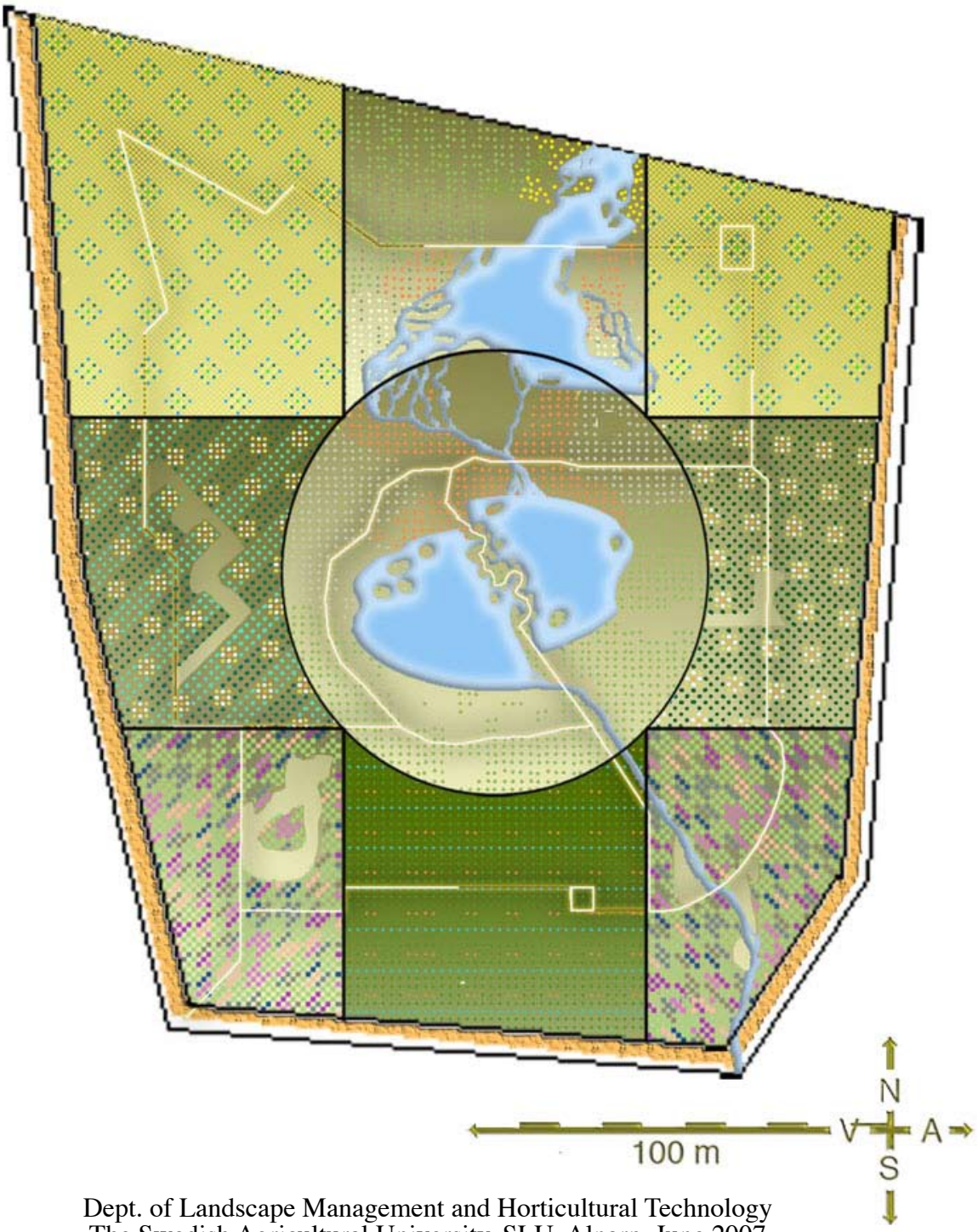
Master degree thesis in Urban Forestry and Urban Greening (LP0401)

The Twin forests

Adapting landscape laboratory concepts in Alnarp landscape laboratory to an afforestation project in Iceland



Dept. of Landscape Management and Horticultural Technology
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Acknowledgement

My notebook has been busy receiving landscape laboratories information from me the resent couple of months. Also have my cameras been busy of filming or taking photos. My computer has not ether been hanging around, it made a documentary film about the landscape laboratory in Västerskog in Alnarp. The film was the first visual proof for Icelanders that landscape laboratory did actually exist. They liked it.

This report is about landscape laboratory concepts and suggestion of one that might be established in Iceland, called “the Twin-forest”

Without good people I wouldn’t been writing this. I will like to give my deepest and greatest thanks to the people that have supported me, inform me, and being there 24/7. Without those fantastic persons I have made it so fare.

Thank you Ph.D. Roland Gustavsson, for being my tutor, for being supportive supervisor, generous of share your knowledge and last but not least, for giving me great opportunity, take me with you home to Iceland on a conference about Landscape laboratory.

Thank you Anna María Pálsdóttir for, believe in me, knowing that you know that I work best under pressure especially at nighttime and helping me with installation of the report.

Thank you Kiyohito Tamotsu, for being encouraged over and over, being my model on my picture, teaching me “In Design”, lending your scanner and teaching me Japanese, “arigato”

Thank you Henrik Sjoman, for the great chat we had about plants and plantation. It is hopefully not our last discussions about trees and shrubs.

Thank you Stefán Jónsson, for give me the opportunity to plan this area, give thanks from me to your parents when you can, I really value you’re performance.

Thank you Guðbjörg Guðmundsdóttir, being a great neighbor that can share your precious knowledge about a lot of stuff and for waking me up when I needed it.

Thank you Kristbjörg Halldórsdóttir, being there for me, lending me your car all that time I was in Iceland and simply for being the greatest mom.

I, here by, declare that this report is based on my own research, is written by me and that it has never been published before, partly or not.

Hlynur Gauti Sigurðsson

Summary

Forestry experiments have been going on ever since the first settlers came to Iceland and now days it have become industry. Today, so-called “carbon-wood” is a cult among the nation. The theory about that is to bind carbon dioxide into woods and thereby establish forests (www.kolvidur.is). Recreational forests are growing all around the country and awareness among people is still increase.

In Sweden have landscape laboratory researches been going on for two decades. There are two Landscape laboratories in Sweden, in Snogeholm and Alnarp. Professor Roland Gustavsson have been the most dynamic researcher in those matters and he is and have been leader in many work groups of that mater. Project called “Creative management; young managers express themselves in young landscapes”, in supervision of professor Gustavsson took place in Alnarp and ended for two years ago. The results of that project got reserved attention. Creative thinking with creative approach.

In a farm called Deildartunga in Borgarfjörður, west-Iceland is the research area for this part of the project (The other research area will be located in Sturluflöt in Fljótsdalshérað, east-Iceland). The Twin forests will be designed as a landscape laboratory and will have Creative maintaining based on the ides from Alnarp. The circumstances are very different in those two places, Sweden and Iceland, so the design and the plant selection will be very different although the main thoughts about the design are the same. Southern par

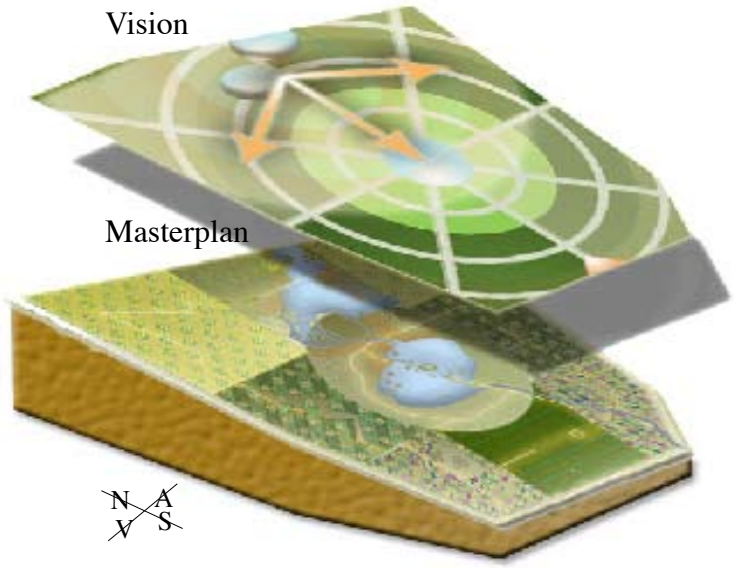

Figure 2: The fusion of the vision and the masterplan for Deildartunga’s Twin-forest.

