

# The chequered gap shelterwood forest at Kulbäcksliden



Photo: Olle Hagner.

◀ Aerial photograph of chequered gap shelterwood system in practice at Kulbäcksliden.

The Swedish Forestry Act was refined in the 1990s to encompass both environmental and production objectives within forestry. Research began on alternative forest management methods. 2005 saw the creation of a chequered gap shelterwood forest at Kulbäcksliden Experimental Forest in Vindeln. Using a grid system, the forest in half the boxes was logged while the forest in the remaining boxes was left untouched. The remaining trees form shelterwoods and the logged gaps are replanted. Studies have shown that forest growth reaches the production objectives of the forestry act while also benefitting social and ecological values.

## Background

Patch clearcutting has been the most common type of forestry since the mid-1900s. This means that planting, cleaning, thinning and final logging are repeated over and over again. The forestry act has long included a regrowth requirement with production objectives to prevent forests from disappearing. Since the 1990s, environmental objectives are also included in the forestry act since biodiversity was negatively affected by traditional patch clearcutting. This resulted in the development of and research into alternative forest management methods.

## Chequered gap shelterwood forest at Kulbäcksliden Experimental Forest

Kulbäcksliden Experimental forest in Vindeln, Västerbotten County, has been home to a chequered gap

shelterwood forest since 2005. Ten rectangular boxes measuring 30 x 45 metres were logged and then replanted with spruce or pine at the experimental forest. The forest in ten equally large boxes was left untouched. This logging method is proposed by a forest management method known as a chequered gap shelterwood (CGS) system and the name comes from the forest resembling a chequerboard from above.

Half of the forest is logged while the other half is spared using a grid system. This allows the forest to have trees of two different ages rather than all the trees being logged at the same time to create a clearcut. Although the CGS system is not currently used in Swedish forestry practice today, researchers are examining whether it could be used for future shelterwood cutting.



▲ Google Maps satellite imagery enables you to clearly see the chequered gap shelterwood forest from above. Kulbäcksliden Experimental Forest.

## Shelterwoods protect

The boxes of untouched forest have positive effects. The trees left standing are called shelter trees and together several shelter trees form a shelterwood. The shelterwoods keep the ground temperature in the gaps more stable than in a clearcut and also reduce the risk of frost. The grid system also offers protection from the wind, which on clearcuts can damage the trees found closest to the clearcut. The CGS system does not affect groundwater levels as much, preventing the groundwater from drying up, for instance. The logged boxes are replanted with new trees, which eventually become shelterwoods when the oldest trees in the other boxes are logged. There is, however, a risk that the shelter trees will compete with the plants in the gaps and impair their growth.

## Sunlight affects growth

Different amounts of sunlight can affect how much the plants grow. Studies have shown that plants in the middle of the logged gaps grow better than those at the edges, probably due to the shade provided by the shelter trees. The plants grow even better in the northern parts of the gaps because they are exposed to more sunlight. The shelterwoods are affected in the opposite way, with the trees in the middle showing poorer growth than those at the edges due to the lack of sunlight. Plants in the gaps that initially exhib-

it poorer growth can experience better growth once they themselves become shelter trees and the former shelterwoods are logged.

## Improves reindeer herding areas

For reindeer husbandry, the CGS system can have positive effects compared to clearcutting. In his 2018 thesis on natural tree regeneration following chequered gap logging, *Naturlig trädförnyring och epifytiska hänglavar 10 år efter en avverkning i schackruteform*, Johannes Ackemo investigated a chequered gap shelterwood forest in Gällivare.

His work showed that the hanging lichen reindeer eat from the trees remain on the shelterwoods and then spread more easily to the younger trees in the gaps than they do on clearcuts with greater distances to cover. It has been shown that twice as much hanging lichen can grow in chequered gap shelterwood forests than in patch clearcuts. In addition, the shelterwoods can reduce snow depth, which benefits the reindeer's ability to forage the forest floor.

## Further research

Further studies of the CGS system will be needed to examine how the forest is affected in the long term. The method has also produced different results in different parts of Sweden. The CGS system can achieve the production objectives of the forestry act while also benefitting social values as the forest does not appear as affected.



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Furthermore, ecological values may benefit, although it is still too early to tell whether biodiversity benefits from the chequered gap shelterwood system.

## REFERENCES /

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## visa skogen

Project PINUS, a project for innovative experiences in managed forests, aims to gather the tourism industry, the forest industry and forestry academia in efforts to create opportunities for tourism in managed forests. Project PINUS began in August 2016 and runs until November 2019. The Museum of Forestry in Lycksele is the project owner.



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