LESY ČR

SUSTAINABLE FOREST BIOMASS IN LIGHT OF THE PARIS COP21

PRIORITIES IN THE FOREST MANAGEMENT OF LESY ČESKÉ REPUBLIKY IN RELATION TO CLIMATE CHANGE

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Brussels, 1st December 2016

PEFC
PEFC/08-21-01/0001

Profile of Lesy České republiky

Enterprise established in 1992, by deed of Ministry of Agriculture

Owner: 100% by Czech State

Main activities:

- direct forest management and provision of forestry activities;
- management of tangible assets and real estates owned by the State;
- making sure that forests provide all their functions, etc.

Basic characteristics:

- Management of forest land: over 1.2 m ha
  (the biggest forest manager together with Poland and Rumania in Europe)
- Annual timber production (harvest): 7.5 – 8 m m³
- Forest regeneration: 14.000 ha/year
- Small water stream management: 38.000 km

LČR Organisational Structure

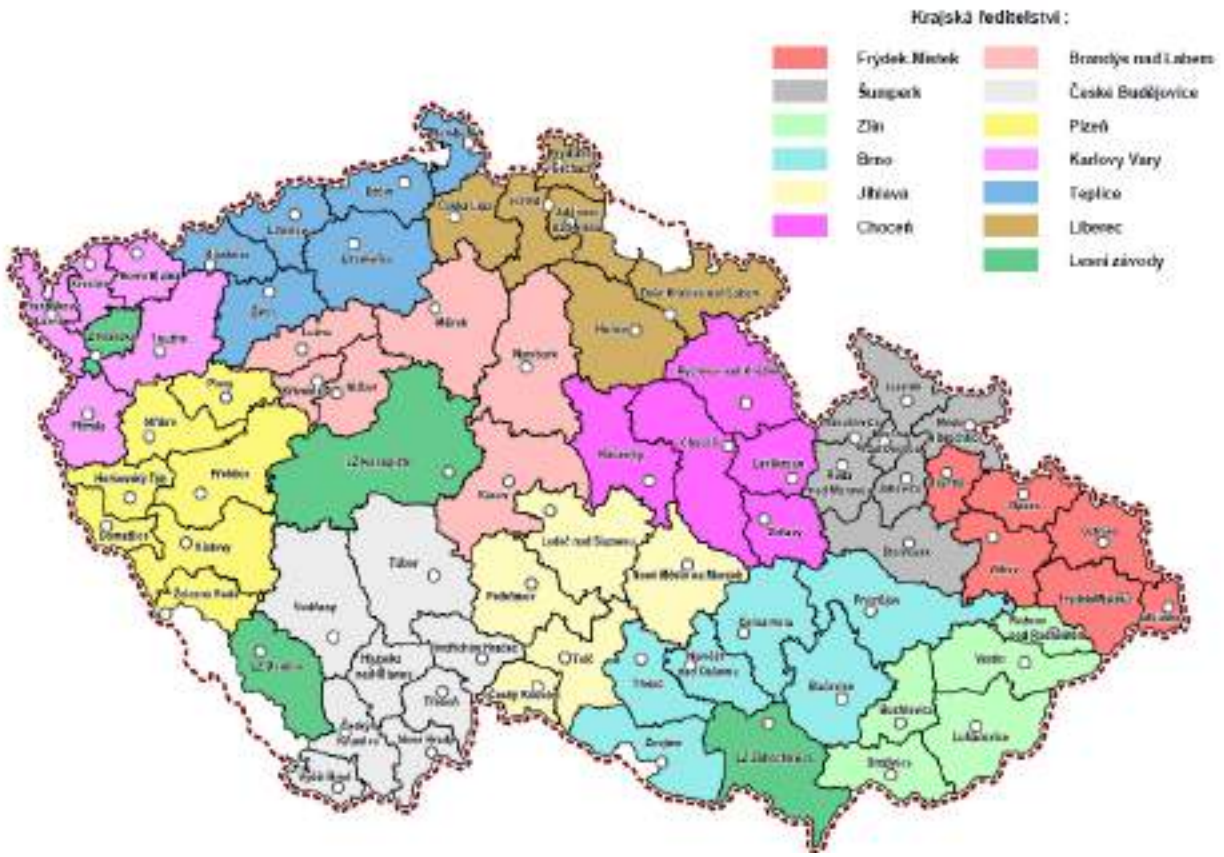
12 regional directorates (72 forest management units)