Keywords:
Creative management, Deildartunga, Dynamic landscape, Iceland, Landscape laboratory, Twin forests, Västerskog.

This report is attempted to adapt the ideas in Alnarp into Icelandic circumstances in Deildartunga.

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1 Introduction

The “Twin-forest’s” embryo was a chat that the author and his friend had about forestry and gardening for about 4 years ago. Stefán, son of Jón from Deildartunga 1, and the author studied environmental planning and design together in the Icelandic Agricultural University for long period. They had an idea of making two identical forest in the west of Iceland, where Stefán is from, and the east, where the author is from. Their dream is now getting to real. With this project the ball has taken to role.

Forestry is rather new industry in Iceland, less then 100 years old profession. Foresters control the forestry in Iceland and therefor it is inevitable commercial and not as recreational as it could be. The public is getting more and more aware of the importance in forestry and the average Icelander, wants to create forests to bind carbon dioxide, stop soil erosion, and simply to enjoy the forest. By having the landscape point of view in forestry, the industry could not only be for commercial forests but also for people to enjoy more then they would do. This opens up for a shared field of competence which should be a challenge during the next period.

From the beginning of the 1990s a group of researchers have been lead by professor Roland Gustavsson, a landscape architect and professor Pelle Gemmel, a forester at the two corresponding departments at SLU-Alnarp were supported to take a shared action and develop what we today know as the landscape laboratories of Alnarp and Snogeholm. They formulated a series of concepts in the start and some others have become identified later as a feed-back when the development started to become known. Later on, former students in SLU, Jan Sesták and Dana Hladíková, in supervision of professor Roland Gustavsson, took through a special three year project, implementing design in the management phase when the forest was about ten years old in a project they called “Creative management; young managers express themselves in young landscapes”. Designing an area in Icelandic circumstances as an adaptation to the mentioned Swedish concepts would open the Icelandic foresters and public eyes for “new” kind of forests and aspects of forests, design as well as a special creative and design-lead management. Forests in Iceland are not that many at the moment but they are increasing. Iceland is rather new and unformed forests country and the purpose of this project is to show what design might mean in Icelandic forests if it is seen as an overlapping and bridging subjects in between forestry and landscape architecture.

The hope is that this project will be useful for not only the author and his friend, but also for the guests of near tourist stop, Deildartunga´s hot spring, and forest lowers in general. It will be the spark of many other landscape laboratories, different or similar. Last but not least: with this project the ball has taken to role. Two identical Landscape laboratories in Iceland the east and the west; called ” The Twin Forests”.

1.1 Aims

• To investigate the ideas “Landscape laboratory” and “Creative management”.

• Design a park in Iceland made after Landscape laboratory ideas and adapt it to Icelandic circumstances, fallowed by establishing and maintenance plan.

2 Methods

The main methodology was documentation by filming, photographing and observations.

• Excursions

The author went on three excursions while doing this project. First he visited Västerskog several times both in group and by him self. He dueled there for many hours to catch the spirit of the forest, *Genuis logi*. He filmed, took many photos and made comments. The second excisions he went on the Friday the 13th of April author went to see the Landscape laboratory, Snogeholm, with his tutor, students from SLU and their teacher, Alan Gunnarson. The day after, the author and his tutor went to conference in Iceland and a part of that conference was about Landscape laboratory. There came to gather people from all over the Northern and Baltic countries. In the end of that conference it was a open meeting for the public. The author showed a short documentary film that he had made from Västerskog Landscape laboratory and introduced this concept to the Icelanders and in the mean time Västerskog and Alnarp off course. His last excursion was to Deildartunga on Thursday the 19th April. There he spent the whole afternoon, filming, photo shooting and taking notes.

• Interviews

Author interviewed informally the son of the landowners in Deildartugna 1, Stefán Jónsson and closest neighbors of his, Andrés Jónsson in Deildartunga 2. Also he chatted with Henrik Sjomann, landscape engineer with Master degree in landscape planning 2006 with special interest in vegetation construction and urban plantation. Professor Roland Gustavsson was always with information ready, both in words and written.

3 Results

3.1 Landscape Laboratory

Commercial forestry and Nature-based forestry are more common in general public vocabulary then Landscape laboratory forest. Humboldt was the man who introduced the term “laboratory” as experimental meeting between different knowledge fields (Gustavsson, R. 1994). The main idea of every laboratory is to make researches. Landscape laboratory is basically the same idea, except it takes place outside, in the landscape, but handle the same things in a way; researches, demonstrations, innovations, expression, education, dissemination, communication and recreation (Jensen, R. B.). The Landscape is constantly in progress and it takes time and space to follow the nature. Every landscape researcher has to travel long distances to investigate certain environment, certain biotope or flower at proper time to have his researches as accurate as possible. That is not always an option and can be extremely expensive to follow up. How can we examine environments, inhabitants and urban society at the same time without spending too much time and money? Landscape laboratory is maybe not the ultimate solution for that but it can combine a lot of those aspects, all depended on what kind of landscape laboratory it is each time. This concept is not sacred and as variable as every other inside laboratory but comparing to Jensen’s article “Future perspectives on Urban afforestration in relation to planting and design”, the overall concepts are four: **1**, The monoculture: indigenous tree species can be studied in pure stands – for the first time in Swedish and Danish history. One layered crown structure. **2**, Simple mixtures with 2-3 species; fast growing species work as nurse trees and are supposed to be used the first 20-30 years. One-two layered crown structure. **3**, Mixed plantations with up to 15 different species, Multi layered. And **4**, Differentiated planting distance –shifting from dens to open meadows. (2006)

“The landscape laboratory gives the possibility to deepen the knowledge and to bring different aspect together concerning the same geographical landscape, giving a more integrated and a more fully understood knowledge; a knowledge in what the context and spatial patterns are stressed.” (Alnarps Landscape laboratory brochure.)

3.1.1 Snogeholm and Holstebro

The Snogeholms landscape laboratory was established at the glories Scania´s Landscape day the 7th of May 1994. Ten years before, a man named Gunnar Jönsson planted, upon his unique incident, a little plantation in the Scania landscape that gave precedent ideas for planting.
Snogeholm is the second laboratory of that kind in the northern part of Europe. It is a private land about 40 kilometers east of Malmö (see figure 3). 75.000 plants of 29 species were planted in the area, which is 30 hecktas. Most of the species were common in Swedech landscape but some of them where attempt. The main nurse tree was beech but the other 28 were elm- common ash- poplar, hornbeam- sessile oak- alder buckthorn- common oak- wild cherry- birch- hawthorn- aspen- bird cherry- common yew- common alder- lime- larch- maple- Alpine currant- viburnum- Swedish rowan- redcurrant- goat willow- western hemlock and crab apple. The distance between plants in the plantation was 1,5 meter x 1,5 (Gustavsson, R). The summer 1994 was historically dry time in Scania and in the resignation in the autumn was 5200 plants or about 7% of the main trees, beech and hornbeam. (www.../snogeholm)

Figure 3: Snogeholm landscape laboratory

Holstebro, is the third and most resent Landscape laboratory project. The project got the name “Sletten” because it was raised on a flat area, primarily farmland. It is the first one outside Sweden but in totally different circumstances then the other two, it is in a new established neighborhood in a town called Holstebro in Denmark/ Jutland, which has approximately 30.000 inhabitants

