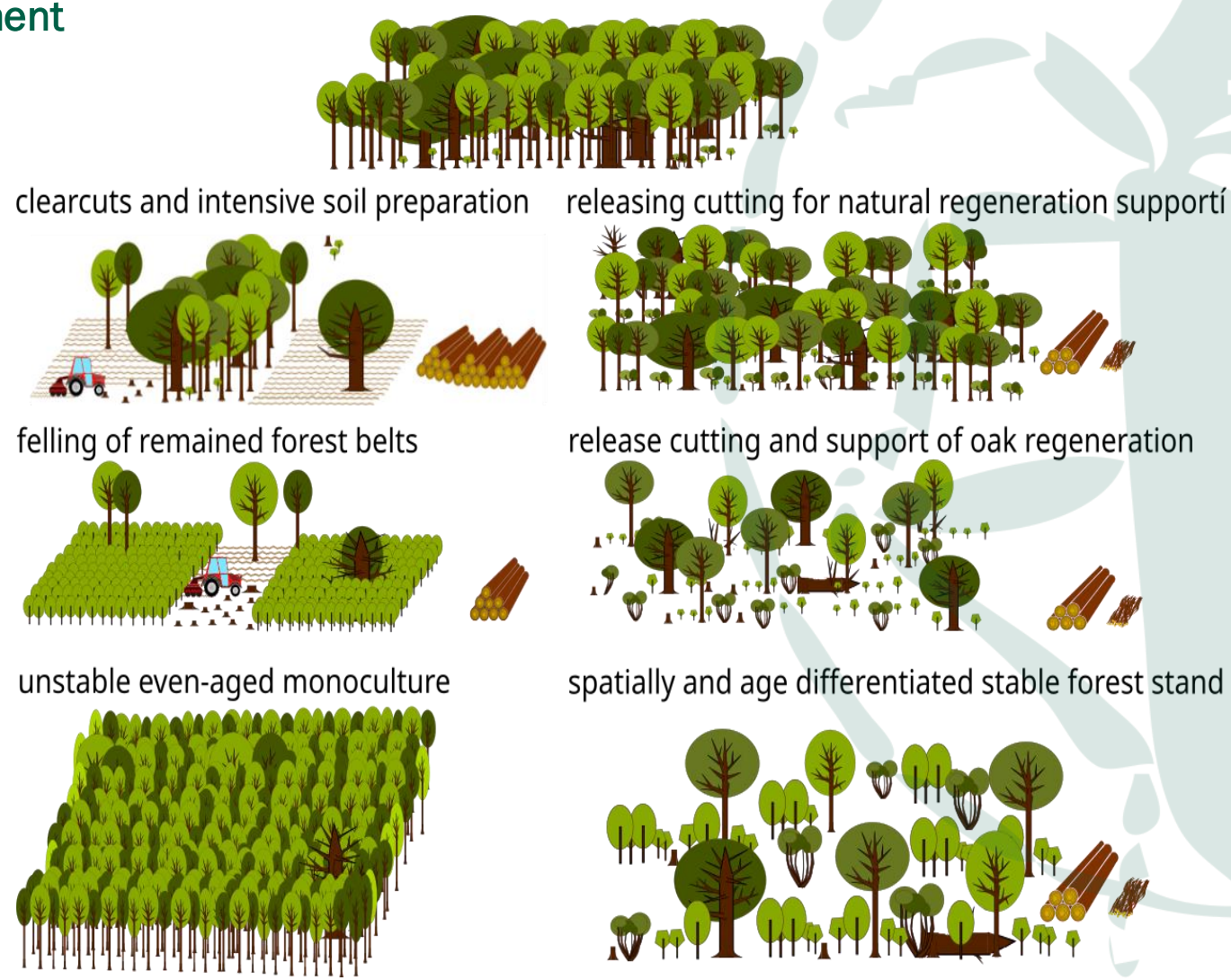
Nature Conservation and its application in forest management

Intesive forest management leads to declining of forest species. = ban on soil preparation.

