

# BARKING UP THE RIGHT TREE

or how to promote Local wood knowledge in Western Norwegian Communities

Diploma project at Bergen Arkitekthøgskole 2019 By Ida Wressel & Nikolina Søgnen





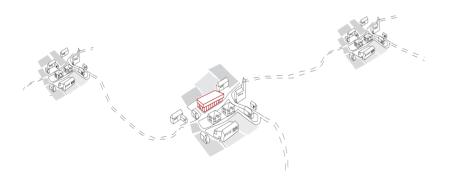








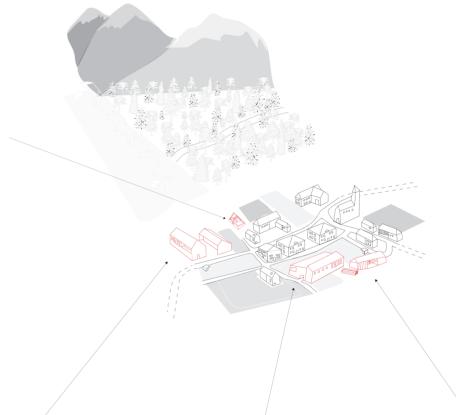






#### THE BUILDING SITE

During construction all the professions meet on site, discuss and find solutions together. This is a very important social situation to maintain the local value chain. It is also a crucial occasion for innovation and reinterpretion, as most building projects take place within a strong vernacular context where knowledge of traditional crafts is demanded.





#### THE FORESTER

In each village a government representative is in charge of the all the forest. This person ensures holistic forest management by coordinating felling, mediating in conflicts and securing the function of protective forests.



Owns the forest and cuts trees when needed or requested by the forest manager. Either fells himself of uses a contractor. Can sell the material or pay for refinement. Also uses his forest for collecting firewood.



# THE CABINET MAKER

Mostly produces custom pieces on request. A big portion of their work is making kitchens. Cabinet makers always have their own wood storage and typically request wood with certain properties directly from the forester. Also buys the best material from the sawmills.



# THE CARPENTER

Buys material from the sawmill. Some are also foresters and harvest specific trees themselves. Many carpenters have large workshops and build modules. Practice modern and traditional carls is similaneously. It is fairly easy to get motivated apprentices in the area, though hardly any are female. Twice per year all the carpenters take part in a social event hosted by the Bregenzerwald carpenter union.



## THE SAWMILLER

Buys timber from the farmer or refines on his behalf. Sells refined material to carpenters and cabinet makers. Typically cuts into coarse dimensions, leaves to dry and then refines further on request.



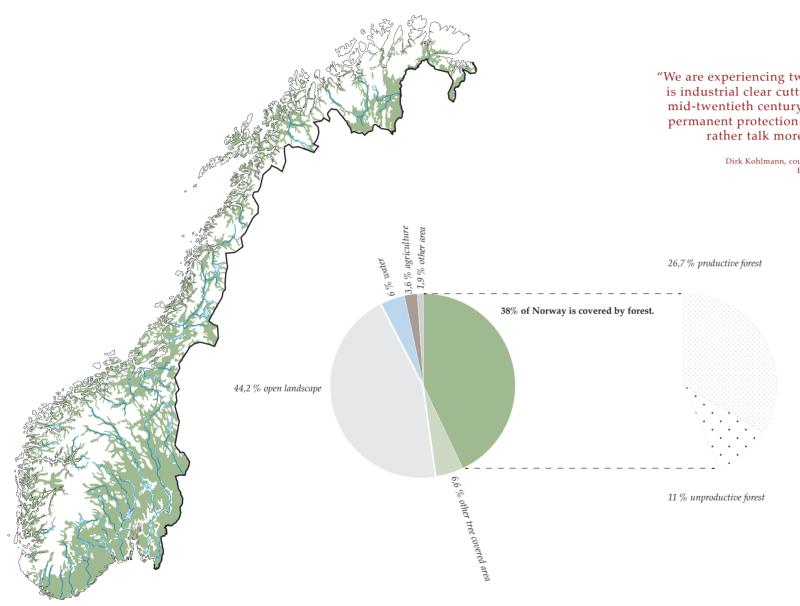
THE ARCHITECT

Most architects in the area work within the vernacular traditions, both restoring and reinterpreting the old typologies. Drawing on the competence of the local craftsmen and the quality of the local material, they typically design all-wooden buildings with sophisticated detailing.









