



Regional Forest Information Week

State of forests and forest management in the UNECE region
in the context of current needs and challenges

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Forest health and vitality

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Forest health and vitality - Outline

- Pan-European Region (based on the State of Europe's Forest Report – 2011)
 - Deposition of air pollutants
 - Soil condition
 - Defoliation
 - Forest Damage
- Canada and USA (based on FRA2010)



Forest health and vitality – Pan-European Region

Deposition of air pollutants

Deposition of air pollutants such as sulphur or nitrogen compounds, heavy metals, and a number of base cations from burning of fuels such as coal and oil in power stations, industry or vehicles.

- Deposition of air pollutants information is available from up to 300 intensive monitoring plots ('Level II') subjectively selected in the major European forest types.
- Mean annual sulphur inputs decreased by 30% between 1998 and 2007, with significant reductions measured on half of the plots.
- For nitrogen compounds, modeled critical load exceedances suggest relative success of clean air policies.
- Measured deposition still increased on a number of sites and there was no improvement for most of the monitoring plots.



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Forest health and vitality – Pan-European Region

Soil condition

Chemical soil properties (pH, CEC, C/N ratio, organic C, base saturation) on forest and other wooded land related to soil acidity and eutrophication, classified by main soil types.

- Soil information is available from two soil surveys in the 1990s and 2008 with approx. 5000 plots.
- There was an increase in pH and base saturation in acid forest soils but a decrease of soil pH and base saturation in other forest soils.
- There was an increase in organic carbon in the organic and upper soil layer for the majority of revisited sites.
- A C/N index < 1 was found on 14% of the 2738 observation plots, which causes disturbed organic matter and nutrient cycling, especially the plots in Central-Western Europe.
- The current tendency to acidification and eutrophication of soils in many parts in Europe is a potential area of concern.



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Forest health and vitality – Pan-European Region

Defoliation

Defoliation is an indicator of tree health and vitality that reacts to many different factors, including climatic conditions and weather extremes as well as deposition and insect and fungal infestations.

- Almost a quarter of the surveyed trees were assessed as damaged over the last five years.
- There has been no significant change in tree health on around two thirds of the plots monitored over the past twelve years.
- Defoliation increased on 24.4% of the plots monitored and decreased, indicating an improvement in crown condition, on only 14.9%.
- On most plots, tree crown condition remained on the same defoliation level, and 29% of the plots showed deteriorating forest health over a 12 year assessment period.
- The effects of environmental impacts such as adverse weather conditions, insect calamities, fungal diseases and air pollution vary between regions and tree species.



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Forest health and vitality – Pan-European Region

Forest Damage

Damage caused to forest by insects, diseases, biotic agents (e.g. wildlife & grazing), abiotic agents (e.g. storms), and fires.

- **1.2 percent** of the forest area in the MCPFE region is **affected by damages**, while in the **MCPFE region without Russia damages were reported for 5.8 percent of the total forest area**.
- Due to the low percentage of forest area damaged by insects and diseases in the Russian Federation (0.04 percent), **less than 1 percent** of the forest area in the MCPFE region was affected by damage caused by **insects and diseases**.
- **In the MCPFE region excluding the Russian Federation, 3.2 percent** of the forest area was adversely affected by **insects and diseases**
- Data provided for the MCPFE region, excluding the Russian Federation (for which data was not reported), indicated that roughly **2 percent** of the forests are facing damages by **wildlife**.