The area is planned for 400 houses, is 160 hectares (Jensen, R. B. 2006) and three completely new habitat models witch work with species mixtures, planting distances and succession in various ways. The total number of stands is 34 of a minimum 0,4 hectars, 8 of them are made with exotic species with larch as the nurse tree. 68 different species have been planted with the distance of 1,5 x 1,5 and 1,2 x 1,2 meter where it is suppose to be very dense (Jensen, R. B. 2006.). These extraordinary ideas of landscape laboratory in new hosing area have made the media interests and already it has been described in several papers and popular articles. (Nilson A.B. 2006)

Figure 4: Holstebro landscape laboratory

3.1.2 Västerskog

The first Landscape laboratory was set up by the Swedish University of Agricultural Sciences decided in Alnarp in 1990. In the summer 1993 the brook was established and everything was prepared for the next step, which was taken the spring after when it was planted in the southern part of the road. (In this report the southern part is the focus area.) The northern part was planted in 1998.
After 11 years from the plantation, two students from Czeck Republic came to Alnarps University. Their name was Jan Sesták and Dana Hladíková and in supervision of professor Roland Gustavsson, they made influential management of Västerskog. The project was called "Creative Management in Young Landscapes of Alnarp´s landscape laboratory". The experiments in the landscape lasted for three years, from 2003 to 2005. They got a priceless good help and support from a lot of people and especially children.

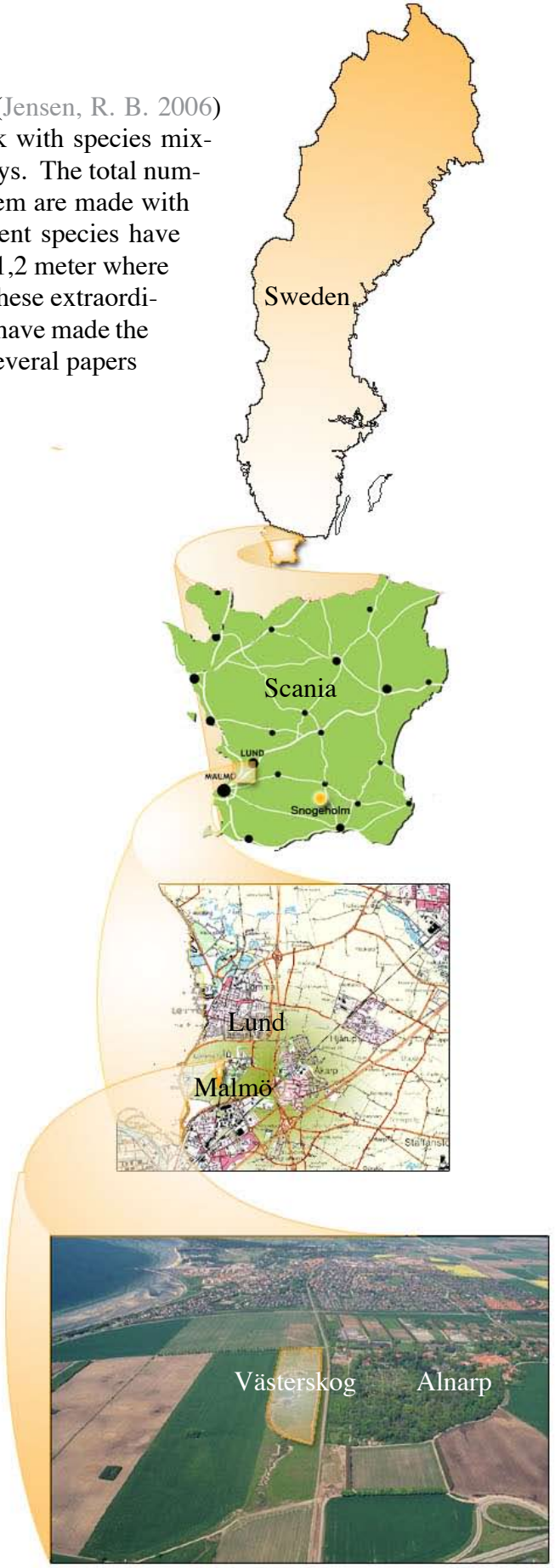


Figure 5: Location of Västerskog and Snogeholm

Background and Design principles

The idea of the landscape laboratory in Alnarp was born in 1990 when Hans Lindén and Roland Gustavsson pointed out that The Swedish agricultural university in Alnarp, as a centre for all kinds of landscape recourses, should offer an area of those maters. Alnarp may consider as an island in an agricultural land, where two main connections lies there through, a road and a railway. By looking on a MAP X and imagine that Vässterskog were agricultural land instead of forest; it might look like a sharp knife have cut into Alnarp with a sharp line along the railway. The main argument of having the Landscape laboratory there was to get a "perfect outskirts" of Alnarp, as a island on between Lomma, Åkarp and Burlöv. (Folkesson, A. 1996)

The edge was designed in three main ways.
1) Truck stamp edges, with taller tree species, they were divided in to two types. One with ten equally divided species, apple, ash, oak, plum, cherry, lime, maple, white beam and rowan. The other type is with oak and white beam 50/50%.
2) Mosaic edge, with many shrub species, like hazel, blackthorns, hawthorn, rowan and roses, and mixed whit trees, like oak, lime, ash beech and poplar. Though the name of this edge type is mosaic is it not like it is chaos, because it certainly are not. It is mainly that trees are separated from shrubs, and the shrubs are always on the edge of the edge.
3) Shrub edge is based on black thorn, wild rose and hazel but many other shrub species can be found too.

All of those types were planted in both west and the east side of the forest so that possible was to see how it would react towards different light conditions and wind. The wide of the edge is either 5 meters or 10.

Öresund Sea is about one kilometer from Västerskog and salty winds are common from the west. With that in mind, the design of the western edge of Västerskog was designed to make shelter for the rest of Alnarp. Several exits (see arrows on the Map of Västerskog) are though on that "hard- core" edge and are they quite hidden from the outside but more obvious from the inside. (Folkesson, A. 1996)

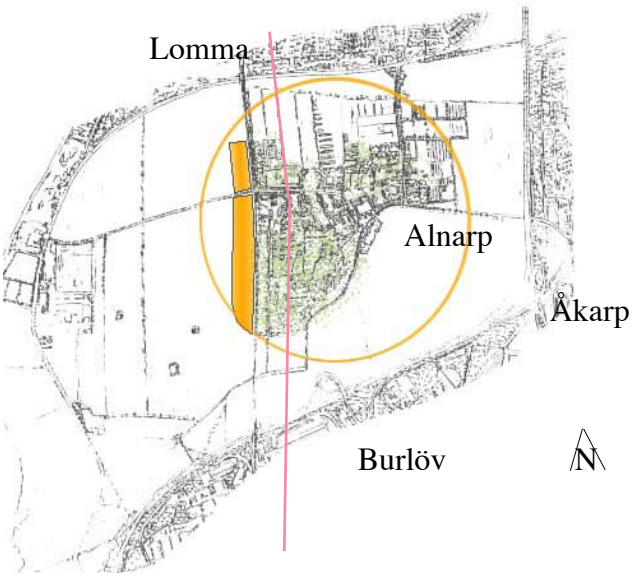


Figure 6: Alnarp as it was 1993. The orange zones are Västerskog and the circle is possible future forest plantation. Also it is to demonstrate the form of Alnarp as a island. The pink line is the railway

Inside the forest can be found many different types of stand structures. With one species plantation, like beech, poplar, ash and rowan, with two species plantation, like beech + larch, oak + silver birch, beech + alder and ash + poplar, and with many species plantation.

At the entrance to Västerskog bright and welcoming meanwhile the northern part is much darker and closing. That is done deliberately to have the forest's perspective different from all over.