4 forest enterprises

Over 3,000 employees

LČR contributions
into establisher‘s fund

- 2013 – CZK 6 bn
- 2014 – CZK 6.5 bn
- 2015 – CZK 8.3 bn
- 2016 – CZK 5.6 bn

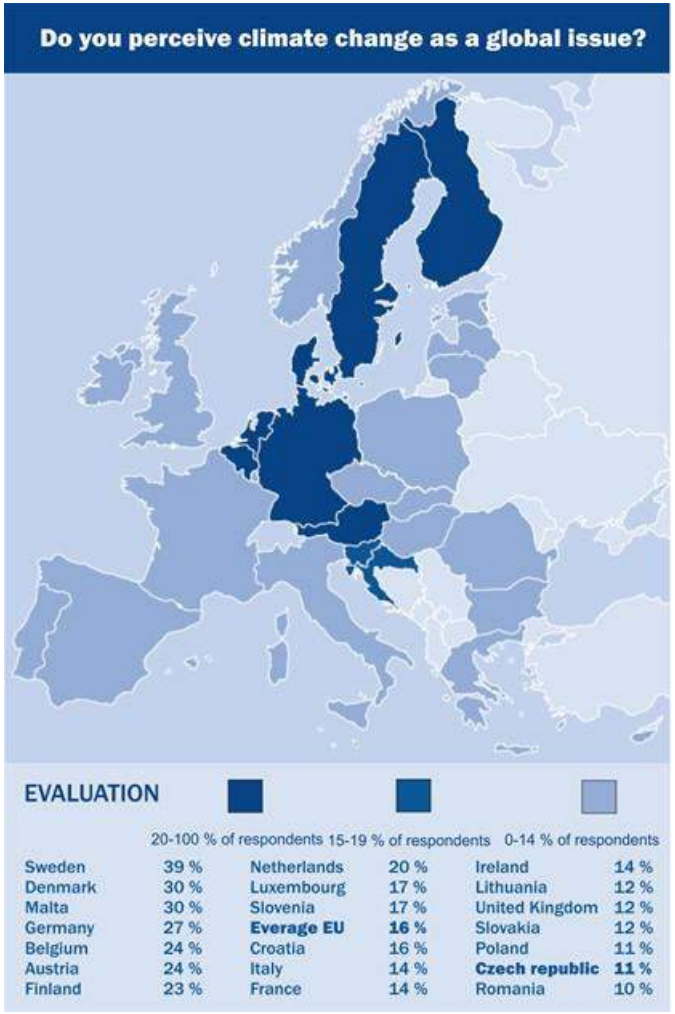


Global climate change – How is it perceived?

Yes, climate is changing and we see it
as a threat for existing civilisation?
„**YES**“ – experts

„**AMBIGUOUS**“ general public in EU.

„**RATHER NOT**“ public in CZ,
way below the average public opinion in EU
(see results of questionnaire poll across EU 28 in 2014).



In CZ, there are several studies and predictions that differ in the assumed speed and impact of climate change

Development prognosis for spruce favourable x unfavourable ***sites***

Spruce stands

- The share of forest land with favourable conditions for spruce may drop from current 79% up to 50 (40)%

