

The background of the slide features a stylized illustration of four pine trees. Each tree has a green, layered canopy and a brown trunk. The trees are arranged in a slightly overlapping row across the width of the slide.

Bark Beetle in the Czech Republic

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Introduction

- [video](#)



Why?

Drought!!!

History

- First note about bigger bark beetle attack comes from Sumava region
 - after windbreaks in 1868-1870 - 7 mil.m³
 - the bionomy of bark beetle was recognised
 - only manual chain saws and debarking tools
- Next bark beetle disaster developed during 2nd world war
 - becuae of lack of forest management and because of very dry year 1947 - 8 mil.m³ in Czechoslovakia
 - first motor chainsaws and forest cableways
 - use of first insecticides - DDT
- After 1948 (nationalization of private properties by the Communistic regime)
 - the only priority - maximum production from monocultures of spruce

History

- 70s and 80s
 - strongly affected by air pollution from industry and mass declining and dying of forests in North Bohemia region
- 1983 – 1988 bark beetle disaster affected 7 mil.m³
- After 1989 (velvet revolution)
 - new political and economical influence got to forestry but without implementing into forest policy (ecological approach, increase of biodiversity)
- Changes happens from 2018
 - only thanks to the bark beetle disaster which in fact began already in 2003

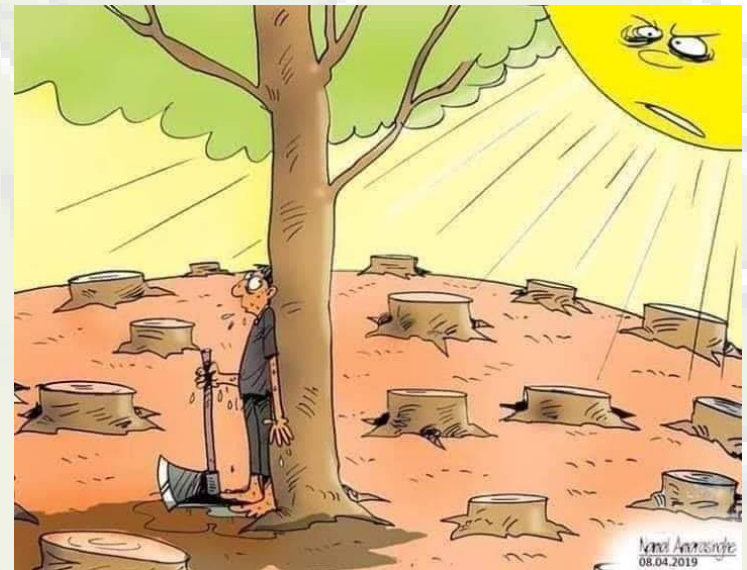
= Bark beetle attacks are not new

Forests in CZ

- 34 % of forestry land
- Current composition
 - 50 % spruce / 16 % pine / 8 % beech / 7 % oak / 1 % fir
- Natural composition
 - 11 % spruce / 3 % pine / 40 % beech / 19 % oak / 20 % fir
- Altitude 115 m – 1602 m above sea level
 - Average 440 m
- Average humidity 690 mm/year
 - 2015 – 78 %
 - 2016 – 92 %
 - 2017 – 100 %
 - 2018 – 76 %

Forests in CZ

- Average temperature 7,9°C in last 30 years / 7,5°C pre-last 30 years
 - 2015 – 9,4°C
 - 2016 – 8,7°C
 - 2017 – 8,6°C
 - 2018 – 9,6°C
- Water in deeper soil horizons – missing in rhizosphere due to longer periods between precipitation



Forestry in CZ

- State forests 56 %
 - including military forests and protected areas
 - Forests of the Czech Republic Co. 47 %
- Private forests 19 %
- Municipal forests 17 %
- Others
 - Small corporates, church forests etc.
- Managed forests under Ministry of Agriculture
- Protected forests under Ministry of Environment

