

Best practices from Germany on sustainable forest management

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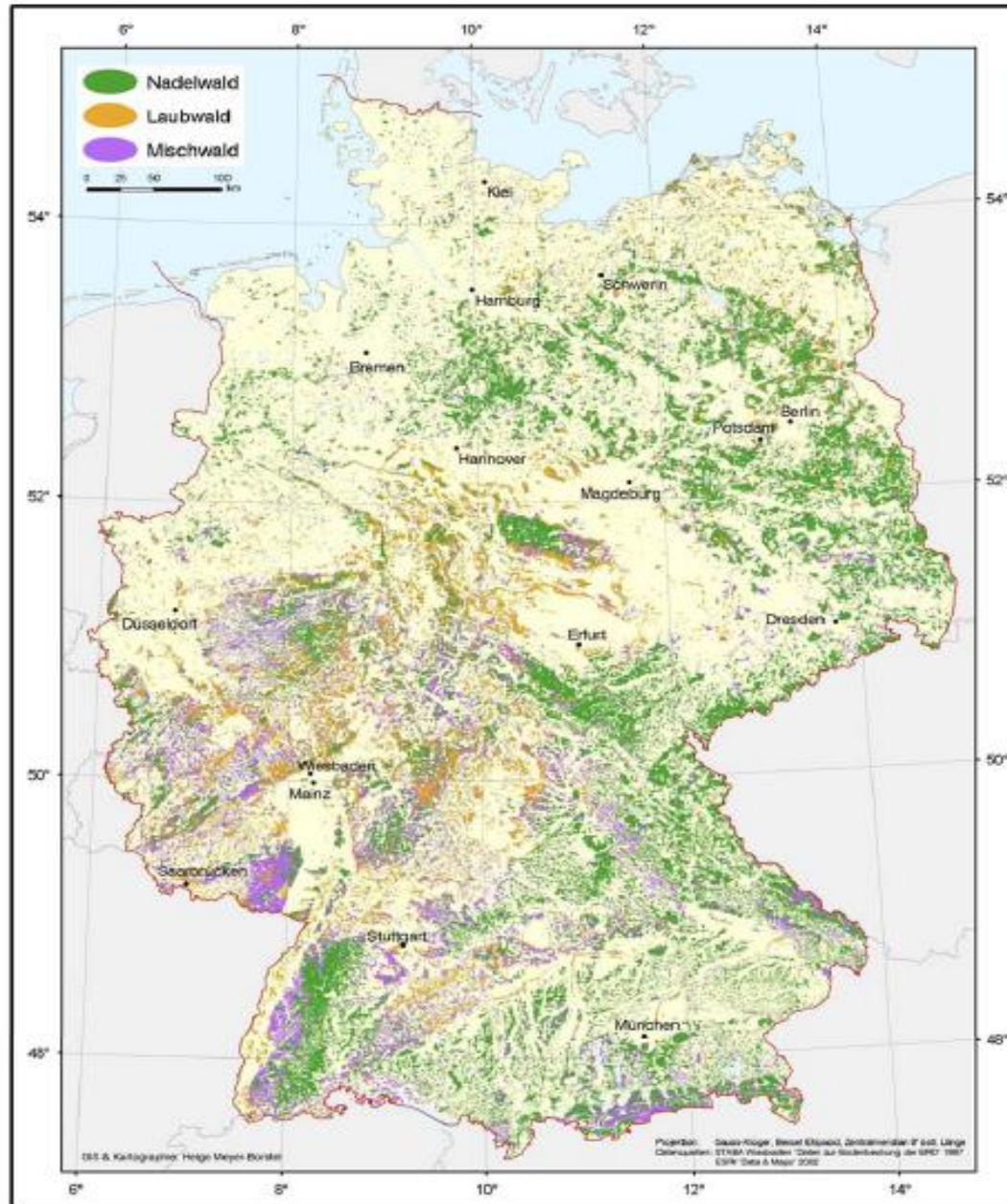
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Forests in Germany



