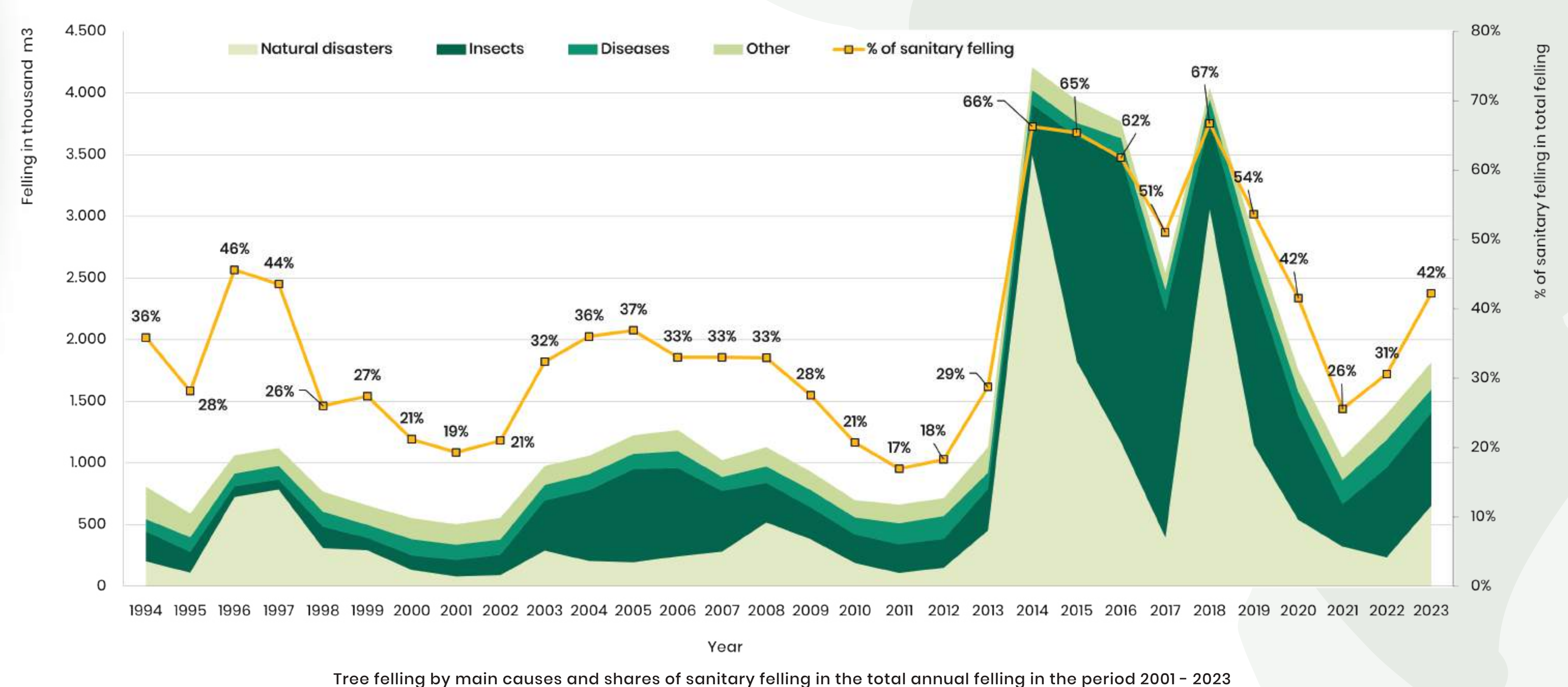


Forests and climate change

The impact of climate change on forest ecosystems is evident all over the world, and the effects are increasingly visible also in European forests.

HOW CLIMATE CHANGE AFFECTS FORESTS IN SLOVENIA

- increase in average annual temperature,
- different distribution of precipitation over the year,
- increased drought during the growing season,
- more frequent natural disasters (forest fires, windbreaks, floods, snow and ice breaks),
- changes in tree species composition,
- spreading of invasive alien species,
- more frequent occurrence of diseases and pests in the natural environment,
- reduction of biotic diversity and increased frequency of sanitary loggings.



Tree felling by main causes and shares of sanitary felling in the total annual felling in the period 2001 - 2023

ADAPTATION OF FOREST MANAGEMENT TO CLIMATE CHANGE:

- Adaptation of the tree species composition in forest.
- Increasing stand stability through thinning (e.g., situational thinning).
- Establishment of selective stand structures in forests suitable for this silvicultural system.
- Monitoring and conservation of biotic and genetic diversity of forests.
- Construction of infrastructure in areas with an increased risk of natural disasters.
- Preparation of action protocols in the case of pests and diseases outbreaks.

THE IMPORTANCE OF GENETIC DIVERSITY IN FOREST STANDS

The genetic diversity of forest tree populations plays an important role in ensuring the resilience of forests to climate change and other threats. Genetic diversity is the basis of long-term evolutionary processes that enable forests to maintain their adaptive potential in a changing environment.

The greater the genetic diversity of trees in forests, the more likely it is that some trees will have inherited characteristics that will make it easier for them to adapt to rapid climate change and increase the resilience of the entire forest ecosystem.

Results of the LIFE SySTEMiC project (Close-to-nature forest sustainable management practices under climate changes) show, that forests with high biotic diversity and a varied (multi-layered) vertical stand structure are also genetically more diverse and can be compared to the diversity in primeval forests and unmanaged forests. Therefore, such forest management solutions are recommended, which are adapted to the site conditions and tree species mixture (for example selective or irregular shelterwood management with smaller gaps). The diversity of management approaches and the promotion of an age-diverse stand structures facilitate the spread of pollen, which consequently increases genetic diversity and create conditions for new combinations of genes, which are important for the adaptation of forest tree populations to climate change.

GUIDELINES FOR SUSTAINABLE FOREST MANAGEMENT



BEECH FORESTS

In beech stands, management that increase the structural diversity of the stands, is recommended. The main measures for adaptation of beech stands are: improvement of tree species composition, provision of a varied stand structure, promotion of natural regeneration, frequent tending measures (e.g., situational thinning), creation of multi-layered and selective structures and constant monitoring of biotic diversity, especially its genetic part.



SILVER FIR FORESTS

Selective silvicultural practices that maintain the adaptive capacity of forest tree populations are recommended. The adaptation potential of silver fir forests to climate change can be very high when suitable structure of the forests is formed, when timely selective thinning and tending of older stands is carried out, when tree structure is preserved and when natural regeneration is undisturbed, without pressure of game browsing.



OAK FORESTS

The silvicultural system that is most suitable for the management of Quercus robur stands is an irregular shelterwood system with larger gaps or a uniform shelterwood system that provide enough light for the growth of oaks. The system of forest restoration must be adapted to more frequent natural disturbances, especially with regeneration gaps of varying sizes, as this ensures the mosaic structure of future stands and increases their resilience.



PINE FORESTS

It is suggested to use forest management methods, which are taking into account the greater demand of pine for light and increase their complexity. A creation of a multi-layered vertical structure of stands is recommended, which enables the uninterrupted spread of pollen, promotes the genetic diversity of pine populations and increases the number of new gene combinations that are important for the adaptation of forest tree populations to climate change.



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