**Maintenance of the Health and Vitality of Forest**

Maintaining the health and vitality of forest ecosystems is fundamental to enhancing forest functions and implementing sustainable forest management.

Natural disturbances, such as **fire**, **strong** **wind**, **flood**, **pests** or **diseases** are essential for the regeneration of natural forests.

**Decline of forests caused by multiple factors**

**Classification of the causes of decline and damage:**

The causes of decline (dieback) and damage can be classified as:

1. Non-anthropogenic

* **Abiotic** **factors** such as wind and snow
* **Biotic** **factors** such as diseases and pests

1. Anthropogenic

* **Abiotic factors** such as climate change and air pollution
* **Biotic factors** such as damage by introduced organisms

**Non-anthropogenic factors**

**Abiotic factors**

**1- Fire:**The largest natural disturbance of forest ecosystems in the world is fire.

Natural fire is liable to occur and spread widely in regions where the dry season and warm season are concurrent.

Although lightning is the major natural cause of forest fire, humans have been the most significant cause of fire worldwide.

**2- Wind:** Strong wind is another common agent that causes destruction of forests.

**3- Cold injury:** Cold injuries can be divided into two categories; **frost damage** (freezing damage) and **winter desiccation damage**.

Plans for newly established plantations should exclude such sites or identify alternative, cold resistant species to be planted on them.

Winter desiccation damage often occurs near the margins of the natural distribution of a species.

**4- Snow**

There are two forms of snow damage; **snow pressure damage** and **crown snow damage**.

Crown snow damage includes **stem bending**, **stem breakage**, **uprooting** and **branch breakage.**

**5- Air pollution**

Air pollution is the pollution of the air by toxic substances which are anthropogenic in origin, such as sulfates, nitrate, and ozone.

Air pollution may be one of the most widespread potential causes of forest decline in many parts of the world

**Biotic agents**

**1- Pests and diseases**

Pests cause damage to trees in various ways, such as **inhibiting growth**, **reducing seed** **production** or causing **stem** **deformation**. These effects sometimes cause **death**.

**2- Mammal damage**

Damage caused by mammals is usually in the form of browsing damage, and mostly affects regenerating seedlings and saplings.