Nature Conservation and its application in forest management

Intesive forest management leads to declining of forest species, but without forest management light demanding species declining = change in forest management

- Species-rich and age-varied forest is more stable than monocultures of the same age
- Strenghtening of regeneration period will help a more balanced forest age structure
- Lightening of the forest gives a chance for natural regeneration of light-depending tree species
- Light forest provides refuge for declining species



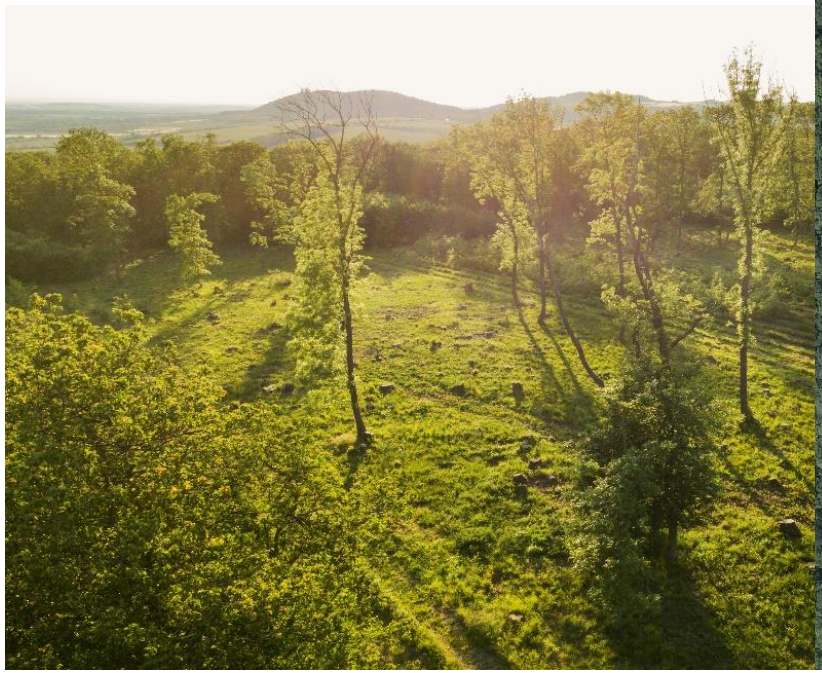
Nature Conservation and its application in forest management