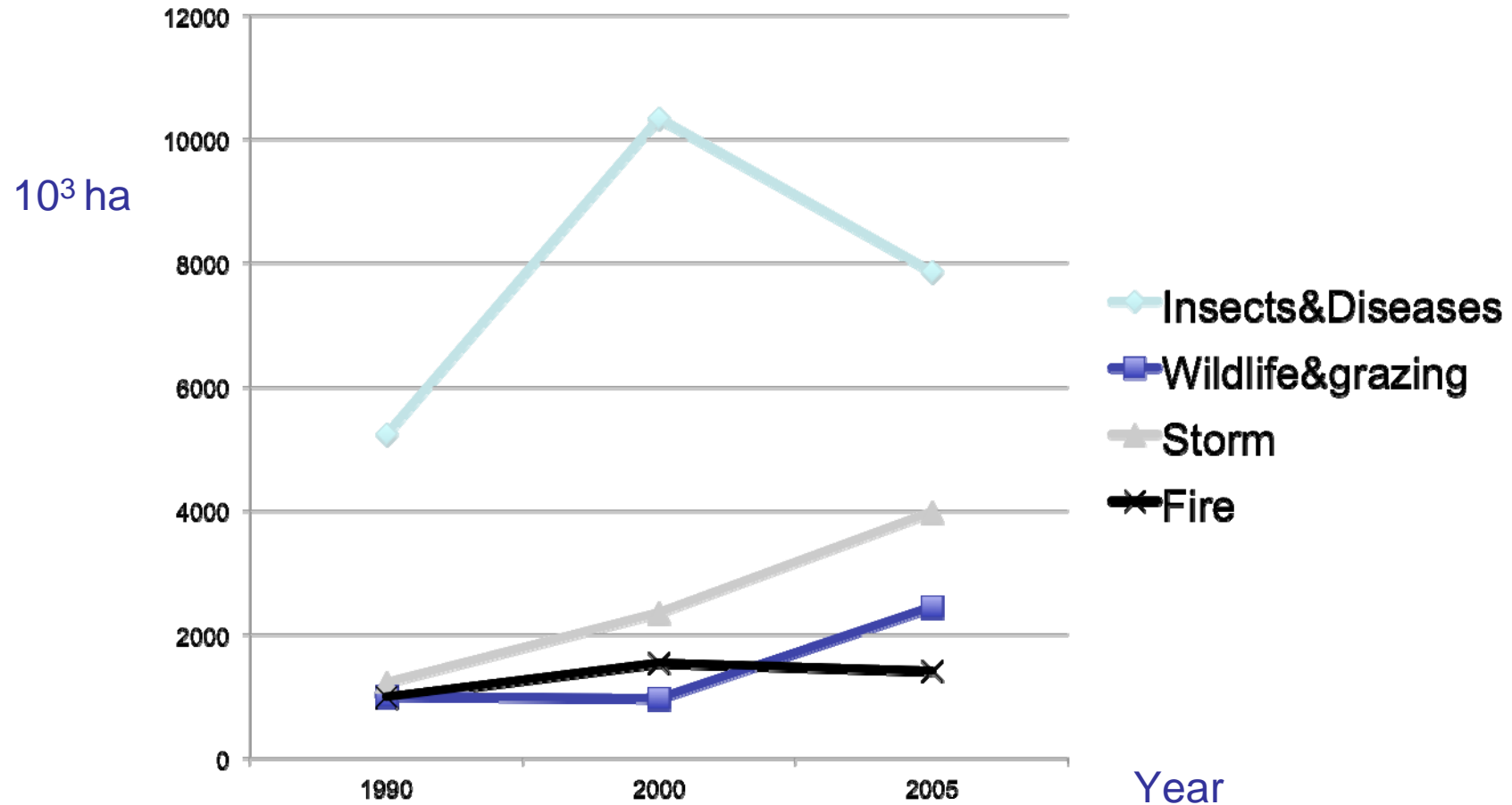
Forest health and vitality – Pan-European Region

Forest Damage (2)

- The largest areas damaged by forest fires are found in the Russian Federation, where 1.1 million ha were burnt. However, the proportion of area burnt is slightly above **0.1 percent** and thus within the range of all other European regions, except south east Europe, where countries reported that 0.6 percent of the forest area was damaged by **fire**.
- For Europe without the Russian federation 2.6 million ha (**1.3 percent**) of forests are damaged by **storm, wind and snow**.



Forest health and vitality – Pan-European region



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Forest health and vitality – Canada & USA

Data collected for FRA 2010 on forest health and vitality focused on the following, largely quantifiable categories, for which many countries record incidence and extent:

- area of forest significantly affected by insects ;
- area of forest significantly affected by diseases;
- area burned (separated into areas of forest, other wooded land and other land);
- number of wildfires (separated into those affecting forests, other wooded lands and other land);
- proportion of wildfires and planned fires;
- area of forest significantly affected by other biotic factors (such as wildlife browsing, grazing and physical damage by animals);
- area of forest significantly affected by abiotic factors (such as air pollution, wind, snow, ice, floods, landslides, tropical storms, drought and tsunami);



Forest health and vitality – Canada & USA

Forest fires

- On average, 0.5 percent of all forests (3.4 million ha) was reported to be significantly affected each year by forest fires; this figure implies an increase with respect to figures reported in 1990 and 2000.
- Less than 10 percent of all forest fires are prescribed burning; the rest are classified as wildfires.



Forest health and vitality – Canada & USA

Pests and diseases

- More than 3 percent of all forests in North America (including Mexico) are affected annually by pests and diseases.
- The mountain pine beetle has devastated more than 11 million hectares of forest in Canada and the western United States since the late 1990s – an unprecedented outbreak exacerbated by higher winter temperatures.
- In 2006, Canada reported the highest area of insect disturbance for a single country of 17.3 million hectares (major outbreaks of two indigenous: the mountain pine beetle (*Dendroctonus ponderosae*), which damaged 9.2 million hectares of forest, and the forest tent caterpillar (*Malacosoma disstria*), which affected 5 million hectares).
- No data were reported on diseases for the United States of America in this reporting period, compared with 17.4 million hectares reported for FRA 2005.