"We are experiencing two parallel booms right now. One is industrial clear cutting of the spruce planted in the mid-twentieth century. The other is that of voluntary permanent protection of important forest. We should rather talk more about the middle way."

Dirk Kohlmann, county governor forestry department Bergen, 15.05.19



# FOREST TYPES

#### PLANTATION

In the cycle of planting and clear cutting most or all trees in an area are uniformly cut down. The strategy aims to create certain types of forest ecosystems and to promote specific species that require an abundance of sunlight or grow well in large, even-age stands. The monocultural forest may lead to increased stream flow during storms, loss of habitats, opportunities for invasive species as well as negative impacts on scenery and outdoor life. For efficient production of large quantities of timber it is an optimal strategy and the revenue from a cutting can be an immensily important boost in a farm economy. However, the outtake can only happen once per generation and is vulnerable to the timber prices in the given period. Clear-cutting with following soil preparation involves years of carbon leakage and thus disturbs a forest's potential for regulating the climate through carbon binding.

# NATURAL REGROWTH

Naturleg forynging

Management is based on the selection and promotion of individual trees of all ages, rather than the creation of areas with trees of uniform size. Different existing forest stands may require different silvicultural interventions to achieve a continuously productive irregular structure. The cutting interval needs to be in balance with the regrowth. Regeneration will normally be by the growth of naturally regenerated seedlings rather than by planting. This forest management is more common among farmers and small scale forestry.

## PROTECTED FOREST TYPES

# Protective forest Vernskog

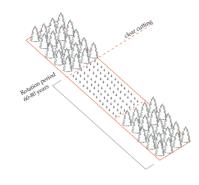
The government decides if a forest should be registered as serving a protective function. The motivation is typically risk of extreme climate or natural hazards, and the forest must be managed according to these primary interests. It does not exclude that some trees can be cut, but it is not the production of timber that determines the felling.

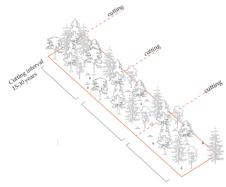
## Primary forest Urskog

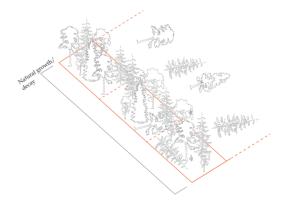
This extremely rare type of forest is regarded as untouched by human hands and thus constitutes a completely natural community. It has significant amount of dead trees in different decomposition phases. The general age of the trees is relatively high. The forest has many layers of vegetation and presence of continuity demanding species. Primary forest is usually automatically protected and only 0,5% is left in Norway.

## Secondary forest Gammalskog

In this type of forest there has not been human activity for at least 160 years (age span varies between conifers and broad leaves). It has no or few traces of felling and provides crucial living conditions for a great number of species. Forest owners can apply to permanently protect their forests in return for a small compensation.











## Clear cutting Flatehogst

All plants are cut in an area at least the size of 2,5 football pitches. This is the typical harvest method for spruce plantations and the most common type of forestry in Norway today. The time of harvest is dependant on the plants being ripe (at least 60 years for harvest is dependant on the plants being ripe (at least 60 years for spruce) and the price of timber on the international market. The quality of the logs is typically quite even. This method trequires beavy machinery and forest nodes to grant them access to the field. Often very large areas with multiple owners are cut at the same time to increase the cost efficiency. You always leave a few trees to die. After clear cutting you are required to plant either by spreading seeds or leaving a few strong individuals to spread theirs naturally. Replanting is quite labour demanding and the plants need to be looked after in order to make sume they survive.

