

1. Introduction

1.1 History of acute forest damage

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In the last 4 decades, many European countries have suffered acute forest damage. In northern and central Europe the main cause of damage has been windthrow, whereas in the south and especially in Mediterranean countries the main cause of damage has been forest fires.

In spring 1967, storms which hit southern Sweden and the southern part of the Federal Republic of Germany brought down 10 million m³ of timber. In November 1972, 17 million m³ were windthrown by heavy storms in the northern regions of the Federal Republic of Germany and the gales of November 1984 levelled approximately 25 million m³ in Central Europe.

In Sweden nearly 1 million m³, mostly spruce, was windthrown in early November 1969, while Great Britain experienced its most acute forest damage on the night of 15/16 October 1987, when 4 million m³ of coniferous and broadleaved timber was brought down by a storm which hit the southeastern part of the country. Britain was also hit by major storms in 1953, 1968 and 1976 when approximately 1 million m³ of timber were windthrown each time.

In the most recent acute forest damage which occurred on 28 February and 1 March 1990 and affected several countries, the estimated volume of windthrown timber is shown below:

Germany	65 million m ³ or twice the amount of annual cut
France	7 million m ³ or 18% of annual cut
Sweden	1 million m ³
Switzerland	5 million m ³ or 110% of annual cut

Forest fires cause different problems compared to those caused by windthrow. Fires destroy timber as well as all kinds of ground vegetation bringing about severe soil erosion. Clearing of burnt forests before replanting is a dirty and unpleasant operations and personnel often are not willing to carry it out. Burnt timber brings very low prices because of its limited use.

In the decade 1977-1986 Italy lost 1 400 000 ha, Southern France 400 000 ha, Spain 2 500 000 ha and Greece 400 000 ha of forest and shrubland to fires.

The effect of extensive forest and shrubland fires in the Mediterranean countries cannot be expressed only in terms of timber loss, since soil erosion, site deterioration and subsequent difficulties in re-establishing the forest due to the dry climate and poor soil conditions is often much worse.

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1.2 Impact of acute forest damage

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The acute forest damage incidents have standard features in common:

- ◆ They are unforeseen.
- ◆ Enormous quantities of timber accumulate on the forest floor in a short time or a great number of trees die standing.
- ◆ Timber processing operations become extremely difficult because of problems relating to the availability of manpower, harvesting machinery and equipment, storage facilities, transport and markets.
- ◆ Extensive areas need reforestation in due course.
- ◆ There are limited opportunities for cost-effective prevention although appropriate management of stands can reduce the overall impact.

The effects of acute forest damage depend upon the nature of the causal agent, time of year it occurs, tree species and size, stocking density and previous silvicultural treatment of the stand, as well as specific terrain conditions. Coniferous forests such as spruce, pine and fir with low stocking are sensitive to storms, especially on unfrozen soil.

Conifers are also damaged by heavy snowfall, while broadleaved trees are normally more resistant to storms and snow in the late autumn and winter due to better root systems and lack of foliage. However, strong winds may have the same effect on conifers and broadleaved trees. Pines are highly inflammable trees and on the Mediterranean coastal areas of Europe thousands of hectares of pine forests are lost each summer due to fires.

After a disaster, bark beetles can be a major threat to windblown timber and to the health of the remaining forest. High populations of spruce bark beetle (*Ips typographus*), can build up and attack both the damaged area and the surrounding forest for up to 10 years after the initial incident. Pine is sensitive to blue-stain fungi and immediate clearance of the devastated area is required to minimize risks of degradation.

As wood left in the forest is subject to degrade, harvesting should proceed without undue delay. However, this should be preceded by an assessment of priorities.

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1.3 Objective of the manual

One of the major problems faced is the availability of qualified manpower. In extensive catastrophes recruitment of local workers may not be sufficient. Employment of skilled workers from neighbouring areas or across national borders depends on several factors and is not always successful. Working conditions are exceptionally difficult at the disaster area because cutting of windthrown or burnt timber is a demanding and potentially dangerous task requiring experience and understanding of the special problems involved.

A sudden, large increase in the quantity of timber available will tend to lead to a reduction in timber prices. Effective and inexpensive storage methods should be considered to avoid excessive timber supplies.

Large scale forest damage may affect the ecological balance of the forest ecosystem in a harmful way. On steep ground increased water run off and soil erosion may result. Movement of heavy machinery during clearance operations can cause soil compaction. Disturbed soil and the accumulation of large quantities of wood waste on the forest floor will complicate reforestation activities.

1.3 Objective of the manual

The manual is a framework based on experiences from past acute forest damage in Europe. Many of its elements have to be adapted or developed in more detail to correspond to national as well as local conditions.

The manual covers the following topics:

◆ Management and organisation

Establishment of committees for dealing with disaster and determining the committees' functions and responsibilities.

◆ Damage survey

Methods for a relatively fast and accurate identification of type and severeness of damage, charting its geographic extent, and estimation of damaged volumes.

◆ Damage reporting and action planning

Content of a preliminary report and principal measures to be taken, based on the inventory and other preliminary information.

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1.3 Objective of the manual

◆ **Harvesting operations**

Guidance on harvesting operations covering:

- Health and safety; accident risks, training, personal protective equipment, first aid and dealing with emergencies.
- Working methods for manual as well as mechanized systems; equipment, machines and techniques to be used and output guides.
- Recruitment of labour and procurement of machines; work regulations, accommodation arrangements and trans-national agreements.

◆ **Marketing windblown**

- Utilization options for damaged wood, strategies for marketing and entering new markets.
- Methods for long term storage and deterioration prognosis.
- Strategies for long distance transport.

◆ **Reafforestation**

Priorities for rehabilitation and reforestation, problems which may arise, and measures to overcome these problems.

◆ **Evaluation of measures**

Assesses actions and measures taken in order to benefit from experience gained in case of future forest disasters.