Forest District Managers at State Forests

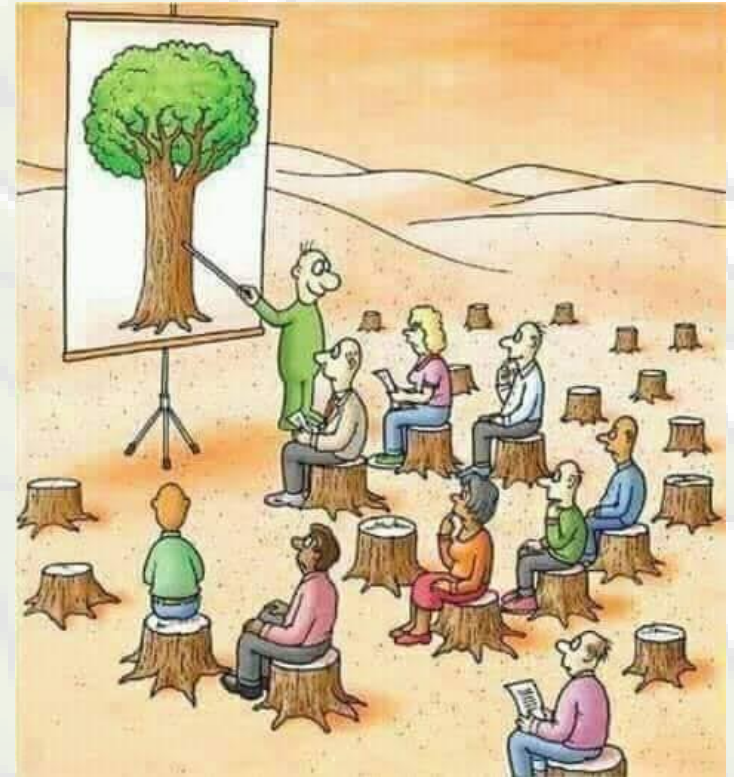
- Employed by Forests of the Czech Republic Co, which ensures forest management at 47 % of forestry land
- Every FDM is responsible for 1.000 - 2.000 ha
 - X before 1990 for 500 ha
- Cooperates with the executive forestry company (privately owned) in his district
- Controls lumber sale only at stump location
- No other employees / flexible workforce like lumber jacks, forest workers, no machines...

Forest District Manager

- But
 - The contracts for forestry work based on the lowest price
 - The contracts for 3, 5 years (for 10 years in the past)
 - Long competitive tendering (because it is state enterprise)
 - X bionomy of barkbeetle is few weeks
 - The good manager must not hand over control and sale
 - = sale at roadside location, not at stump location
 - No legislation tool to press the forest corporation at his district to process marked salvage felling immediately
 - Impossible to act fast when new bark beetle focus appears
 - forest workers and lumber jacks are usually sub-contractors of the executive forestry corporation

Forest Managers for Private Owners

- Forest managers for small private owners
 - Employed by the Forests of the Czech Republic Co.
 - Available for free for the owners of ≤ 50 ha
 - Should serve as the specialised observer of their forests
 - Should cooperate with the forest owners
 - Should check the health of forests, should suggest management, should mark salvage cutting and set up dates for felling
 - More activities if the forest owner asks (marking of improvement felling and harvest felling, helping with reforestation etc.)



Forest Managers for Private Owners

- But:
 - Private ownership of small forests started only in 1990s
 - Missing history of ownership, missing responsibility towards family owned properties, missing relation to the properties
 - Cooperation with Forest Manager is not active
 - the small owners often even do not know who is the Forest Manager in their district
 - missing pressure from the State on small forest owners
 - First letter of reminder sent in autumn 2018 (4 years after bark beetle attack beginning)
 - Legislation is weak – missing law that would strictly cut the bark beetle focus without asking the owner
 - Penalties do not work
 - Lot of small forest owners, a few of Forest Managers
 - Lack of compulsory activities of Forest Managers for private owners by the law

Forest Management Planning

- Regional plans of Forest development
 - Tool of state forest policy
 - worked out by state organisation Forest Management Institute
 - based on forest surveys and protection and declares functions of the forests and their potentials
 - Updates valid from 1.1.2019
 - Framework management directives as a basis for:
- Forest Management Plans / Guidelines
 - For 10 years
 - By specialised mensurationists
 - Map + text part
 - For Private owners up to 50 ha for free

Salvage cutting

- Standard annual allowable cut 18 mil.m³/year in CZ
- 2016 - 4 mil. m³ salvage felling
- 2017 – 6 mil. m³ salvage felling
- 2018 – 14 mil. m³ salvage felling
 - And other 5 - 6 mil. m³ unprocessed timber left in forests
 - Decrease of log prices
 - Wood-working capacities are full
- 2019 prognose – 30 - 50 mil.m³ of salvage felling
 - First swarming of bark beetle started 20th April (few days of 20°C) but than it stopped and we expect to continue in those days