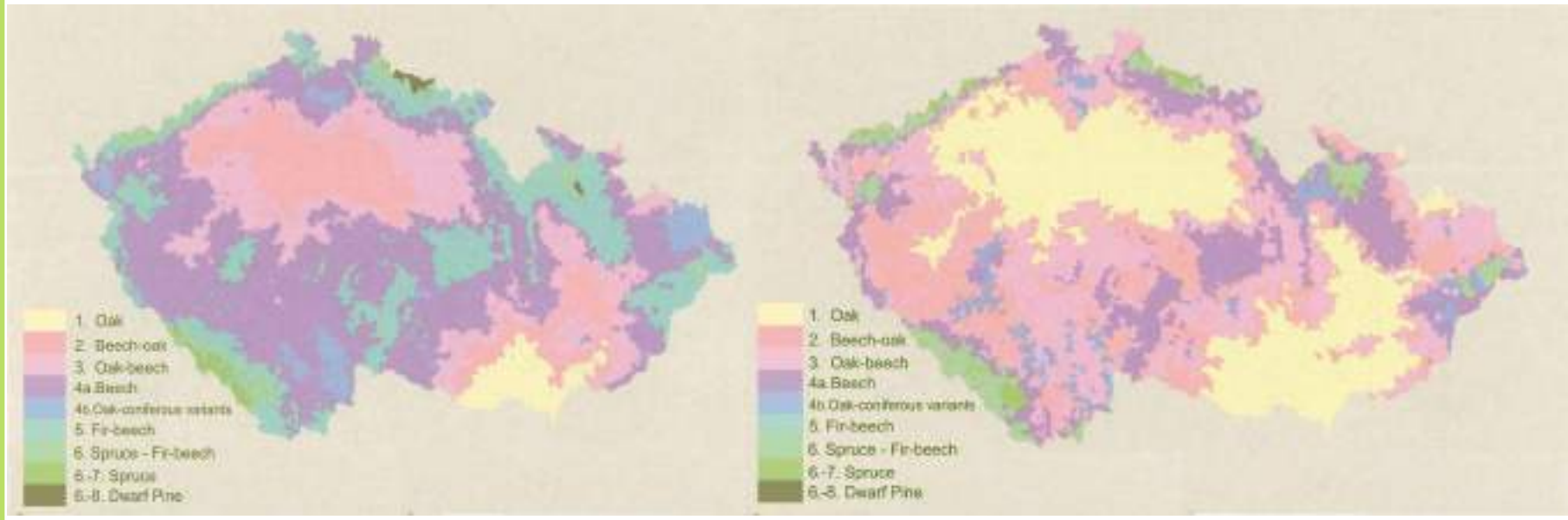
Spruce unfavourable sites

- The share of forest land with unfavourable conditions for spruce may rise from current 21% up to 50 (60)%

Prognosis of changes on forest zonality in CZ

The changes in the forest zonality as indicators of adequate tree species composition relates to the climate change. There are different prognoses such as:

1990 **2030**



Source: BUČEK Antonín, VLČKOVÁ Veronika

Based on this prognosis: oak and beech-oak altitudinal vegetation zone is to cover ½ of the whole country by 2030

Other examples of prognoses: changing conditions for growing spruce in CZ

Source: ŠANTRŮČKOVÁ Hana and VRBA Jaroslav

- climate change **impacts** and its **scope** and **speed** of the influence on forests are still hardly *„predictable“*.

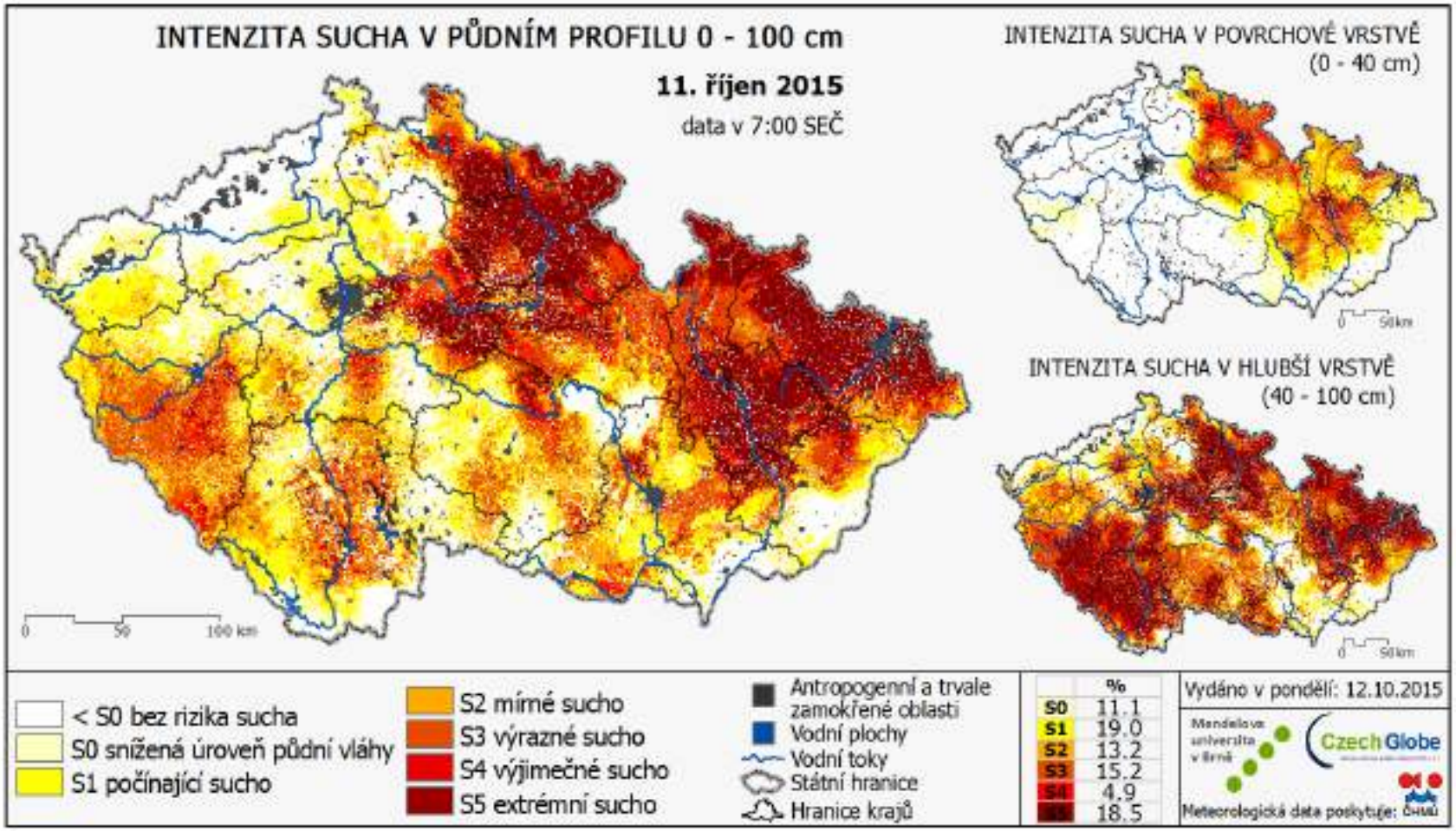
LČR see the climate change in context and take it seriously