Water restoration can have many positives effects the environment, like those few points that are mention here.
- Increase habitats for plants and animals.
- Reduce leaching and erosion.
- Slow down the water stream to the sea and the coast so that the water can refine better.
- Create homey and welcoming environment.
- Option for fish farming
- Open the nature for the wildlife.
- Water reserve

(Folkesson, A. 1996)

The design of the waters stream was maid from many different aspects. Water-level, depth, brooks-steepness, vegetation, form, and purpose are few things that were tried on that assignment. (Folkesson, A. 1996)

Jan, Dana and professor Roland, among volunteers, came up with a lot of ides how to maintain Västerskog in the name or "creative management" In the next following pages, most of those ideas will be mentioned briefly and described with pictures and map.

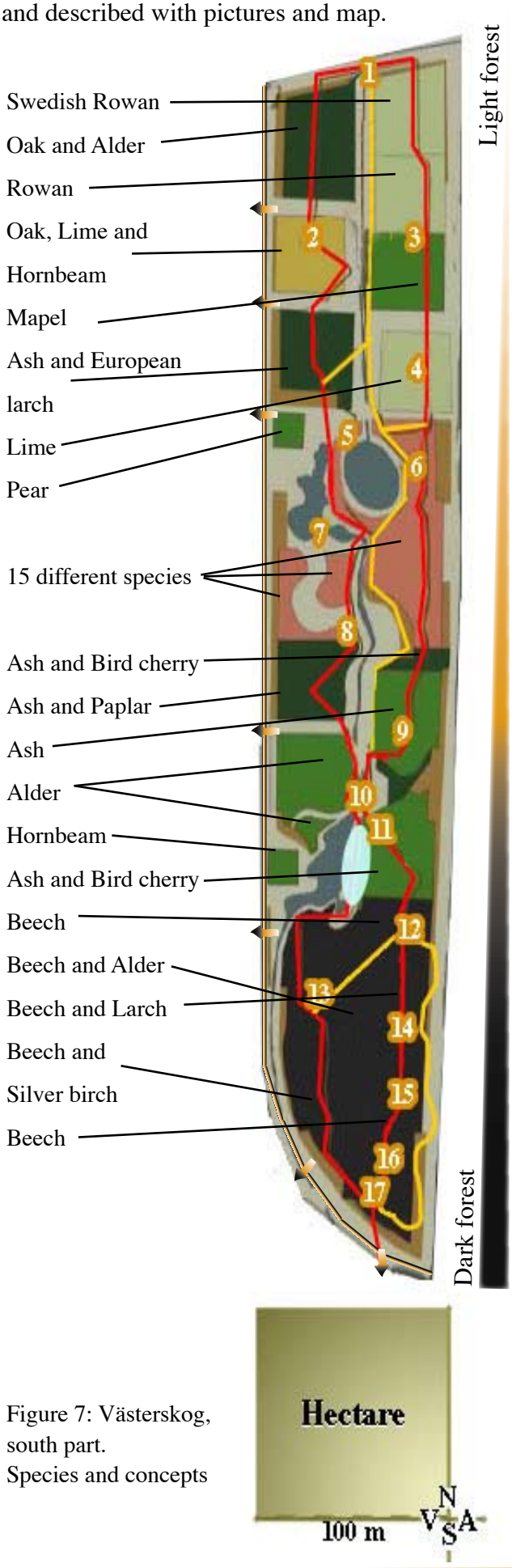


Figure 7: Västerskog, south part.
Species and concepts

Figure 8: This is at the entrance to Västerskog. The sign gives clear informations about the vision, species, the "dynamic" concept and a map of the area.

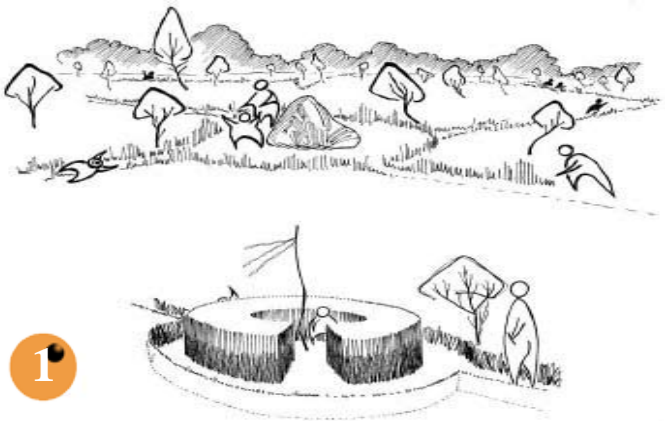


Figure 9: The children's Savanna. These drawings show how the kids can act in a small-scale landscape, how they could use small area, in a grown up scale, to do smaller rooms in them. This Savanna could be visible just few steps from the entrance.

Figure 10: Children have made huge different in this dynamic landscape. In this stand, they used trunk to form a square like as a sand pit, only in this case the sand and the toys comes from their imagination.

Figure 11: Maple and rowan stands. The Rowan species makes more open space than maple, which is much denser.

Figure 12: Lime is a light demanding plant and usually closes the canopy. Gaps have been made here to let the light through and give the under story species start to grow.

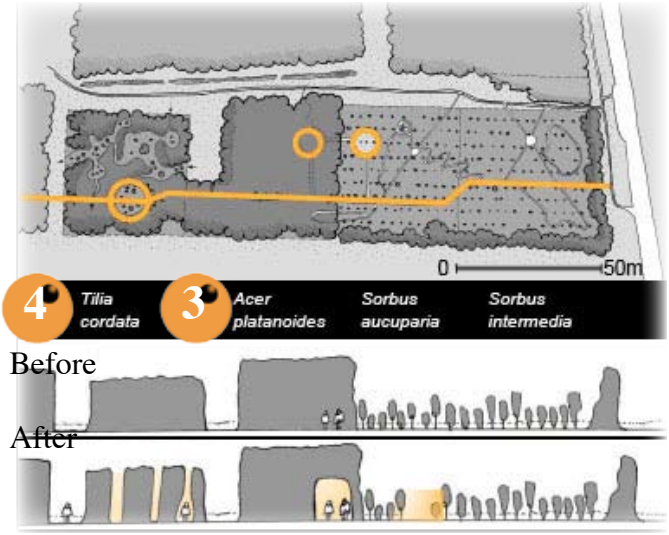


Figure 13: Here is possible to see how the path goes from the entrance through the stands. The circles are a gap that lets the light through the canopy. The payoff is light down to the ground to make the understory attractive for explorers.

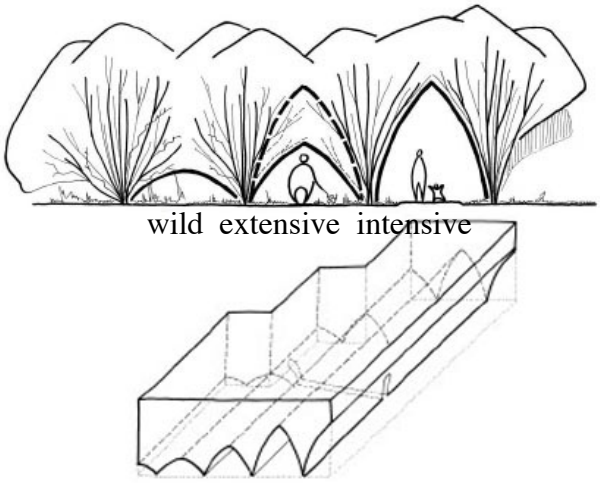


Figure 14: Field layer effect. The "Hazel hall" has straight rows and spatial barrier. It is three kinds of tunnel effect, one is high so that man can walk under (intensive), the next is lower so a child can walk (extensive), and the last one is lower than that (wild).

Figure 15: Here can be found "Hazel hall". It has a field layer effect (See figure 12) in the spring and is increasing complexity through powerful management.

Figure 16: Two ponds lie next to each other but ar not connected directly and are very separated for that mater. They have different water level and different habitat. This pond is more open and round shaped.