# Pocket harvest Gruppehogst

Cutting is done in an area small enough for the replanting to happen naturally, with seeds spreading from the surrounding trees. You can cut an area dear on leave some strong individuals to protect the coming seedlings. These larger trees are then removed when the seedlings have become large are then removed when the seedlings have become large of a careful transition from natural forest to spruce plantation, or in instances where you also need the forest to serve for instances where you also need the forest to serve fore functions such as binding mass or protecting from avalanches. Although it sometimes means removing all trees in an area, the vegetation will be able to repair itself and thus method is defined a "Goods" within a given forest.

# Farmer's forestry Plukkhogst

You carefully select which individuals to cut. These are always those of the best or the worst quality. The purpose of the method is to promote better growing conditions for the remaining trees and cutting is typically done every 15-30 years. Felling is done by chainswar and local transport by winch and tractor, so you need a road for access. Farmer's forestry secures variety of species and multilayered vegetation. Though there is academic dispute over the productive ability of this forest compared to plantations, the quality of the sourced timber will always be maximised with armset's forestry. However, this requires aftertion and present the productive ability. However, this requires aftertion and productive ability. However, this requires aftertion and productive ability of the sourced timber with a source of the source of



Before the harvest



3-5 years after the harvest



10-15 years after the felling

Before the felling





10-15 years after felling















#### Mechanised

There are typically three different There are typically three different machines required for industrial forestry: one machine to build roads, one for cutting the trees and one for transporting them to the nearest road. All industrial contractors and organized by large cooperations of which forest owners are members. The cooperations but the timber from the forest owner and sell it. Because of the coots involved, that large areas. Can be done all year round.





# Manual

This method is flexible in that it This method is flexible in that it does not require any planning or cocordination. You need a chainsaw and a tractor. It has become popular to bring a mobile sawmill to the forest and leave the material to dry there after cutting. By using a winch you do not need direct access to the tree with a machine, so manual fall to the property of the proper











EXPORT

1/3 of all logs are shipped to Germany or Sweden.



INDUSTRIAL SAWMILL



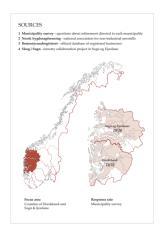


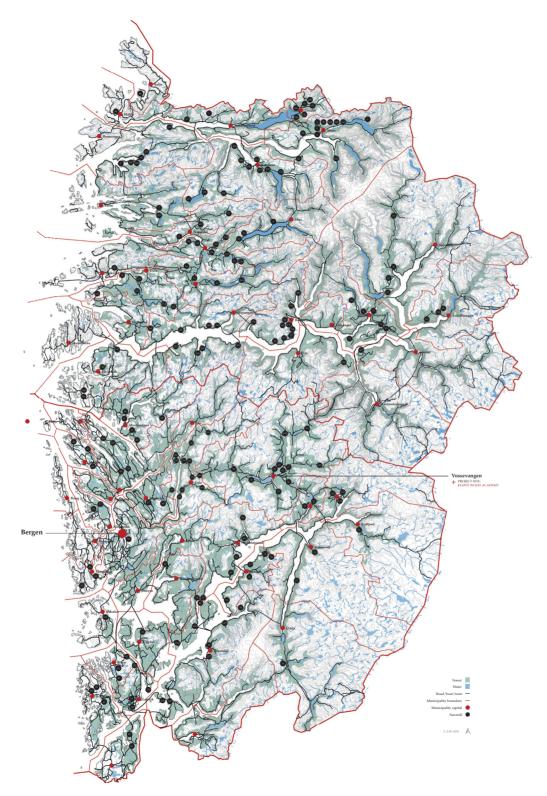
SMALL-SCALE SAWMILL

MOBILE BAND SAW







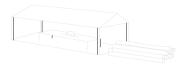




The introduction of the waterdriven frame saw spurred a paradigm shift in Norwegian forestry. Where before you had to axe or split timber into planks, you could now use the energy embedded in rivers to cut a log into multiple pieces. This technology was the foundation for Norway's export of refined wood. Neighbouring farms typically shared a sawmill and though most substituted the band saw for a circular saw in the late 1800s, many of these farm sawmills were operating well after WW2. Allowing for more efficient utilization of forest resources, the sawmills increased the farmer's standard of living. Today there are a few operational waterdriven frame saws in various museums.