Enterprise has its own experience.

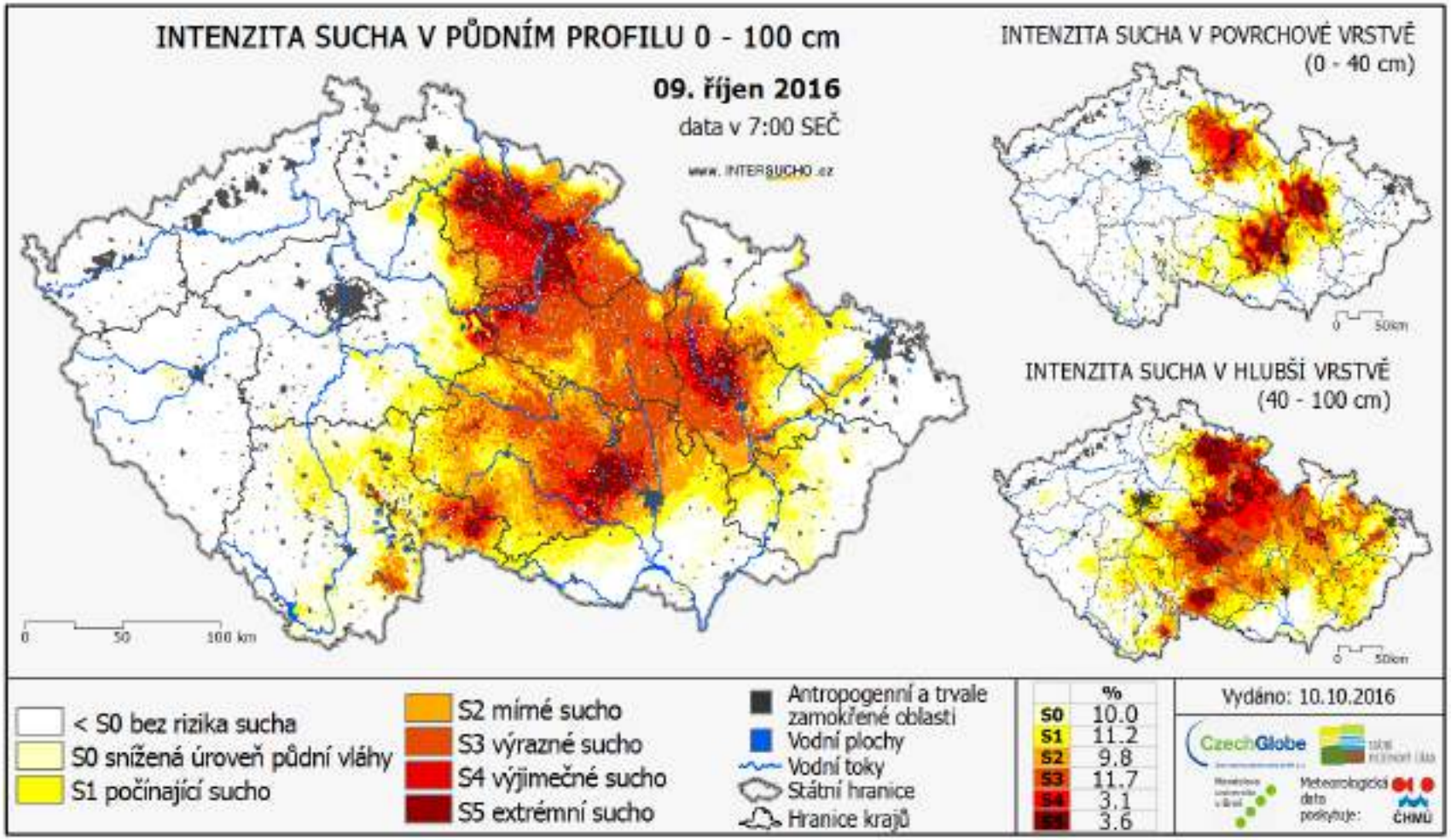
Photo taken at Bruntál Forest Management this June