Forest area: 11×10^6 ha

Forest cover: 32 %

Average standing volume
 $317 \text{ m}^3 \text{ ha}^{-1}$

Average PAI
 $12 \text{ m}^3 \text{ ha}^{-1} \text{ y}^{-1}$

Average annual cut
 $8 \text{ m}^3 \text{ ha}^{-1} \text{ yr}^{-1}$ (66 % of PAI)

Total annual increment
 $134 \times 10^6 \text{ m}^3 \text{ yr}^{-1}$

Total annual harvest
 $89 \times 10^6 \text{ m}^3 \text{ yr}^{-1}$

Ownership
43 % private
37 % state
20 % community



Until the 18th century large forest areas in Germany had been devastated. The state rehabilitated the forests mainly with conifer plantations.

In the 19th century the concept of CNF “close-to nature forest management” was developed, which is implemented in most forests in Germany now



Large spruce monocultures close to Munich, established in 1840, had to be clearcut after insect damages in 1920. Due to the climatic conditions (i.e. frost), competing vegetation and deer browsing spruce monocultures developed again.



**Storm damages in German forests between 1980 and 2007,
more than 90 % occurred in pure conifer forests !
1990: 73 Mio m³, 1999: 33,9 Mio m³, 2007: 37 Mio m³**

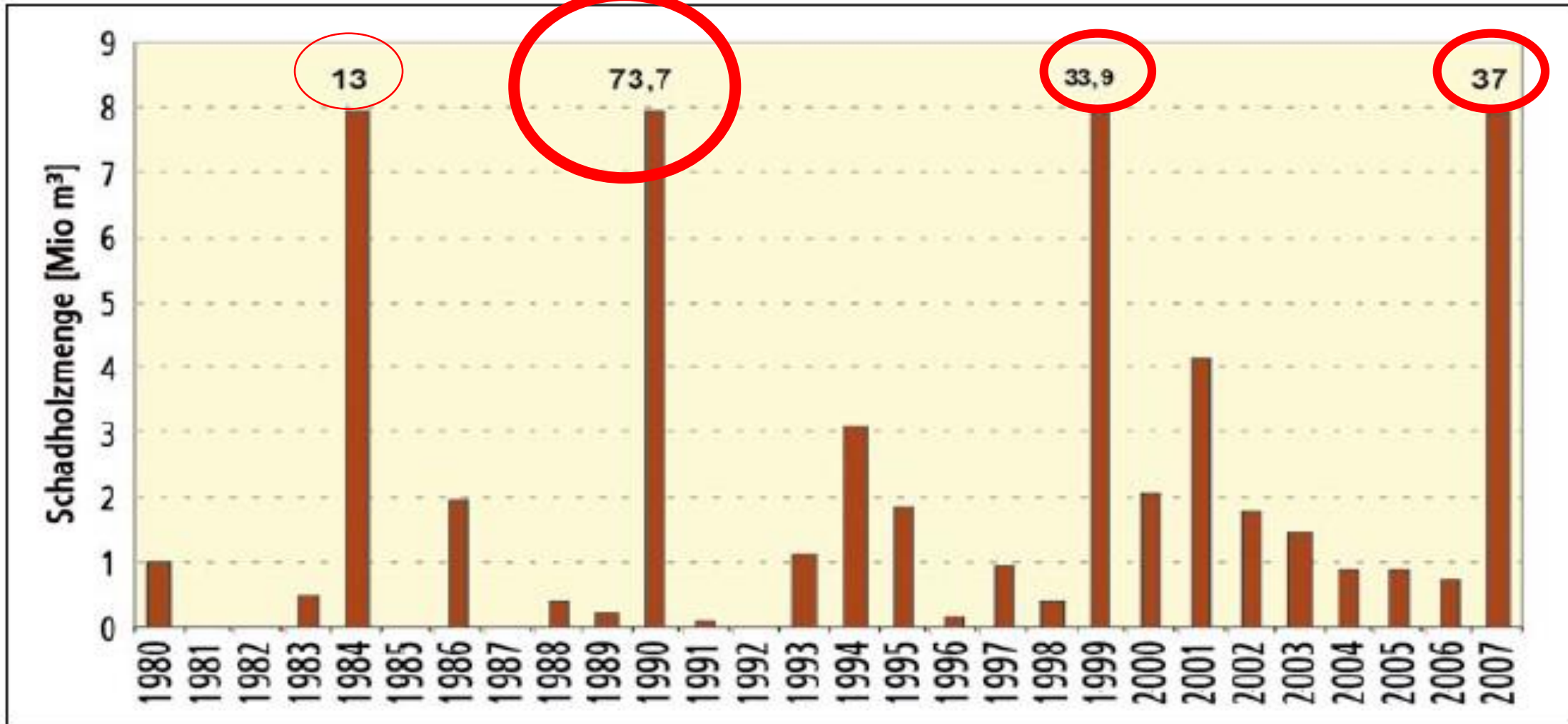
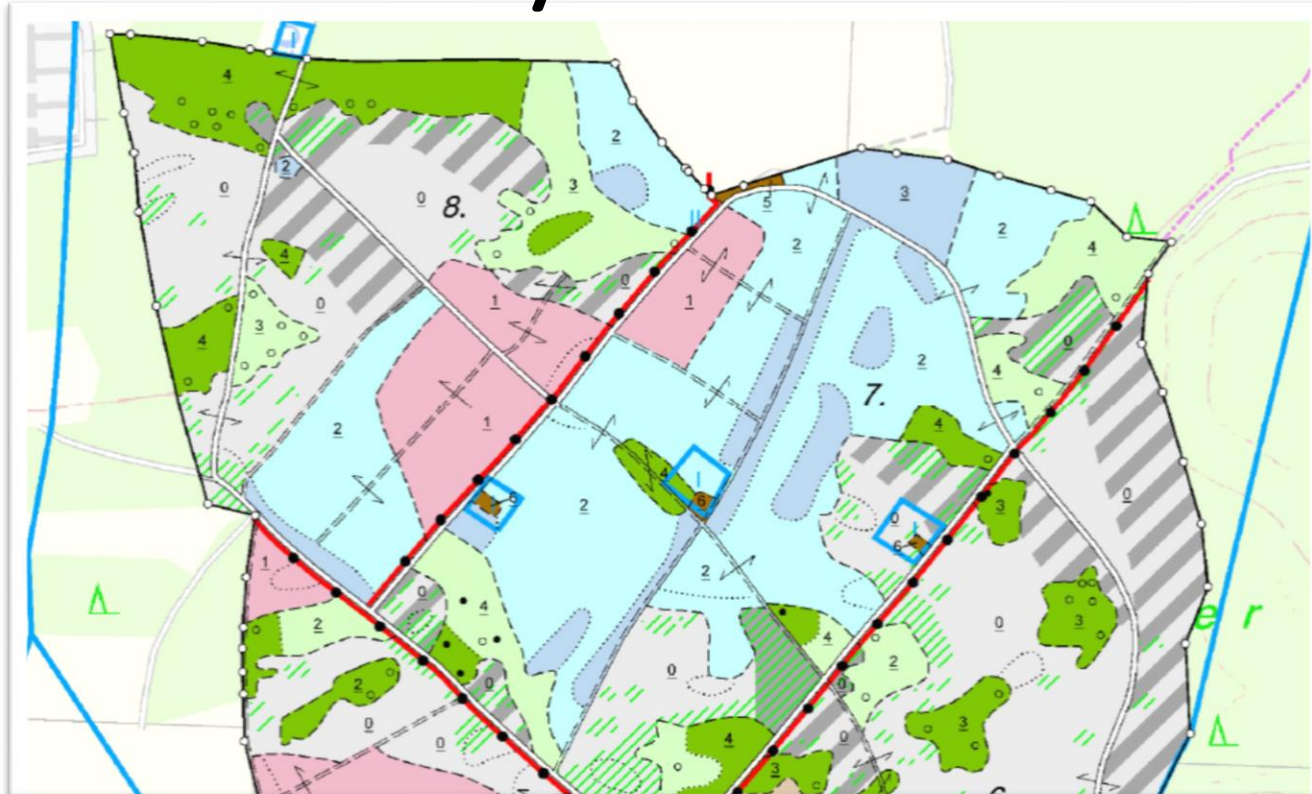