Mobile band saw
Most of the sawmills in the region are newer band saws that can be hooked up to a tractor and brought into the forest. These sawmills can cut fresh wood into coarse dimensions and the material can be left to dry in the forest if desired. Mobile band saws are fairly cheap and reduce the cost of transport significantly. Some choose to make their band saws stationary, erecting small houses for them. Today we are experiencing a boom in the acquisition of mobile band saws, with several one-man businesses making a living off either renting them out or cutting for farmers.



#### Small-scale sawmill

Before the mobile band saw, you would transport the log to a sawmill to get it cut. As a forest owner, you either pay to get the material cut or you sell it to the sawmill. After cutting the timber in coarse dimensions, the material needs to dry for at least a year under roof. The optimal result is achieved by finally drying the wood in a mechanical dryer. Once the wood is dry enough to be stable, you can cut it into finer dimensions and plane it. The length of the refinement process is dependant on the type of wood, its dimensions and its purpose. Normally a small-scale sawmill only has facilities for cutting and simple milling, and only a few have mechanic dryers and planars. Today these sawmills mainly supply restoration projects. Their main obstacles are old machinery and lack of drying facilities (both space and equipment).



There are a few large manufacturers of pallets, staircases etc. that have their own sawmills, but in terms of building materials we only have one industrial sawmill in the region: Moelven Granvin bruk, number 23 on the map. Alot of investments have been made in this sawmill the recent decades. Today it boasts modern machinery that can handle large quantities, but still Granvin bruk stands out in that it uses saws that are adjusted to each log, making the most of every piece of the timber that they carefully sort into 70 (!) categories. They have invested heavily in drying and have a wide range of planars. Today Granvin bruk supplies 20% of the building materials used in Hordaland. They only cut spruce. The timber is harvested in the vicinity or is transported by boat from the coastal areas where spruce was planted extensively. The sawmill has 31 full time positions and is the cornerstone of the community - recently Granvin chose to invest millions in a new carpentry workshop at the local primary school, while most other municipalities are reluctant to invest in crafts education.