- ✓ large-scale clear cuts change into opened forest stands
- ✓ dying spruce (change in needles colour and defoliation)
- ✓ vital larch (fresh green colour)

Drought intensity in soil profile – October 2015



Drought intensity in soil profile – October 2016



Climate change manifested and observed by LČR

1. Spruce, the most sensitive species to climate change, is dying in areas with precipitation deficit.
2. The occurrence frequency of insects and fungi (European spruce bark beetle and *Ips duplicatus,* Honey fungus, *Chalara fraxinea, Gemmamyces piceae).*
3. Change of phenophases of certain species, mainly beech (sprouting leaves 3 weeks earlier than 20 years ago).
4. Accelerated development of pest (3 generations of bark beetles per year are not an exception).
5. Dynamics of production capacities of individual tree species has been changing. The growth is more profound in broad-leaved than in coniferous species and the competition relations between individual species are changing.
6. Share of salvage felling has grown and resulted in open forests and large-scale clear cuts over 1 ha.
7. Biodiversity in forests has changed – some species disappear and some are new.
8. Risk of susceptibility of stands and individual trees against wind and snow damages is growing.
9. Microclimate within forest stands, water regime in soils and on soil surface has changed (long periods of drought during vegetation season, heavy torrential rain with no absorption).

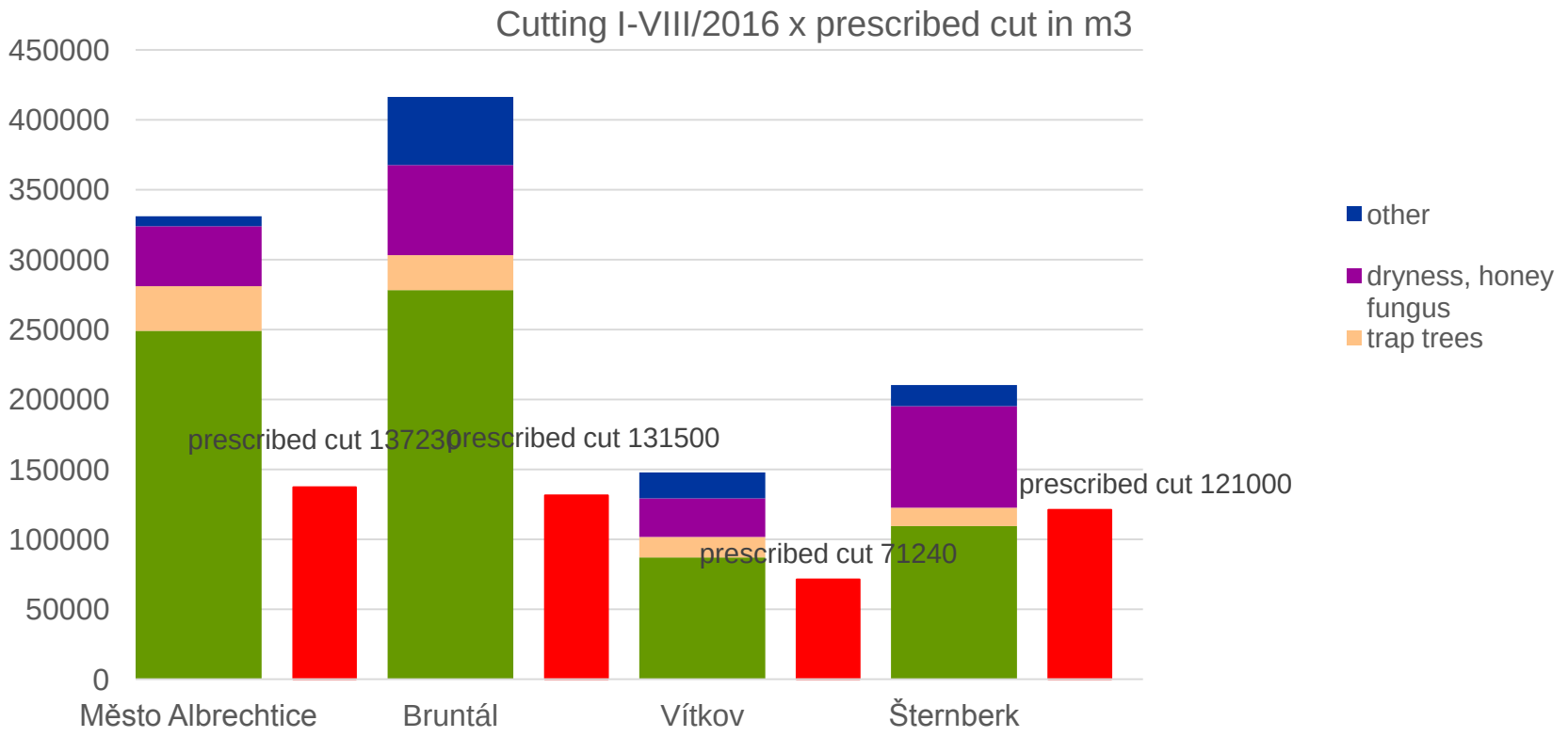
Bark beetles in 2016 – casual link to climate change