Figure 17: This stand is mixed with all kinds of shrubs and tree species. The under layer have been formed so that it is possible to see in certain distance under the canopy. The trees nearest the path have been pruned up to three meters and when the view goes deeper in the forest, the pruning gets lower. See figure underneath.

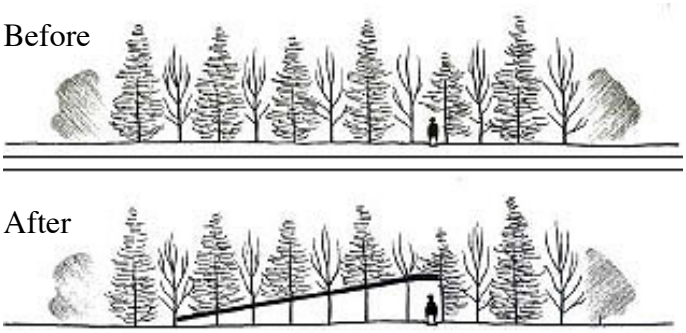


Figure 18: Before there was a dense forest. Hard to see around in the forest. After pruning side by the path in this structure the path had been given new life and it is open up to some limit.

Figure 19: This pond is narrower then the other and steeper. So the vegetation do not go as far into the water as in the neighbour-pond.

Figure 20: This canal connects the narrow pond (nr.5) and the pond in nr 10. A path lie both sides of it with openings and closing towards it. All kinds of reed lives in it.

Figure 21: Wide-open ash stand with lot of options for kids to run around, easy to see through the trees, even in summertime.

Figure 22: The largest bridge of three in Västerskog. On the left side is a open view towards a pond with alder all around.

Figure 23: Here the alder has only one stamp closest to the viewpoint, little bit further they are two, and so on until they get many. This technique gives a different perspective then we are used and somehow it feels like those many-stamp trees seems further away then they are actually.

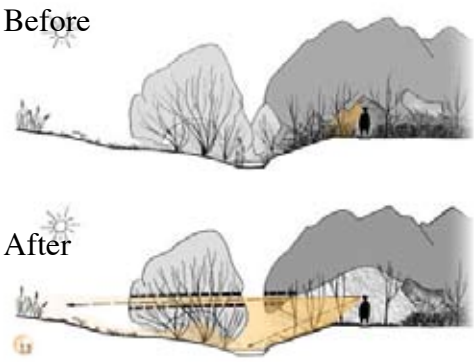


Figure 24: By cutting into the alder it is possible to open the view without cutting the tree it self down. Also by cleaning up the ground layer.

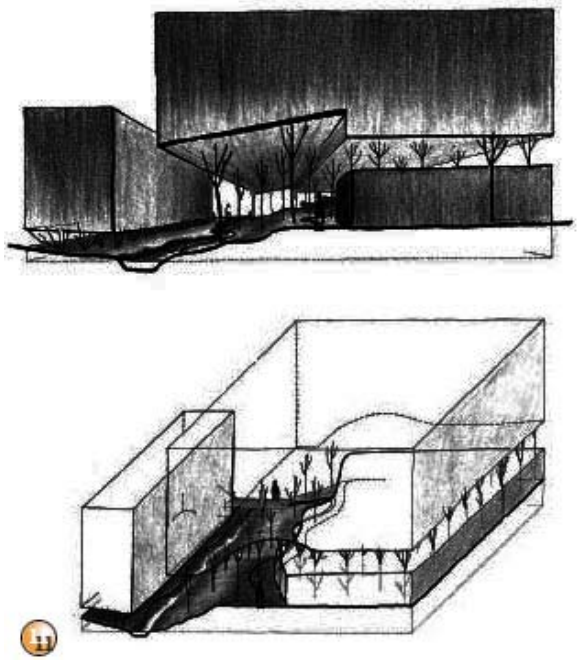


Figure 25: There it is easy to visualize these actions on the alder. How the view opens up.

Figure 26: This architecture is making upper landscape. By cutting the top of the larch; some kind of hill shape is framed and by pruning them gives it a more of a character and it is more artificial in a way.

Figure 27: Birch was the nurse tree here and now it has grown much higher then the main tree, beech. The path lies through them in a straight line and today it is giving a shelter to the walkers on the path.

Figure 28: The same as in nr 13 is going on here, except now the nurse tree is larch but beech still is the main tree.

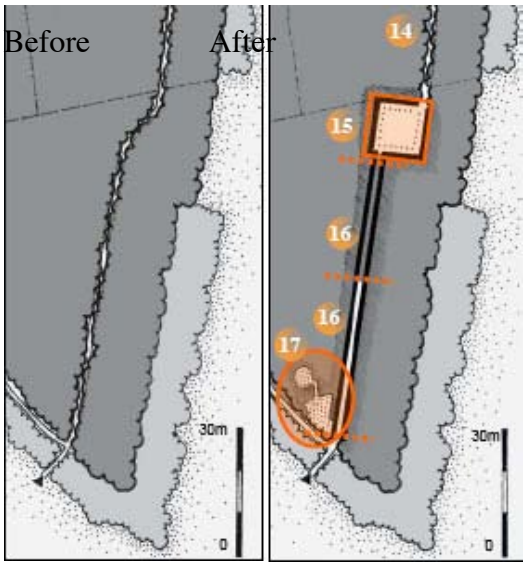


Figure 29: The last elements are connected and all maid by similar concepts. This figure shows how this part of the beech stand has been changed, before and after.

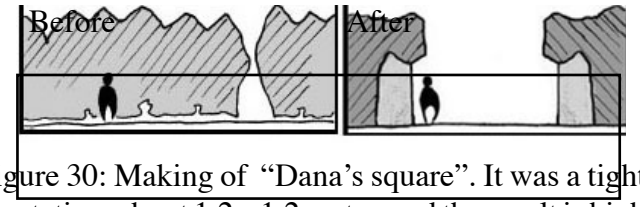


Figure 30: Making of "Dana's square". It was a tight plantation, about 1.2 x 1.2 meter, and the result is high density where almost no light could get through. 16 square meters large interior compact room, shaped as a 100% cubic, was made. It brings sunlight directly into it, that is a huge contrast in all this density.

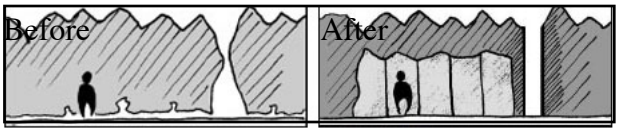


Figure 31: Making off "Baby pillar hall". It is monoculture beeches stand with extremely high density. Pruned was a 100 square meters large area up to 4 meters each stamp. The shape of the pillar hall is irregular.

Figure 32: "Dana's square" is probably the most talked about phenomena in Västeskog. You get the feeling that you are a trapped in a pleasant prison sell.

Figure 33: "Baby pillar hall" is open hall under the canopy with pillars maid of beech stamps.

Figure 34: "Open corridor" is path with leading walls and a lot of light.

Figure 35: "Tunnel" is a dark path.

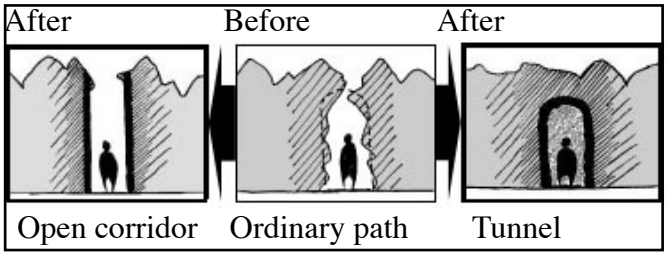


Figure 36: The "Open Corridor" and the "Tunnel" was maid in between planting rows. The leaded walls in the corridor lead the way but the branches do in the tunnel.