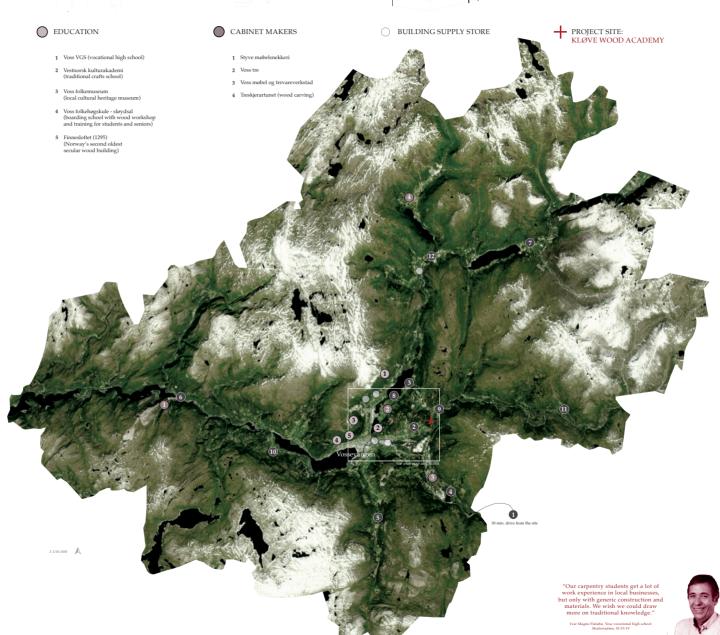




1 Moelven Granvin bruk

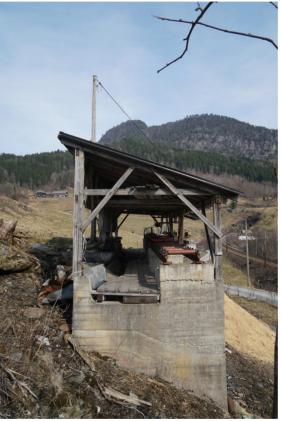
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- 2 Lars A. Graue
- 3 Almeland sag
- 4 Voss bygdasag
- 5 Gjerald sag
- 6 Mugås sag
- 7 Vossestrand bygdesag
- 8 Øvsthus sag
- 9 Kløve grendesag 10 Knut Dagestad
- 11 Tvinde sag og flis
- 12 Seimen høvleri