	< 500 m³
	501 - 1000 m³
	1001 - 2500 m³
	2501 - 5000 m³
	5001 -10000 m³

	10001 - 15000 m³
	15001 - 25000 m³
	25001 - 50000 m³
	více než 50000 m³

Example – structure of harvest at an unit hit by drought

- ✓ No intentional harvest
- ✓ Almost unrealistic planning of forest activities (harvest placement, forest regeneration, etc.)
- ✓ Data 1 – 8/2016



Dying of spruce stands in relation to overall harvest at units hit by drought over last 15 years

- ✓ First drought-related symptoms recorded in North Moravia around 2000
- ✓ The problem of dying spruce stands spread from 3units to 9 units over 15 years.
- ✓ Some units reported improvement e.g. Jablunkov

White – intentional (commercial) harvest
Red – salvage felling

OJ/rok	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Město Albrechtice																
Bruntál																
Janovice																
Vítkov																
Opava																
Ostrava																
Frýdek-Místek																
Jablunkov																
Sternberk																

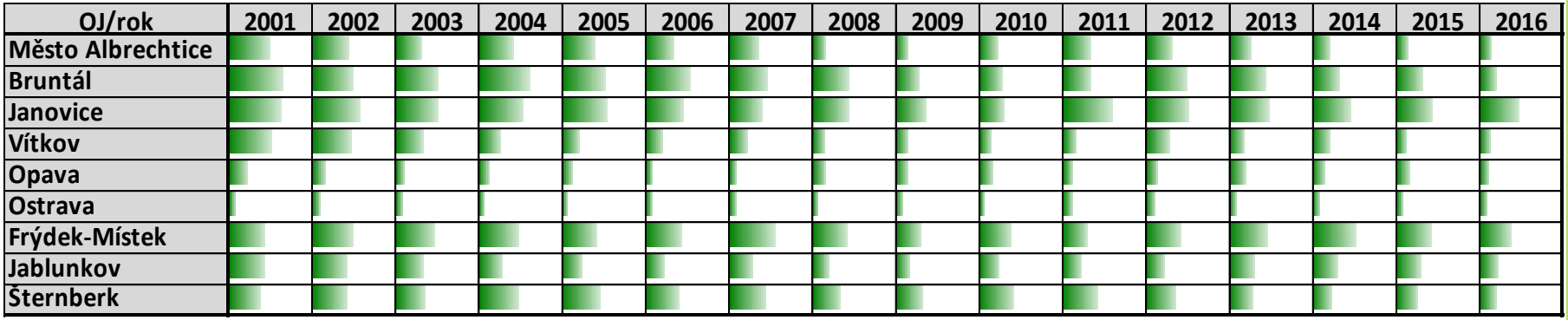
Legenda

10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

Share of spruce in regeneration at units hit by drought over last 15 years

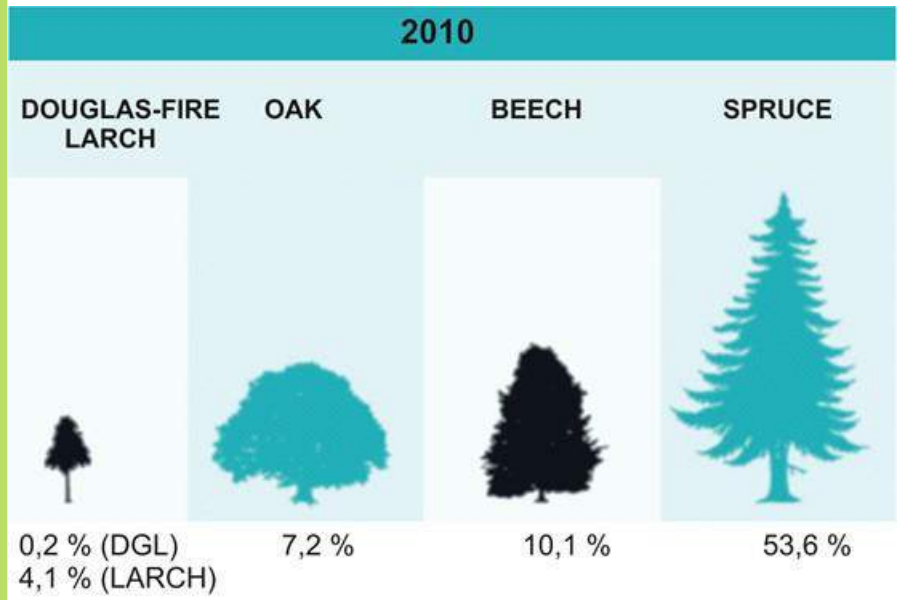
- ✓ At all listed units, the tree species structure at newly planted stands on post-calamity areas has changed.
- ✓ Spruce is intentionally substituted by other tree species.
- ✓ More spruce mainly due to massive natural regeneration.