Abb. 1: Häufigkeit von Sturmschäden und Menge des Schadholzes durch Stürme in Deutschland im Zeitraum 1980 bis 2007

Sustainable forest practices: Forest Management Plan for 20 years for stand treatment



E1:	10%	Einr.fl. ha:	0,32	E2:	30%	Einr.fl. ha:	0,95
HE (10 Jahre):		=	267 fm/ha	HE (20 Jahre):		=	308 fm/ha
			84 fm auf der Fläche				292 fm auf der Fläche

BZ: Fichten- Buchenbestand mit Lärche

VZ: 50 Fi (Dgl), 40 Bu (BAh), 10 Lä
N: Bu aus NVJ

1. ZA:

Ausnutzen lichter Bereiche und Schaffen von Gruppenshirmstellungen zur VV von Bu, Nachrichten über gesicherter Bu- VV-Gruppen entsprechend ihrem Lichtbedürfnis, gesicherte Bu-VV mit Fi aus NVJ zusammenführen, Bu mit Lä durchstellen, Waldrandgestaltung.

2. ZA:

Fortführen der Verjüngung wie im 1. ZA.

Forest Management Plan for communal forests

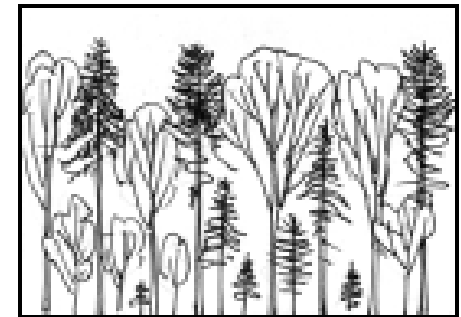
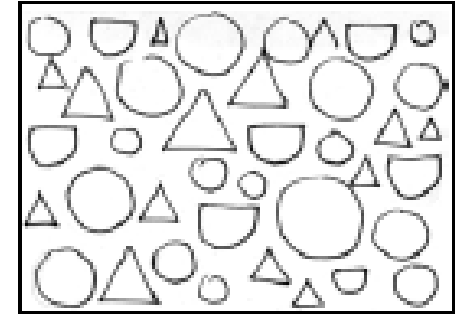
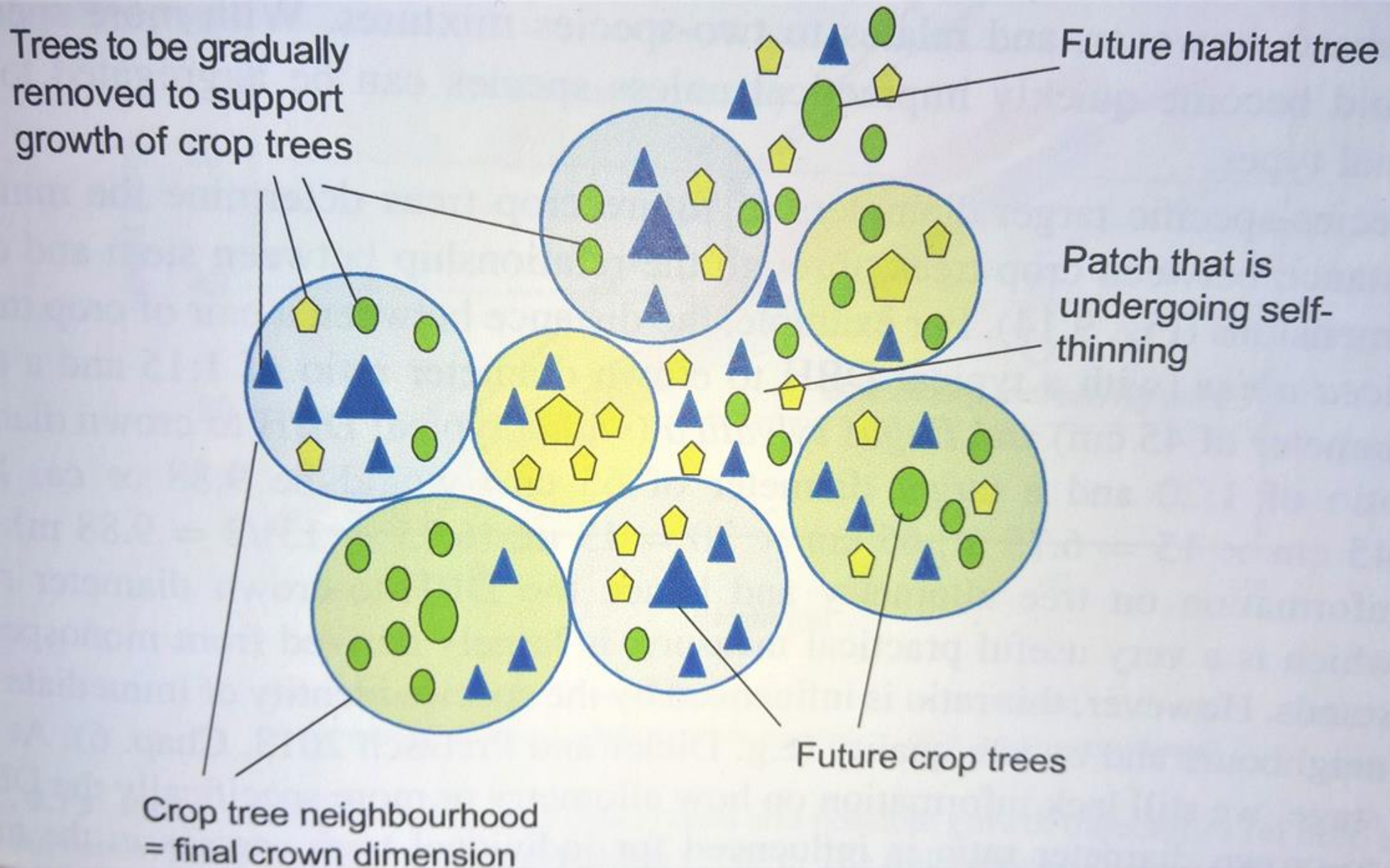
Forest Management Map 1:5000 of former pure spruce area after 40 years of conversion of monocultures:

Dark-green and dark-blue areas are broadleaf-dominated young stands

Exemplary stand description and planning sheet:

