

Deadwood breeds new life!

Photo: Carl-Johan Eriksson. Sveaskog's image bank



◀ Deadwood is essential to forest landscapes. The best scenario is a mix, with both lying and standing tree trunks decomposing at different rates.

Most forests are home to both living and dead trees. The share of dead whole and partial trees varies. In a young planted forest, we find only the odd lying tree trunk and a few tall stumps, while in an old, untouched spruce forest we find plenty of dead trees. These dead trees are extremely important to many kinds of fungus, insect, lichen and fauna living in the forest. Accordingly, it is important that modern forestry methods both preserve existing deadwood and create new deadwood when implementing forestry measures such as logging.

Why do trees die?

Trees can die for very different reasons. The tree species found in forestlands are divided into pioneer tree species and secondary tree species. Pioneer tree species, such as birch, aspen, pine and willow, are species that are the first to establish on open ground, experiencing rapid initial growth thanks to unbridled access to life-giving sunlight. In some cases, very many trees can sprout up in a confined area, which will result in a process known as self-thinning, which means that the stand is simply too crowded and some of the trees die as a result. Secondary tree species, which at northern latitudes mainly means spruce, are able to grow in the shade of pioneer trees. In time, the secondary trees will outgrow the pioneer trees, eventually leading to the pioneer trees being sufficiently disadvantaged to die.

Trees can also die due to weather conditions.

Storms are sometimes powerful enough to uproot trees, which are then known as windthrown trees. If the trees are instead snapped by the wind, this is a sign that they were probably already weakened for some other reason. Snow can also cause trees to die in the forest. Snow damage occurs when wet snow freezes on branches and the extra weight causes the tree to bend or crack. Snow damage usually only affects individual trees with thinner trunks.

Another cause of tree death is a wood fungi or wood insect infestation. The tree has usually already been weakened in some way before being infested by fungi or insects, such as snow damage or perhaps logging damage from a forest machine thinning the surrounding forest. Rotting is caused by a fungus that can spread through the root system, with the fungus secreting substances that decompose the wood, eventually resulting in the tree's death. Rotting is

Photo: Daniella Andersson



▲ A spruce snag still standing in the forest provides a habitat for many different species, and maybe a woodpecker is living in that hole?

most common in spruce, and once the wood has been weakened, the tree is more easily snapped. Spruce bark beetles are small beetles that can localise weakened spruce trees and multiply beneath the bark. They most often infest recently windthrown trees, although if the spruce bark beetle reproduces too rapidly in one spot it can start to infest and kill standing spruce.

Different types of deadwood

Forest landscapes contain different types of deadwood. If a tree dies standing, it is called a snag. If the tree has snapped high up the trunk, the standing part is called a tall stump. Most common are pine snags, which due to their hard wood can stay standing for several hundred years. Many different species can live both on and in a pine snag. If you use a magnifying glass to inspect a trunk that has lost its bark, you may find small, black pin lichen, an owl may be nesting in a hole higher up, and if the bark is still in place, various insects will be thriving underneath it.

Lying deadwood is called either coarse woody debris or windthrown, depending on whether the tree is still attached to its roots. Coarse woody debris, which is separated from the roots, is usually of greater ecological interest as it serves as a habitat for many different species. The side resting on the ground is home to wood fungi, or polypores as the actual fruiting bodies are called. You can also find small holes in the trunk, which are traces of wood insects seeking food or a nesting place in the wood.

Many different factors affect the quality of the deadwood, and this in turn determines which species will thrive. A few of the factors are the tree species, the diameter of the trunk or branch, the ambient climate, which part of the tree it is and why the tree died.

Some groups of species feed on pine snags that died in forest fires and are exposed to sunlight, while other groups of species prefer old coarse woody debris from a spruce in a damp forest.

Moreover, it is important that the deadwood is at different stages of decomposition, which means everything from trees that have just died to coarse woody debris that has almost completely decomposed.

Why is deadwood so important?

Much of the forest's biological diversity is down to deadwood. Every five years, the Swedish Species Information Centre at the Swedish University of Agricultural Sciences publishes its Red List, highlighting which species in Sweden are threatened and risk extinction. Approximately 40% of the forest species included in the Red List are dependent on deadwood. Different groups of species are dependent on one another and deadwood is of fundamental importance.

Consider the following example. A spruce has a damaged trunk and is infested by spruce bark beetle, which eventually kill the tree. A three-toed woodpecker finds the infested tree and can feed on the bark beetles.



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Other insects can also nest in the channels burrowed by the bark beetles. Finally, the tree snaps and following this the wood fungus *Phellinidium ferrugineofuscum* colonises the coarse woody debris. *Phellinidium ferrugineofuscum* is a decomposer that forms beautiful, brown fruiting bodies close to the trunk. When you think of fungi that grow on coarse



Photo: Daniella Andersson

▲ Even old logging residue has biological value, including this pine crown, most probably a by-product of dimension logging in years gone by.



woody debris, you perhaps picture small, cap-like fruiting bodies, but *Phellinidium ferrugineofusum* is a so-called resupinate fungus, which means that it grows close to the trunk without any protruding parts. It almost looks like the bark has been transformed into brown velvet, with some comparing the colour to chocolate powder!

Coarse woody debris colonised by *Phellinidium ferrugineofusum* is often home to other red-listed species, such as *Fomitopsis rosea*. *Fomitopsis rosea* forms fine caps with a red-pink colour underneath. If conditions are really favourable, an extremely rare polypore, *Skeletocutis brevispora*, can also start growing on the coarse woody debris after a few years. It grows either on or right next to old fruiting bodies of *Phellinidium ferrugineofusum* and requires that the forest is essentially ancient woodland, that is, untouched by modern forestry, if it is to flourish.

In today's managed forests, the amount of deadwood is very low compared to both areas untouched by modern forestry and how things were in the past, before large-scale forestry.

Today, trees are logged before they become old enough to die naturally, forest fires are contained or extinguished to prevent large economic losses and windthrown trees are harvested to prevent pests from multiplying and damaging large areas of forestland. In modern forestry, it is particularly important to include proactive efforts to increase the amount of deadwood in forest landscapes, and these are conducted on several different levels.

When planning to log a forest, areas with a great deal of deadwood, especially coarse woody debris, are excluded. If standing forest is left to surround the coarse woody debris, the ambient climate remains

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damper than if the trees are cleared. Trees around snags can be cleared as the species that thrive in this environment are also favoured by sunlight. If the forest owner is FSC-certified, they should also create new deadwood during logging work. The minimum requirement is high felling, which means creating a tall stump measuring at least three metres, or girdling (removing a strip of bark spanning the entire circumference) three trees per hectare of logged forest.

Most forest owners also exclude part of their forest from conventional forestry, so-called nature conservation areas. Within these areas it may be appropriate to give nature a helping hand and to create deadwood by, for example, girdling, damaging trunks in various ways or burning forest.

As mentioned before, there are risks associated with creating too much deadwood, such as spruce bark beetle populations growing exponentially, so the Swedish Forestry Act stipulates no more than five cubic metres of fresh deadwood per hectare. Should a forest owner want to create more than this, they can apply for an exemption from the law.