White – other species but spruce planted
Green – planted with spruce



Scenarios of development of tree species structure at LČR

- ✓ Spruce share has been dropping in tree species structure at LČR
- ✓ Share of oak and beech has been growing at LČR



Sustainable forest management – management concept

*Document comprises the differentiation of forest management based on the main forest function, status and **natural conditions**!*

- ✓ *second edition in 2015*
- ✓ *drafted by experts across the entire Czech forestry sector*
- ✓ *discussed also with other forest owners (communal)*
- ✓ *assessed by independent experts (University, Forest Research Institute)*

The management differentiation with regard to climate change is reflected in all chapters.

Main chapters:

1. *Objectives of sustainable management*
2. *Silviculture*
3. *Forest regeneration*
4. *Management to promote the target structure*

Silvicultral measures adopted by LČR

Goals:

✓ **Preservation of forests – increasing the adaptation potential of forests**

Actual measures:

- do not exclude spruce from regeneration without good reason, but differentiate based on the experience from individual vegetation and natural zones while using the information on gene pool of local ecotypes and populations (one can argue the shift of forest vegetation zone on humid stands in spite of extreme scenarios of climate change)
- spruce is growing well from 400 m a.s.l. and on some stands even from 300 m a.s.l. Key role is played by suitable exposition and terrain morphology.
- increase the biodiversity of forest stands and favour stress-tolerant species (Douglas fir, larch, Sessile oak, xerothermic oaks, hornbeam, maple, birch, lime)
- increase the genetic variability of regenerated species – certified stands and „selected trees“ directly from the sites hit by drought
- create suitable stand mixtures with higher share of pioneer species
- exclude intensive (schematic) tending
- prefer partial cutting systems in the form of narrow stripes or gaps and shelter wood system; prefer natural regeneration
- target care of forest edges (using shrubs, etc.)

Measures adopted by LČR in calamity areas

Goal:

✓ **Slow down, mitigate dying of forests**

Actual measures:

- define special management rules and reduce rotation age for spruce stands
- change the target species structure in favour of stress-tolerant and auxiliary species (birch, aspen, ash, field maple, wallnut)
- create suitable stand mixtures comprising several species to reach biodiversity and use pioneer species
- support natural succession of site-suitable species at selected sites
- while tending, support all broad-leaved species, amelioration and auxiliary species
- exclusion of traditional management processes which might cause only accelerate the decline and destruction of spruce stands.

Potential impacts of forest management on wood-processing industry?

Current situation:

- ✓ Total harvest approx. 15.5 m m^3 of timber
- ✓ In CZ, high share of coniferous assortments - 89% coniferous, 11% broad-leaved
- ✓ High export of raw timber (40% of timber harvested in CZ), even though there is big potential to increase the processing of domestic timber

Expected development over the next 30 years:

- ✓ Reduction of overall harvest up to by 1.5 m m^3 as compared to current figures to 14 m m^3 (this is caused by the dropping share of mature forest with planned harvest and lower increments of growing share of broad-leaved species).
- ✓ harvesting less coniferous and more broad-leaved timber – 78% coniferous, 22% broad-leaved

Challenges for wood-processing industry

- ✓ increasing the volume of timber processed in CZ
- ✓ gradual change of production programme to favour broad-leaved assortments
- ✓ increase the efficiency of wood processing

Significantly lower spruce harvest – dropping almost by 2 m m³ by 2050

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2013-2022	2023-2032	2033-2042	2043-2052
Spruce thous. m3	10 452	10 373	10 643	11 869	11 910	11 698	13 028	15 729	12 968	12 170	12 299	10 785	10 487	10 667	10 399	8 756	8 631	8 357
Pine thous. m3	1 871	1 769	1 815	1 269	1 507	1 658	2 571	1 166	1 411	1 383	2 083	1 900	1 899	1 879	2 895	2 126	2 035	1 941

Water Stream Management at LČR

- Currently, the enterprise manages over 38,500 km of water streams and over 820 small water reservoirs.
- The management is carried out by 7 management units based on catchment area.