3.2 Icelandic Situation

3.2.1 Viking Forest Saga

In the beginning of Icelandic Saga, when the Vikings settlers came from Norway in the 9th century, it is claimed that one forth of Iceland was covered in vegetation or about 40.000 square kilometers (Blöndal S., Gunnarsson, S.B. 1999) and 30.000 square kilometers of that was birch forest (Guðlaugsdóttir, G. 2007). Everything from the cost up to 200 meters height was a good timber forest and between 200 meters over sea up to 400 meter it was generally copes wood with mixture of birch (*Betula pubescens*), dwarf-birch (*B. nana*) and hybrids of them. In between the birch were broadleaf like rowan (*Sorbus aucuparia*), willows (*S. phylicifolia, Salix lanata, S Callicarpaea*), and little bit of aspen (*Populus temula*). Juniper (*Juniperus communnis*) is the Icelandic only native conifer. With to much pasture and agriculture the forests became over used and started to shrink enormously. Also, by cutting out all the largest and widest trees for timber wood the settlers began to cultivate the Icelandic birch from being a tall and well shaped for timber production into low shaped copies forest (Sigurðsson, B. D. 2005). In the last 250 years the forest got to move back and in the end of the 19th century birch forests were about 1,2% of Iceland (Blöndal, S, Gunnarsson, S.B. 1999).

Figure 37: Light green area is birch forest in Iceland for 250 years ago and the dark green is as they were in the end of the last millennium.

Today birch forests cover about 1.200 square kilometers of Iceland, less then 5% of the surface but the plan is to gain this number up to 10% with preservation and plantation (Guðlaugsdóttir, G., 2007).
Forestry is rather new phenomena in Iceland. The first two registered plantation in Iceland was on the one hand in Þingvellir in 1899 with 4.400 tree plants in approximately one hectare and on the other hand in a tree nursery plantation in Akureyri the same year. Forestry is barely 100 years old as a profession. The first employer in the Icelandic Forest Agency was a Danish forester, Agnar Franciscus Kofoed-Hansen, in 1908 (Blöndal, S., Gunnarsson, S. B., 1999). Educated foresters have ever since control the forestry in Iceland and there for it is inevitable commercial and not as recreational as it could be. The public is getting more and more aware of the importance in forestry; to stop soil erosion, shelter from wind, snow hindrance, and timber production are projects that have been in Iceland for long period now. Wakening has been in public health this century (Sigurdsson, H. G., 2006, p.1) and the most resent project that has been started is binding carbon from the atmosphere in to wood. That thing is the new cult in Iceland, so called "carbon-wood" (www.kolvidur.is) . These entire projects are highly important and several ways is to combine them all so that people can simply enjoy the forest and its inhabitant. By having the landscape architect point of view involved in organizing forestry the industry could not only be for these earlier mentioned things but also for people to enjoy more then they would else do.

3.2.2 Icelandic weather

Iceland is considered two climate country. In the south and west part is wet and the heat is more stable all year around, meanwhile in the north and east it is dryer and more contrasts between the heats on the year basis. The reason for that is more or less the highland in the middle of Iceland. A warm and wet wind from the Golf stream comes to the south- and west cost and with it comes a lot of rain. When the air mass goes over the mountains, the affects of foehn leave it on the dry on the other side, but much warmer at the same time. The northern wind on the other hand is cold and dry but it does not mean that the affects are vice verse. The precipitation in the form of snow is more common in the north and in the mountains and but it is mainly the cold air that goes down the valleys again down to the south cost whit very frosty affects. Then it is good to plant strong nurse plant towards the north. Most serious frost damages in forestry are in the falls in the north but at the springtime in the south. The warm mass from the sea heats up cost south coast in the winter time but cool down the cost in the summers.

The winters are there fore warmer in the south then the north. The northern geographical position means that all year around can come here cold air masses and with wormer global climate this danger gets more and more seriously for forestry in Iceland (Eysteinsson, Þ. 2005). Today the average heat in Iceland is about zero degrees in December and January but 10 degrees in July. (www.visindavefur.is) Future prospective for the year 2050 clams that the summer heat in Iceland will rise 1,5 degrees at summertime and 3 degrees in wintertime along with higher CO2 in the atmosphere (Guðleifsson, B. E.). That leads to better harvest in general but that does not necessarily mean that tree growths the same.

Figure 38: Location of Deildartunga, project area.

3.3 Twin forests project, Deildartunga

The "Twin forests" concept is thought for two more or less identical forests in two different parts of Iceland. Deildartunga is the other of them and is located in Borgarfjörður, west-Iceland. The other one will be located at Sturlulöt in Fljótsdashérað, east-Iceland.

3.3.1 Location

Deildartunga is located in the west part of Iceland in a shire called Borgarfjörður and in a valley called Reykholtsdalur; about 100 kilometers north from the capital of Iceland, Reykjavík. Deildartunga is traditional Icelandic farm with cows, horses, sheep and chicken. In the closest surroundings of Deildartunga are few smaller lands that are either vegetables farms or summerhouses. Deildartunga 1, where the project is area, is 340 hectare large and the farmhouses stand in 60 meters over sea. (Jónsson, S. 2006)

3.3.2 Deildartungas Hot Spring

The largest hot spring in Iceland/ Europe, is Deildartugnuhver with flow of steaming water over 180 liters per second. It was used for instance for laundry, cooking and baking in the old days but since the eighties, the water has been transferred in 64 kilometers long pipe to two small cities called Borgarnes and Akranes, mostly for house heating. The farms around the hot spring in Deildartunga have a little share the water and use it for house heating and especially in their green house. The lowest floor in the pipe house is 18 meters over sea level (Jónsson, A. 2007).

Figure 39: The Biggest hot spring in Europe is just 200 meters from the project area.

3.3.3 Former Tree Plantation

The first tree, rowan (*Sorbus aucuparia*), in Deildartunga was planted 1900 and stands in the privet house garden of Deildartunga 1. Sitka spruce (*Picea sitchensis*) were planted in 1927 and they are about 5 meter high. Shelter belt was planted in the 40´s and a decade later it was enlarged extremely with a mixture of conifer and broadleaf. In the end of 20th century Deildartunga was a part of a big forest project and today over 25 hectares are used for forestry, mostly shelter belts. (Jónsson, S. 2006)

Figure 40: 80 years old spruce, little more then 5 meters high.

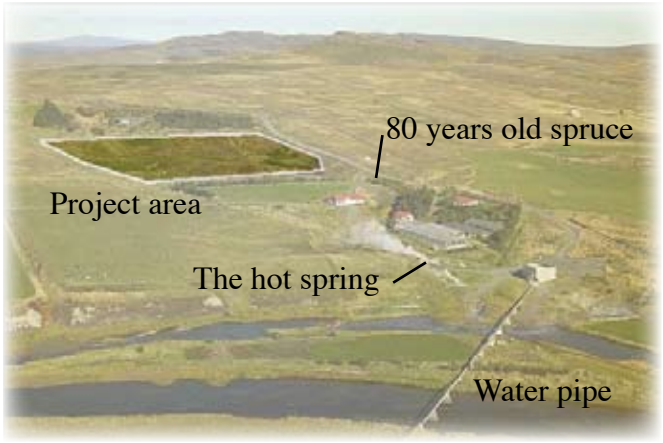


Figure 41: The nearest landmarks.

3.3.5 The underlay

The author predicts that the soil is maybe little more then one meter thick on the underlayer. But the underlay is not just bedrock. The most common underlay in Iceland is glacial drift that is a mixture of different sizes of stone particle, from clay up to big rocks. Water conductive is there fore often quit good. In the east and the west of Iceland a lot of bedrock, so called whale back (ice. hvalbak) can be found and also in Deildartunga. That affects groundwater movements and the soil might get dry in very dry season (Eysteinsson, Þ. 2005). By looking at the surrounding landscape it is possible to predict the shape and elevation of the bedrock.. Based on the shape of the land it is most likely lower in the west end than the east and also because it seams to be wetter in the west, considering the vegetation. There is no coincidence that there is a ditch located there.