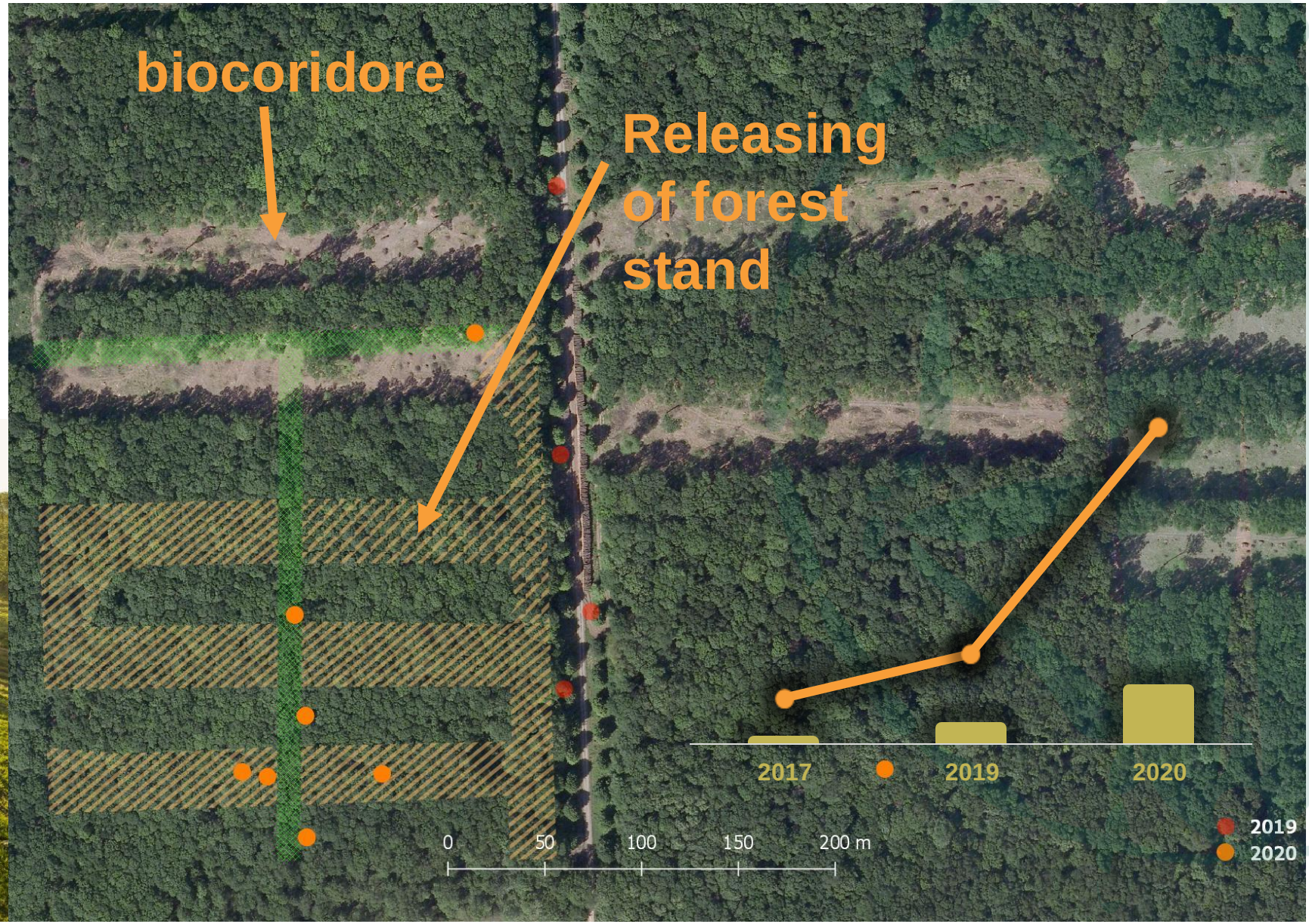
Positive impact on light – demanding species

Foto: Jiří Kmet

Nature Conservation and its application in forest management

- **Special forest operation for save clouded Appolo from extinction**

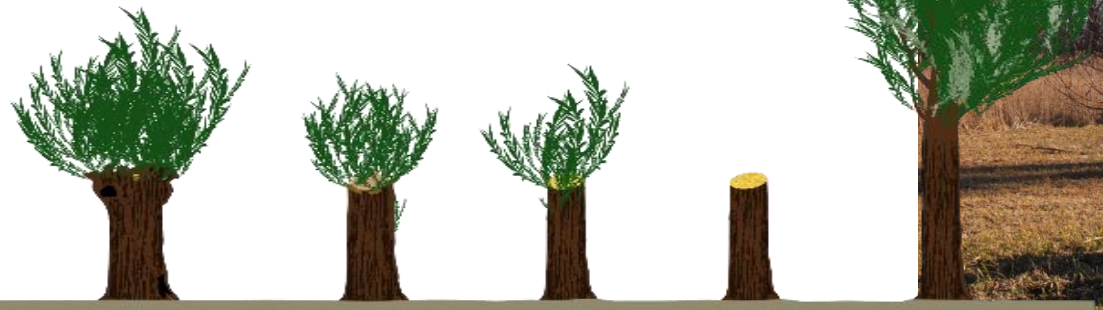




Nature Conservation and its application in forest management

- **Pollarding that save cavity demanding species**

  - prolongs the life of trees
  - cavities are created
  - prune in winter
  - interval 3 - 5 years
  - Even 70 years old willows sprouting