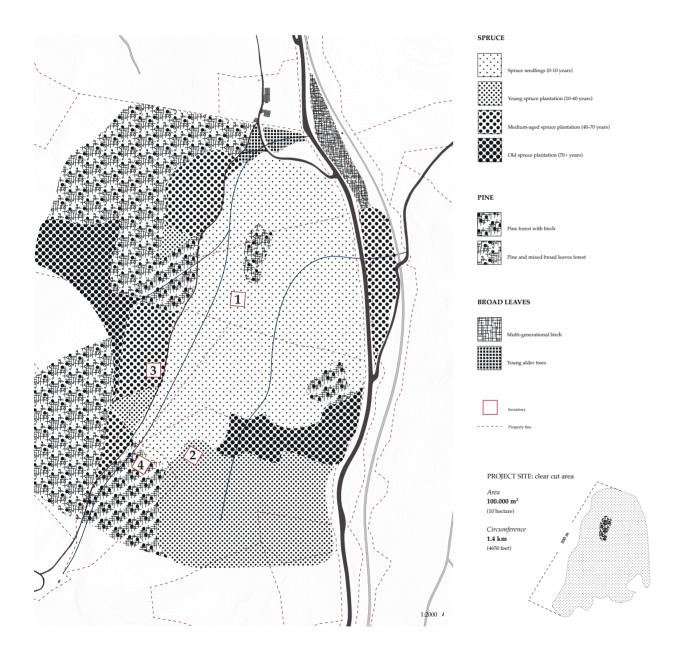


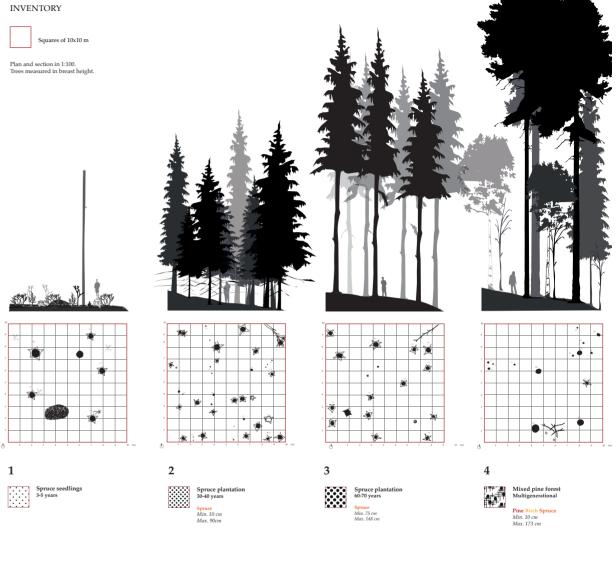






# **INVENTORY**



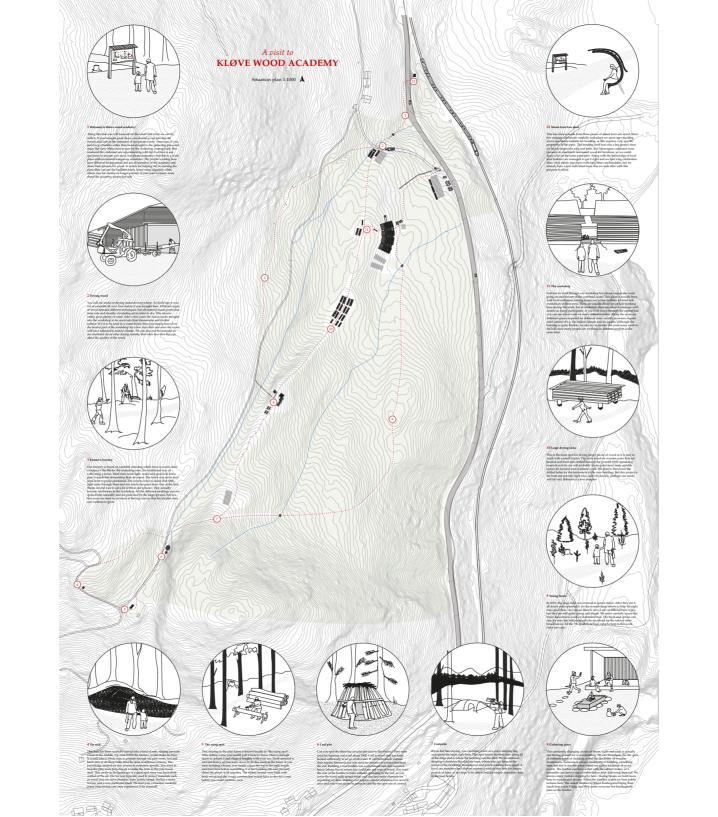


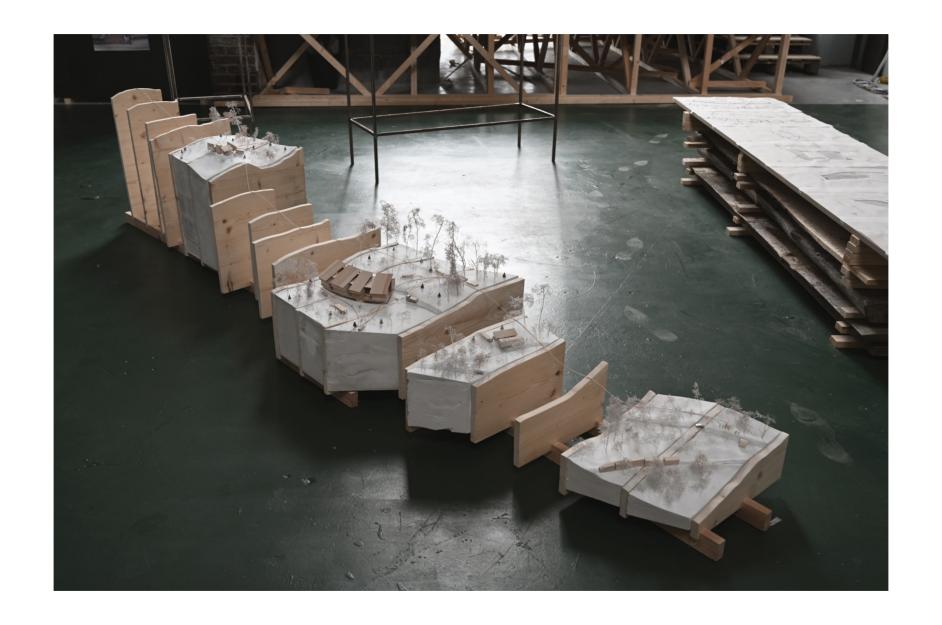












CONIFERS BROAD LEAVED TREES



 Spruce Gran
 29,6%

 Pine Furu
 27,4%

 Larch (planted) Lerk
 Unknown



 Birch Dumbjørk
 65.5%

 Alder Grilor
 8.1%

 Aspen Osp
 8.0%

 Rowan Rogn
 4.2%

 Oak Eik
 3.9%

 Williow Selje
 2.5%

 Weeping birch Hengebjørk
 2.5%

 Ash Ask
 1.0%

 Other broad leaves
 3.6%

Source: NIJOS



#### Pine Furu

Pine trees can grow almost anywhere. They can reach a height of 45 meters and can become 800 years old. The pine wood has a light yellow tone while the core wood is reddish brown. The amount of core wood depends on the growing situation, a slow grown pine typically has a lot of the dense and durable core wood. The Norwegian stave churches examplify how carefully selected pine wood may last for centuries when the wood is precisely treated and constructed. Pine wood is regarded as strong in relation to its lightness. It has see twices and can span long lengths.