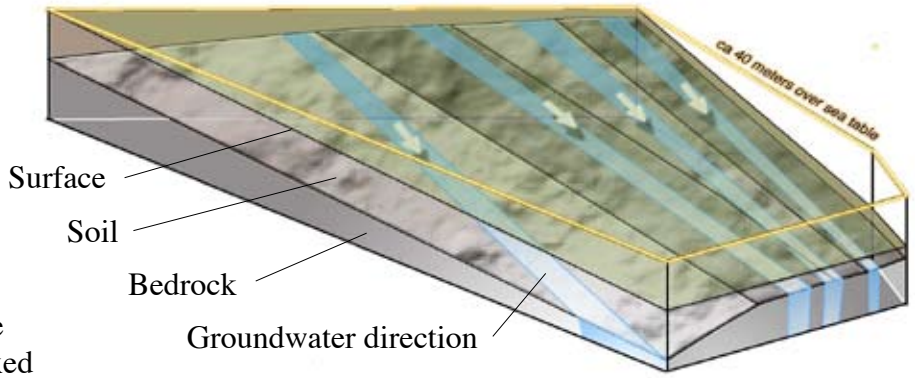


Figure 42: Plausible bedrock layer and the ground water structure. The yellow line is about 40 meters over sea level, the blue is the water, gray is the bedrock and the green luster is the surface.

3.3.4 The Project Area

The project area is approximately 4 hectares and has almost a shape of a square. Along the east edge is a public road to the Hot Spring. To the south is a mixed species shelterbelt up to 4 meters high. North edge lies to a fenced of private land that is planted with primarily Sitka spruce and birch and the west edge is open with ditch and a manure field on the other side. The highest point is about 40 meters over sea level.

3.3.6 Tourist thoughts of the park

Author went to the project area on Thursday the 19 of April, witch happened to be a holy day, The First day of the summer, claiming the Old Icelandic almanac. Meanwhile he was making his recourses there, for approximately one hour, he counted seven cars that stopped by the hot spring. In curiosity he asked people in two of the cars a few questions. In the firs car were four persons, all of them came from Lithuania and one of them spoke a little Icelandic but no one spoke English. They had been traveling around Reykholtsdalur and stopped especially in Deildartunga cause of the famous hot spring. It was the first time for all of them, except that one who spoke; it was her second. In the other car were two Icelanders and two guests of theirs from Estonia. The Icelanders lived in Reykjavik and claimed to go often on a road trip. "We are taking our guests to see our beautiful country," one of them said. They travel a lot outside of Reykjavik and had for example never went for a walk in one of the oldest tree plantation in Reykjavik, Öskjuhlíð, they rather go out of the city. Asking the if they would stop a little longer if there was a little forest/park here; pointing toward the project area at the same time, they said they would most definitely take a little walk there, it would just give their stop a little more value.

3.3.6 Analysis

An analysis is maid to help to be able to focus on the fundamental key on issues later on. SWOT- analyses is a relevant and can be effective technique: Strength, Weaknesses, Opportunities and Threats.

Strength: People come to see Deildartungas hot spring all year around, individually or in groups of all sizes and culture. Livestock and lupine has made a good fertilizing for the soil so this is very good land for plantation. The slope prevent the cold air to stay, like night frosts. This park would be privately owned and not dependent on the state or the municipality in any way. **Weaknesses**: The area is very open to the coldest wind from the north and east, and might that have some benefits later on. "Nobody" has time to do anything now days. **Opportunities:** The existing opportunities are versatile. Deildartunga among other farms and lands are taking a part in a forest project that might be connected to this park and make forest harmony all around.

Both that the area has a square shape and the area is in a slope that is about 1/10 meter and gives a lot of potential for different path systems, water stream design and more. The Icelandic Agricultural University is less then half an hour driving away and could students explore the Landscape laboratory whenever they felt like. Close by are little villages called Kleppjárnsreykir and Reykholt and there could be found children that would like to take part in "Creative management" in the upcoming future. **Threats:** Imminent problems should be prevented and be prepared for. The water in the park is mainly spring water and in the warmest summer times it might vanish. The most danger for young plants does in most cases involve the whether, frost in the ground lift the youngsters up the ground, melting of snow and ice can brake down trees but in some cases animals and livestock could be great danger, like if the fence would brake down. Birds, in most cases Graylag gooses (*Anser anser*), are also menacing, it can easily remove young plant and destroy the plantation. Author has heard of how to prevent that it, by stringing long white strings in about half meter height from the ground for the first year or two. Financing might be problem cause it is on a private land.

Strengh
Hot spring
Fertilize
Slope
Private owned

Weaknesses
Cold winds
Time lack

Opportunities
Forest
Different paths
Water stream
Square shape
University
Children

Threats
Whether
Ice-melting
Livestock
Gooses
Financing

3.4 Vision

1. Most parks have there own structure, but in the principles the structure is the same all over. In this report it is named the "Satellite Principles". Its function is that the glory is found in the middle and the surrounding is a mystery. In this case it is ether most open in the middle and denser to the edges, it could also be vice verse. Like have a complexity of dense and species in the edges and less in the middle. Water is considered very much attraction it gives relaxing atmosphere. By having water of some kind in the middle of the satellite, people would like to go there.

2. And now is to get there. Some kind of path system that lies straight to the subject. At the same time it could be an influence from the Baroque time, axes that lies from the garden to the center. That gives the park a classic and royal pride.

3. But though the strategy is to have it from dense to open does it not mean that it all has to look all the same. By dividing the area into zones and have each zone with its own character, like if each zone had its own dominant tree species, it can have the same effects as before but with different stile. Go from one room into another. So now it is interesting to go around and see what the area has to offer.

5. The technique to get even flow in the subject is useful to look at the entrance. The attraction should be as far away as possible from the entrance. In this case the entrance is on the bottom of the area and to control the flow, the attraction is in the other side of the area. By doing that people try to come closer, the path system goes all around so basically it is possible to anchor the goal from all directions. By taking the circle to right you might end the trip by coming the circle from left. By doing that you have seen most of the park.

6. The attraction could possible be higher then the entrance and there for it suitable as a view point. Using the Baroque axes affects from there it might even be more interesting then expected. Also you newer lose the eyes of you're goal.

When all these rules are clear it is important to break them. People like to have there forest complex and dynamic and several different types of woodland can be incredibly fascinating. High forest, low forest, woodland edges, half-open land, small scale mosaics and shrub-dominated vegetation are examples of forest types and mixture of them, little bit of baroque and a bit of English garden will give the far-out most splended forest or in the worst case the most chaotic and unpleasant. Here it is relevant to use profissor´s Roland Gustavsons own words from one of his many arcticles.

"*…All this well known, but is rarely reflected in landscape design. Rather than trying to freeze parks or gardens and making them static entities, they would be greatly enhanged if their long-time dynamic and structural changes are treated from a deep and active understanding. Moreover, rather than claming that landscape architecture needs simplicity to be successful, it would be of great interests for the future to promote design concepts in which complexity plays a role….*" (Gustavsson. R., 1994, p 184)

3.5 The design, establishing and maintenance

Good design saves money, energy and effort. This design takes the concept of "dynamic landscape" into consideration. It is equally important to design the forest in the first steps as to redesign it over and over. This first design is then practically a guideline for the future. Just like in Västerskog when Jan and Dana came into that project with there "Creative management", when the forest was only about 10 years old. The vision today might not be the vision after 10 or 20 years. That means that this report is a plan and guidelines, made after the Landscape laboratory concept, and then recommended to be followed through by creative management.

There are many goals within this project. With this new park in Deildatunga, an interesting Landscape laboratory could be made and by good maintenance the visitor can enjoy a nice walk. Long time goal is to make a "Savanna landscape", big trees with big crown and space under and between them. But, unfortunately, that goal will not be reached in the autors presence.

This project is only 4 hectares when Västerskog is about 10. That and it is 13 years older gives Västerskog a little more opportunities.