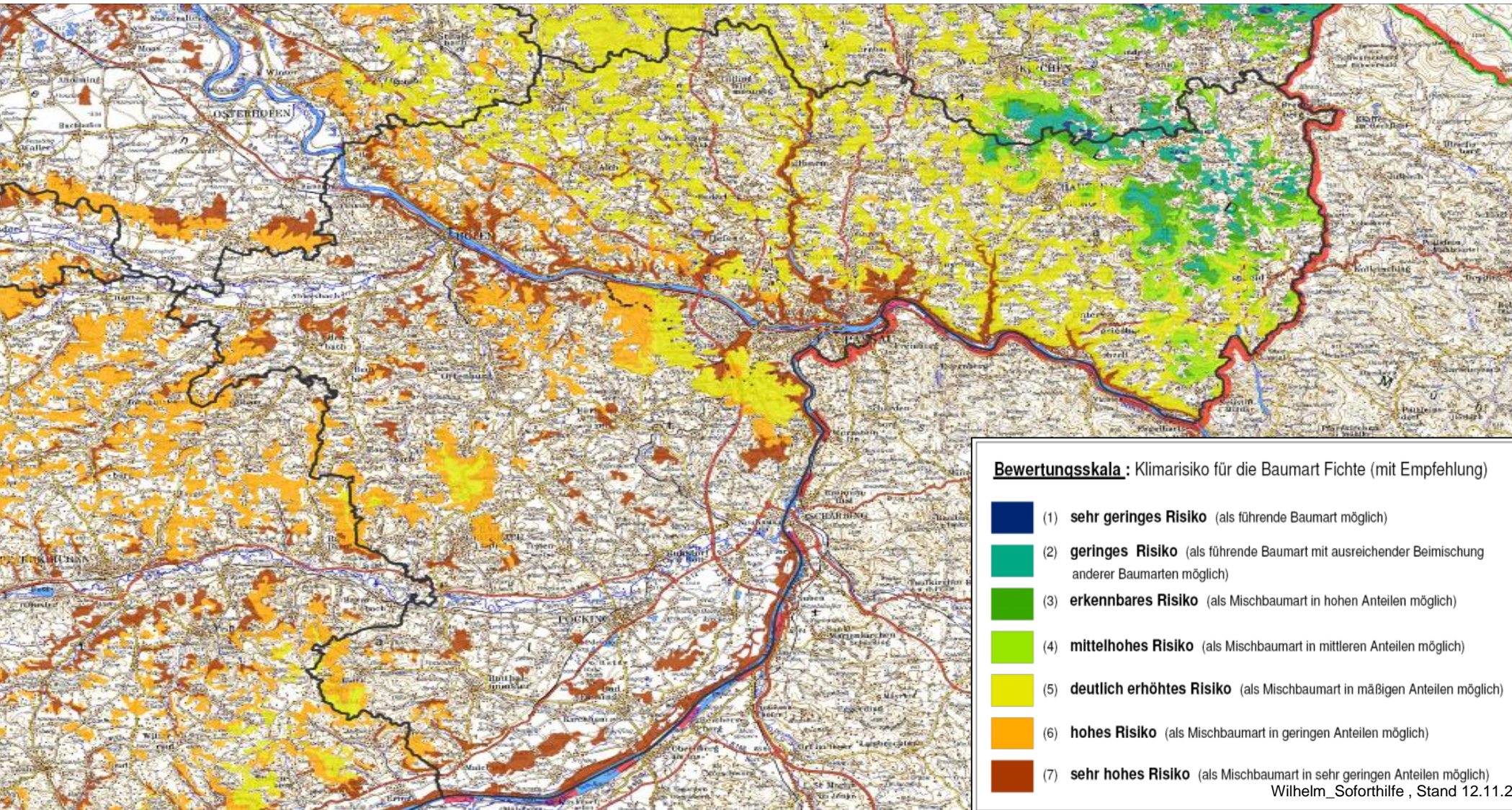
- With target species mix (BZ)
- Regeneration target by species in % (VZ)
- Cutting intensity by volume for 2 decades

Sustainable forest practices: Selection management










selection forest

CLIMATE CHANGE RISK MAP: SPRUCE, YEAR 2100



Bewertungsskala: Klimarisiko für die Baumart Fichte (mit Empfehlung)

	(1) sehr geringes Risiko (als führende Baumart möglich)
	(2) geringes Risiko (als führende Baumart mit ausreichender Beimischung anderer Baumarten möglich)
	(3) erkennbares Risiko (als Mischbaumart in hohen Anteilen möglich)
	(4) mittelhohes Risiko (als Mischbaumart in mittleren Anteilen möglich)
	(5) deutlich erhöhtes Risiko (als Mischbaumart in mäßigen Anteilen möglich)
	(6) hohes Risiko (als Mischbaumart in geringen Anteilen möglich)
	(7) sehr hohes Risiko (als Mischbaumart in sehr geringen Anteilen möglich)