### Birch Biørk

Birch is a pioneer species and is probably our oldest tree type. We have three types of birch in Norway, but none of them grow larger than 30 meters. It is assumed that they can reach 150 years of age, but in forestry the life cycle is 49-70 years. Birch is the preferred firewood. The wood is light and homogenous with a distinct shine. Sometimes the wood is flammed or intricately patterned, making it very attractive for craffsnen. Birch wood is easy to carve and is relatively hard. It is very strong and optimal for beams. Fresh wood is very unstable and precise drying is important.



## Spruce Gran

The most commonly used tree in Norway. Its wood is lighter in colour than the pine wood and stays relatively light over time. They reach up to 40 meters height. The wood is in older examples easy to dry whilst fast grown spruce with both young and mature wood is problematic to control in the drying process and will easily twist. Spruce is commonly used for construction wood and panels in housebuilding. There are large differences in the properties of slow-and fastgrown spruce, but in general it is fairly strong compared to its low weight. The long fibres of the wood is essential to the paper industry.



## Alder Gråor

Alder trees grow densily almost anywhere and is a typical marker of seized agricultural activity. 8,1% of all broad leaved trees are alders. Mature trees can be 20 meters high and they normally become a 100 years old. Usually alder wood is calm and has a warm int. It is regarded as a fairly useless wood with poor properties both as firewood and for construction, and typically only available in small dimensions. The wood shrinks and extends significantly with change in humidity. Alder wood is easy both to dry, shape and chemically treat. A special type of forest hens live only in proximity to alder forests.



# Larch Lerk

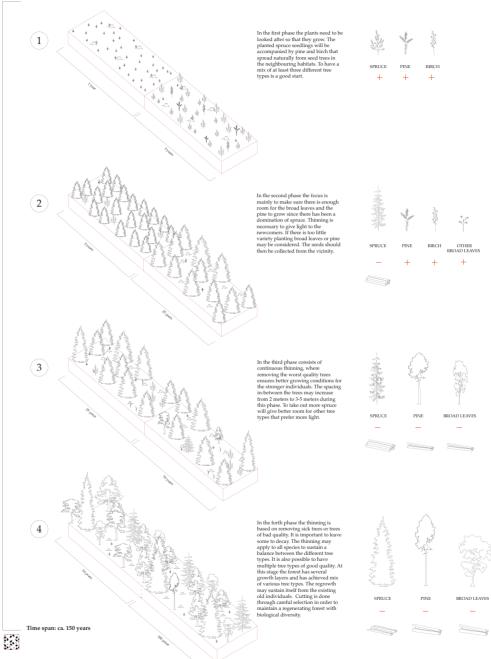
Larch is not indigenous to Norway but has been planted for at least 200 years. They are narrow trees that can become 50 meters tall and reach an age of 900 years. As opposed to other conifers, its needles fall off during wintertime. Mature trees are very straightgrown. Its wood resembles pine in its palette, but is markedly more lively. It is a very strong wood and reelatively heavy. Its high content of resin makes it almost naturally waterprooded and larch lasts very long under water. But this senis run also cause heavy tear on saw blades and makes the wood hard to treat chemically. Fresh wood twists easily and must be carefully dried.



### Aspen Osp

Aspen is a very straight tree that can grow 30 meters tall and reach an age of 100 years. Individuals with poor growing conditions can rot from within and break and they should therefore be cut when they reach 40 years. About 1000 species are intrinsincally linked to aspen and some large trees should always be saved. The sound and light conditions of an aspen forest is highly valued for recreation. About \$% of all broad leaved trees are aspen. Its wood is light and homogenous, making it preferred for interior surfaces. With the right detailing it can also be a beautiful and durable cladding. Planed aspen is the preferred wood for sauna due to its low heat transferring capacity, Should be felled and cut during the winter to reduce danger of fungus attack. Twists easily under drying.