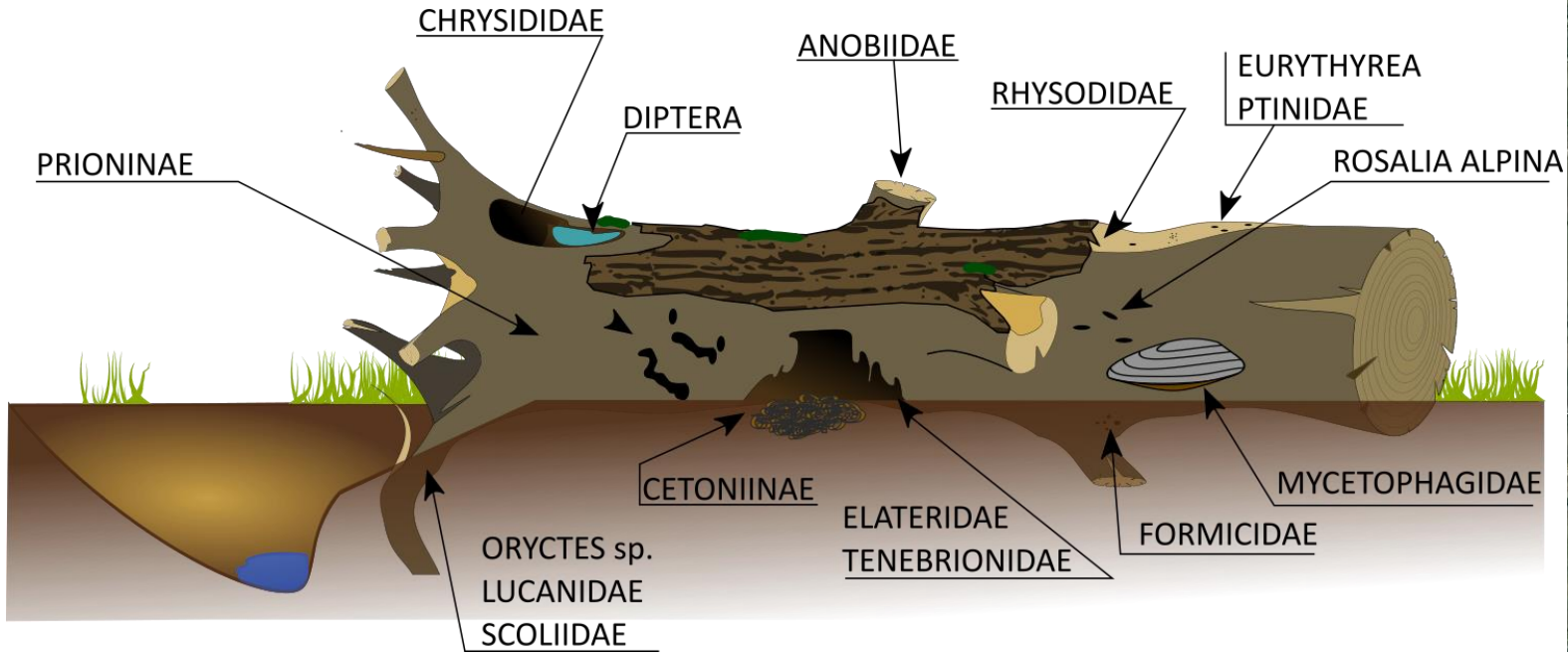
Nature Conservation and its application in forest management

- **Ancient trees releasing – light that support xylophagous rare species**
- **Where there are missing – standard trees left to decay**

Nature Conservation and its application in forest management

It is essential to leave fallen trees in forests. Selected parts of forests with a natural species composition, where natural processes take place, should be retained.

- Economics plays a crucial role in leaving some forests to nature development. It is therefore necessary to define these parts in relation to the size of the property.
- In the Czech Republic, forest owners are financially compensated for restrictions on management



Nature Conservation and its application in forest management

- **Respect for historic forest-free areas and restoration of steppe.**

- **Connecting forest-free areas**

Nature Conservation and its application in forest management

Historical forest management practices have helped the survival of many species. However, even these have been very intense. It is therefore advisable to adopt only those activities that help organisms to survive.

- In the forests one can observe where traditional forest management took place.
- necessary to consider whether the current state of the forest allows the application of traditional forest management.
- necessary to take into account invasive species that may spread in the forest after encroachment.

AGENTURA OCHRANY
PŘÍRODY A KRAJINY
ČESKÉ REPUBLIKY

DĚKUJEME
ZA VAŠI POZORNOST