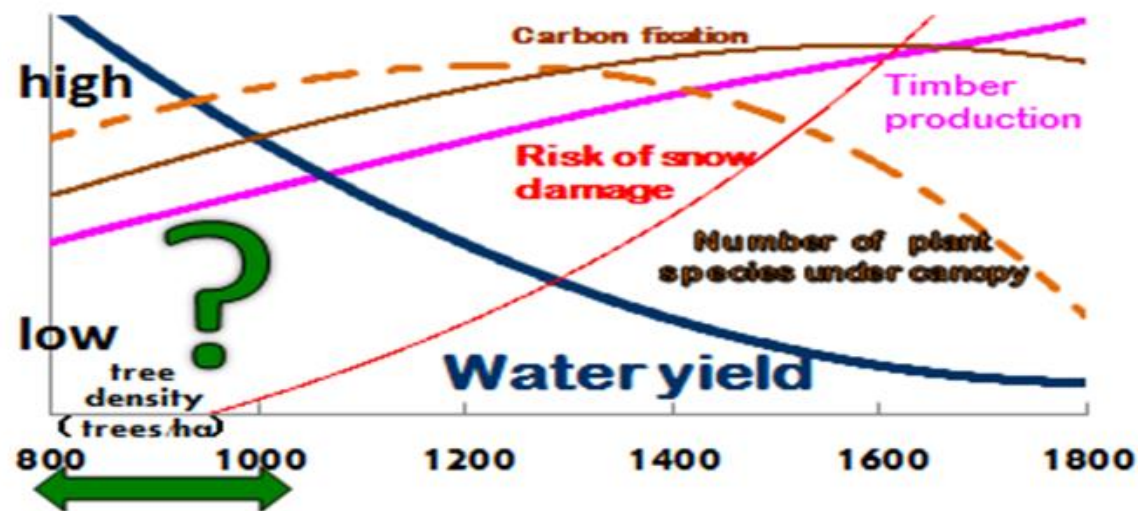
Wilhelm_Soforthilfe, Stand 12.11.2008

Risks for growing spruce in the year 2100:

- Very low
- Low
- Noticable
- Medium
- Considerably high
- High
- Very high

Sustainable forest practices, climate change and other forest functions like water protection

- **Waterharvesting** by thinning of monocultures could be achieved in young planted forests in the Miyun watershed



In the young stands of the project the optimum tree density for forests with dominating water yielding function is less than 1000 trees/ha. Depending on tree species, mixture, structure, age and site conditions we planned for each stand individual tree densities with less than 1000 trees/ha. In order to maintain the stand stability we planned 1 to 3 thinnings within 10 years with defined cutting intensities to achieve such „water-yielding“ tree densities.

unmanaged forests in the project area		after CNF-management of forests (high thinning)	
Rainfall:	562 (431-656) mm/a	Rainfall:	562 (431-656) mm/a
LAI before:	3,34	LAI after:	2,17
water yield:	5,30%	water yield:	7,95%
29,8 mm/a	of rainfall	44,7 mm/a	of rainfall
Groundwater: 298 m ³ /ha,a		Groundwater: 447 m ³ /ha,a	
CNF-management increased the water yield of thinned forests annually by about 150 m ³ /ha !			

Sustainable forest practices and climate change in the EU

- **Close-to-nature silviculture** is widely recognized to be more effective in adapting forests to climate change. It promotes the use of natural and/or site-adapted tree species in mixed forests, aims to diversify the vertical and horizontal stand structures, promotes natural regeneration and avoids large clear cuts.
- **Even-aged silviculture** can also be practiced sustainably: In boreal regions with large forest areas that **will naturally regenerate** and often are affected by forest fire and pest outbreaks as part of their regeneration cycle, even-aged management is considered close-to-nature.
- **Plantation forests** have a low resilience to disturbances, but due to **short rotations**, they offer more frequent options to adapt the tree species selection to the changing climate



Thank you very much
谢谢各位!