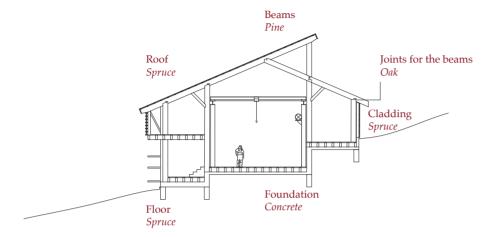




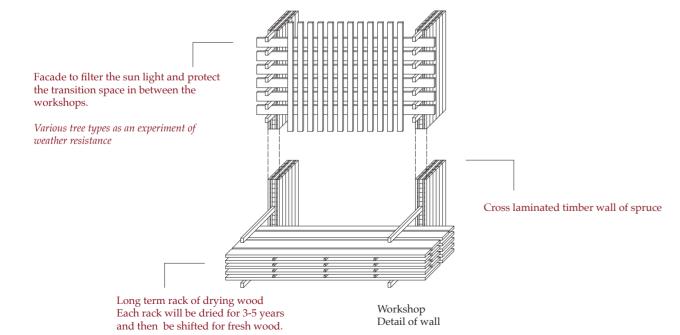


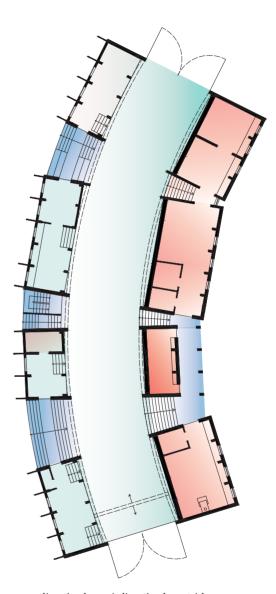




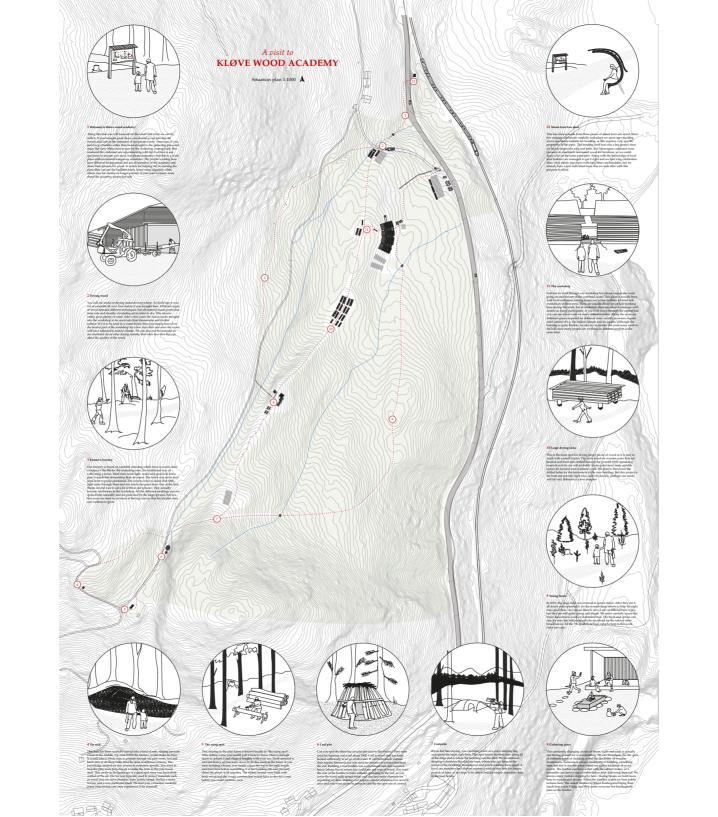


Workshop Cross section





climatized -semi climatized - outside







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