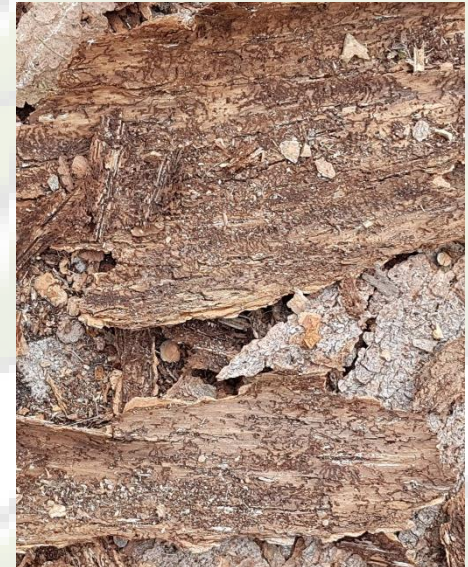
Salvage cutting

- But
 - Not all the area of CZ is attacked
 - Some of the regions / properties are still managed standardly
 - Wood-working capacities are full
 - Lower quality sawntimber/planed timber goes to Asia
 - Also roundwood goes to Asia
 - Prices of standard construction timber did not drop
 - If the allowed felling in affected properties is only salvage felling
 - When can we do improvement felling in spruce forests?
 - » Delay can cause small increments of the trees / wrong tending of forests – less profit in future
 - When can we do harvest cut in non-spruce forests
 - » Overmatured trees bring less profit

Impact of Bark Beetle Attack

- Eight-toothed spruce bark beetle (*Ips typographus* L.) also on pines, douglas fir, larch, fir.
- Nordic bark beetle (*Ips duplicatus* L.) also on pine
- Pine bark beetle (*Pityogenes chalcographus* L.) also on douglas fir
- Larch bark beetle (*Ips cembrae* L.) also on douglas fir
 - Douglas fir was ment to replace spruce in lower areas
- *Pityokteines spinidens* L. – typical bark beetle for fir only - for the first time ever found on larch

- Other tree species suffer of long-term decrease of vitality
- Windbreaks
- Loss of ecosystem stability
- Lower water absorption
- Higher temperature



Sanitation methods

- Mechanical (debarking)
 - Single trees – feasible only for small owners
 - Harvestors
- Chemical
 - Bark beetle traps
 - Bark beetle tree traps
 - Trapping nets Storanet with insecticide
 - Trapping nets for fumigation of EDN (after 24 hrs bb dies)
 - Trapping nets Mercata – fungicide only on the top of timber
- By haulage (transportation away)
 - One of the reason why bb disaster developped. Is 5 kms enough?
- By penalty
 - Timber left in forest, this does not work to stop bark beetle

Is mistake in spruce?

- We have been using climax species as a pioneer species (spruce needs shade not big clearings at the beginning of growth)
- Spruce suffers of lack of water in middle soil horizons (shallow-rooted tree)
- Wrong spruce management - spruce should not be used below 500 m above sea level
- After disasters in 20th century - wrong reproductive material used
- In North-East of CZ spruce declines due to honey fungus (but what is the reason of spreading of honey fungus *Armillaria mellea* Quél.?)
- Disturbations - nature needs to remedy the situation
- Seed years (in general) are more often now – nature calls for natural reforestation



Why?

Drought???

- < Hurricanes and windbreaks (2017 Herwart)
- < Missing relation and responsibility towards family properties
- < Missing work force due to bad recognition of forest job in society, and long procedure of giving work permits for foreigners
- < Missing small sawmills as in the past in every village
- < No subsidies for forestry vs agriculture
- < No payments for ecosystem roles
- < Wrong structure of species in forests
- < Change in economy thinking
- < Longterm instability of forests
- < Climate change and its long-term overlooking by society

What has been done?

- Pressure on decision makers to change legislation
 - In 2018 improvements in rules for subsidies (salvage felling and reforestation, establishing and tending of forest stands)
- Update of Forest Code 3.4.2019
 - Sterile trees can be left in the forests until 31.12.2022 (in some districts) = more energy and work force left for buffer areas where we can cut and sanitize attacked trees
 - Owner does not have to lie down traps and trap trees – obligation is to look up the attacked trees
 - Reforestation within 5 years, establishing in 10 years
 - Management lines at the clear-cut areas can be left up to 5 m width
- Second update under reading, waiting feedbacks

More ideas

- More forest research on reforestation methods
- Lower VAT for fuel timber?
- Subsidy „compensation of lost profit“ for small owners?
- To ensure supply of reproductive material (seeds, samplings) of a good quality and correct provenance
- To reforestate in autumn (more humidity)
- Self-processing of salvage timber from forests by end-customers
- Direct sales of processed affected timber from the stocks in forests – state forests launched this in February 2019