Water Stream Management at LČR

- LČR manage both small streams in forests and forest areas but also streams running through agricultural land and municipalities.
- The common characteristics of the streams is their torrential nature and small catchment areas. The streams are often on steep slopes, have various flow rates and various navigation regimes.
- Management focuses on:
  - flood prevention – construction and reconstruction of torrent control constructions, maintenance and repairs of water constructions
  - measures for mitigating of negative impacts of drought and water shortage by increasing retention capacity of the landscape – building small water reservoirs, retention dams, pools, marshes, revitalisation of water streams and spring areas.

Water Stream Management – solving hydrological extremes

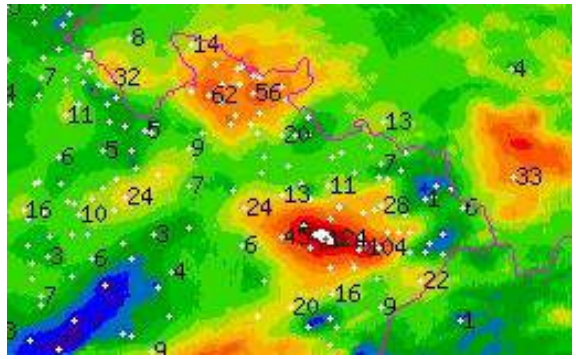
LČR, as the water stream manager, must cope with all hydrological extremes:

<u>Floods</u> (usual torrential) – extreme flow rates = anti-flood measures

x

<u>drought</u> – water shortage in streams = measures to mitigate drought impacts

Water Stream Management – solving hydrological extremes



Over 120 mm of water within 3 hours

***Zrzávka** (Novojičínsko), upon entry into Jičínka **170 m³/s** (Q_{100} = 76 m³/s)*

Water Stream Management – basic measures adopted to mitigate drought impacts

- Construction, reconstruction and maintenance of water reservoirs (incl. de-mudding) – increasing landscape retention potential,
- Revitalisation of streams and their meadows – water retention and runoff slow-down
- Revitalisation of spring areas – water retention and runoff slow-down,
- Anti-erosion measures – reducing deposit of material in water streams and reservoirs,
- Stabilisation of stream beds – reducing erosion and runoff slow-down,

Water Stream Management – basic measures adopted to mitigate drought impacts

Construction, reconstruction and maintenance of water reservoirs (incl. de-mudding) – increasing landscape retention potential

Reconstruction and de-mudding of Kralice water reservoir; bigger, multi-purpose water reservoirs may help to keep minimum flaw rates in drought spells.

Water Stream Management – basic measures adopted to mitigate drought impacts

Construction, reconstruction and maintenance of water reservoirs (incl. de-mudding) – increasing landscape retention potential

Construction of side water reservoir within revitalisation of water stream in Broumov region; similar small water reservoirs have no influence on the runoff balance, but are crucial for keeping microclimate and biodiversity in landscape; may serve as water sources for fire brigade

Water Stream Management – basic measures adopted to mitigate drought impacts

- Revitalisation of streams and their meadows – water retention and runoff slow-down

Revitalisation of Borušovský Stream and its meadow – building new open bed and pools in Svitavy region

Water Stream Management – basic measures adopted to mitigate drought impacts

- Revitalisation of streams and their meadows – water retention and runoff slow-down

Revitalisation of stream and its bed - building new bed and pools – initiating marsh – Broumov region

Water Stream Management – basic measures adopted to mitigate drought impacts

Revitalisation of spring areas – water retention and runoff slow-down

Revitalisation (historic drainage) of spring area of Černý Stream in the mashes of Jizerské Mt. – slowing down runoff and initiating soil deposit in the drainages

Water Stream Management – basic measures adopted to mitigate drought impacts

Revitalisation of spring areas – water retention and runoff slow-down

Revitalisation of Černý Stream in Jizerské Mt. – replacing original paved enforcement with boulders and blocking drainages

Water Stream Management – basic measures adopted to mitigate drought impacts

Anti-erosion measures – reducing deposit of material in water streams and reservoirs

Retention constructions to held floating materials at Bohdašínský Stream and Kamenický stream (Rychnov Region); during minimum flow rate retention constructions might provide for survival of water organisms.

Water Stream Management – basic measures adopted to mitigate drought impacts

Stabilisation of stream beds – reducing erosion and runoff slow-down

Modification of Vojtovický potok Stream in Rychlebské Mt. – longitudinal enforcement and transverse stabilisation constructions from pit stone in 2010

Thank you for your attention!