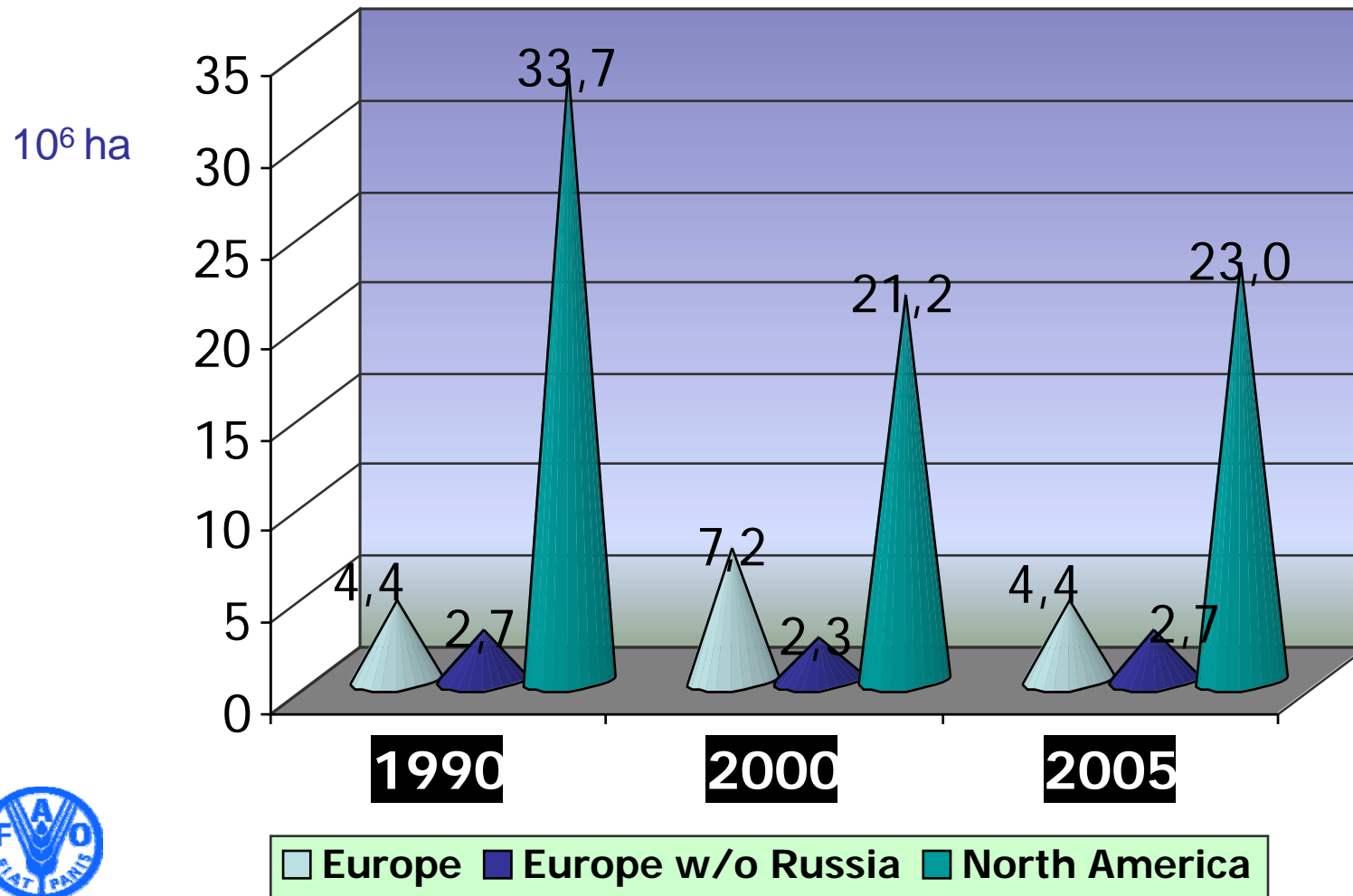
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Forest health and vitality – Canada & USA

Insects – area of forest annually affected (1988-1992; 1998-2002; 2003-2007)



Insect outbreaks



MOUNTAIN PINE BEETLE



The mountain pine beetle (*Dendroctonus ponderosae*) has devastated more than 11 million hectares of forest in Canada and Western USA since the early 1990s.



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Forest health and vitality - Conclusions

- In general, forest in the UNECE region can be considered in a good state of health and vitality.
- Deposition of pollutants in the pan-European region is stable or decreasing.
- Forest soil condition is good, although local variations in pH and C/N can have negative effects on forest health.
- Forest damage, although affecting a small percentage of the total forest area, has increased in the last decades.
- Increase in forest damage is mainly due to abiotic factors, possibly driven by climate effects.
- Damages by abiotic factors (e.g. storms) and fires can have significant effects at local scale.
- Improved data reporting on damage levels (not only affected area) is required to assess the real damage to forests.



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Forest health and vitality - Conclusions

Thank you for your attention



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