Reforestation and Forest Management for Future

- Spruce is not dead
 - In many areas natural regeneration
 - What weather will be in 30 years? What demand? What tree pests?
- Research
 - Recommendations given to owners are missing
- Sowing of seeds of forest trees
 - Lack of knowledge how to stratificate seeds, how to prepare soil
- Agroforestry
 - Is it forestry? Or agriculture?
- Better landscape planning – water!
- Preparatory reforestation



Preparatory Reforestation

- Use after big natural disasters when clearings are huge
- Use of pioneer species that have good impact on soil (leaves fall and root activity, humidity at microsite) and good resistance to winds
- Allow to set up age- and height-determined stands that are more stabile
- Improve quality of target tree species (clearing of branches etc)
- Replace function of mother stand (shadow for shade-loving species as beech, spruce)
- Give us early profit from felling
- Pioneer trees (birch etc) need rehabilitaion in our minds
- 2 ways on big clearing areas:
 - Reforestation of target tree species into small fenced places (minimum 3 species), rest of the area stays free for natural succession
 - All the area can be left for natural succession and after 5-10 years it is assessed and artificial reforestation can start
- It is important to control the game population

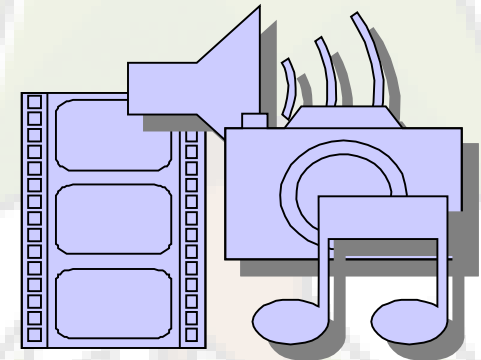
Foresters in CZ

- Foresters is very closed group of people
- Public does not know what foresters do
- The work of foresters become marginal job in the eyes of society (X in early 20th century being forester was something special and respectful)
- Foresters do not know how to communicate their contribution
 - Other forest jobs (lumber jack, horse driver,...) became unpopular and are not inherited anymore
- Salary / rewards in forestry are low = also work force is less and less educated in forestry = work done is of lower quality
 - Foresters are very weak in IT



Information sharing

- Platforms of specialists
 - „In the interest of the forest“
 - Czech Think Tank introduced „Forestry Appeal“ – youtube video published 9.3. and after 2 months it had 124 visitors...
- Petitions
 - It is known that Natural disaster has real impact on society only if it reaches private life – floods can reach it easily, not bark beetle
 - Petice za zdravé a prosperující lesy pro příští generace
 - „Anti-petition“ - Adopt tree and save it!
- Websites
 - Many, out of time



Information sharing



- Forest and forestry education
 - Forest pedagogy
 - Never-ending and patient explanation of forest importance to friends and neighbours
 - If foresters do not make it themselves then green activists and other lobby will do
- Reforestation days for public
 - In 80s it was compulsory
- Raising awareness of the water in landscape
 - Grasslands in towns that stay unmowed

Bark Beetle Map



- **Inputs:**

- Aerial photography → normalized model of surface → 3D model of forest
- Satellite photography ESA Sentinel-2, resolution 10-20m/pixel – thanks to many spectral bands allow assessment of state of health of the forests or resolution of species
- Maps of forest species – tree stands smaller 12 m where filter out
- Detection of dry forests from Planet satellites, resolution 3m/pixel

Bark Beetle Map

- **Output:**

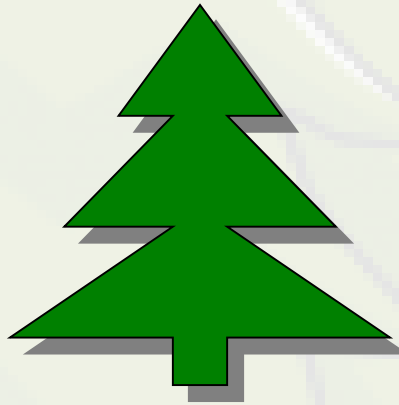
- Map of bark beetle presence and bark beetle development can be detected
- Every forest owner can see what happens in their area (when the salvage felling of a neighbour comes late then he can expect other bark beetle focus nearby)
- Still it is necessary to to to forest stands personally of course
- Data from September 2018, good for use in period of low bark beetle activity in order to make sanitation
- Map is still under development and developers hope it will not be misued for penalizing late salvage felling

Bark Beetle Info

- Monitoring and sharing of information on swarming of bark beetles and chafers (*Melolontha melolontha* L.)
- For forest owners and forest managers
- Cca 200 professional volunteers looking after 500 bark beetle traps, reporting every 7-10 days
- Project realisation: magazine Forestry Work + Forest Protection Service



Thank you



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