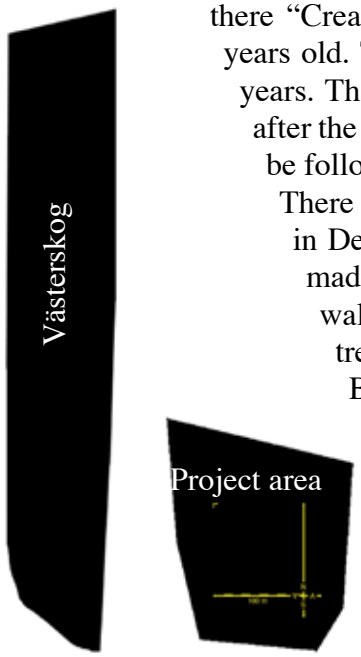


Figure 44: The size different on Västerskog, Sweden and the Project area in Deildartunga, Iceland is as here can be seen.

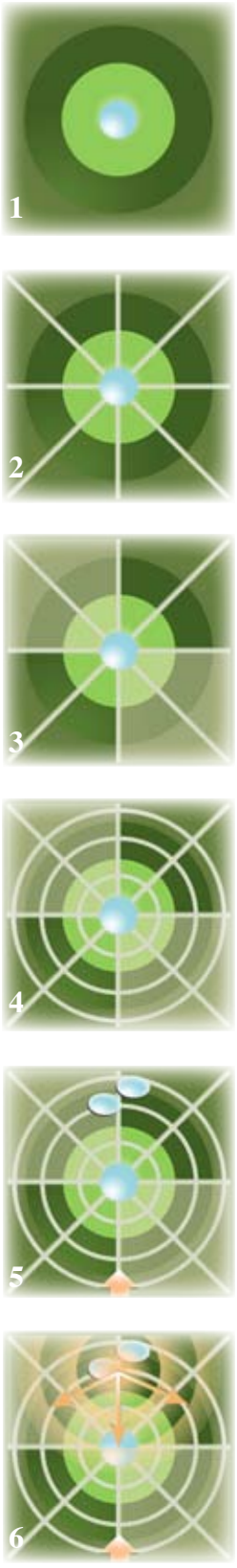


Figure 43: Vision-satellites, simple images and one step at the time.

Deildartunga´s project area has been divided into 10 individual stands and every stand will have its own character. Paths and water stream will be the fundamental element that combine those stands directly by human actions. Path system will not be fully established at the very beginning. Only few ideas will brought up for only that purpose to lead the way to the fallowing years. But, it is important that several types of path are used in this otherwise it will be mono culture and even boring in some cases to walk. It will be in construction of the creative management. The ponds and the streams will be established the summer before planting, like it was done in Västerskog. Detailed form of water elements will not been taking in consideration at this point. It will more or less be improvised when the time comes.

Landscape laboratory

Other plants then the common Icelandic forestry plants will also be used in this laboratory. Species that might live in this climate will be tested. Like those who live in the northern Scandinavia, high in the Alps or something that is worthwhile testing it. In Icelandic situation we might like to call it "exotics" species.
The idea of the dominant plantation technique in borrowed from Snogeholm. A straight lined spruce stand as a nurse tree, with a interval of every 12 meters of a 3 metes wide and 3 meters long mini plantation with mixture of 9 plants of 3 species, hazel (*Corylus avellana*), in the corners, lime (*Tilia cordata*) between them and finally one oak (*Quercus robur*) in the middle of them all. The designer in Snogeholm admitted that if he were doing it again he would have moved it closer together, every 8 meter or so. This plantation gives the opportunity to have there a fine oak forest in the next century (Oral reference in excursion to Snogeholm).

Species selection

"Tree Guide" was used as a sorce with selecting tree species (Johson, O. and More, D. 2004). Iceland is not so similar to Scania, where Västerskog in Alnarp is located. That means differed emphasis in selection of species. The author has taken several tree and shrub courses both in forestry and in landscape design in Iceland. Also he has a great experience on the really life. There are not many species that can survive in Icelandic climate compare to the Scanian, nevertheless it is aristocratic to try new species on a foreign ground. Tree and shrub species that has already proven them selves in the Icelandic landscape, especially in the southern part, will be dominating.
Plants, other then the common Icelandic forest plants, are also used in this laboratory. Species that might live in this climate will be tested. Like those who live in the northern Scandinavia, high in the Alps or something that is worthwhile testing it. In Icelandic situation we might like to call it "exotics" species.

Theoretic Cross sections through Deildartunga´s Twin-Forest

Similar to Västerskog and the Vision, the idea is to go from one room into another but unlike Västerskog, which goes form lighter forest into darker in a long term, Deildartunga´s Twin-Forest is designed similar to chequered carpet, from dark stand into light in short terms. The slope of Deildartungas Twin-Forest lies directly down from north to south so that the sunlight covers more are than if it was flat. The vision is to promote a desirably, tempting and mysteries area from the outside and charming, exotic and admirable from the in. In other words: Comeing from dens surroundings into oasis in the middle. From the highest spot (B3) is suppose to be a view over the oasis in as well as the mountains.

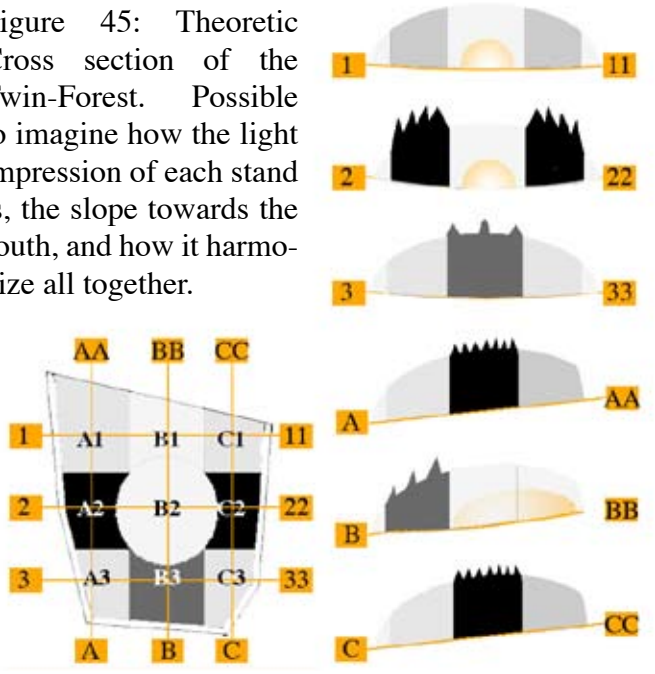


Figure 45: Theoretic Cross section of the Twin-Forest. Possible to imagine how the light impression of each stand is, the slope towards the south, and how it harmonize all together.

This project is never planned to be finished, and since the author can not see the future, he can only consult little more then 100 years. He wants this area to be open with lot of big trees in the end of the next century. Remind of "Savanna" landscape.

3.5.1 The welcoming edges

200 meters ahead from the hot spring is the forest's southwest corner, so it is very much appropriated to have the main entrance there. The edge will be the first impression of the landscape laboratory and only by that particular reason it is important to have it friendly and welcoming. Basically it is mainly thought for the human visitors of the hot spring but also for birds and other animals. Small birds and butterflies are also attraction for the humans as well as the flowering and fragrant shrubs and trees.

• Design

The edge is a 10 meters wide stripe that seal off the main project area, but actually the design is much wider, but the human does not take part in that design, that will be the nature part. The edge and some of the other stands will have frightful tree and shrub species that bird will eat and take care of the spreading. The only thing that the designer can do to control the birds is to place the fence or something similar like T-posts (poles with T-shape touched to the ground) for the birds to sit down, but infect, the bird it self is the designer, it can decide what and where he makes its droppings. (Gustavsson, R., 2007).

• Establishing

Irregular is the keyword for the plantation. The act of the planting will be in a way accidental and have gaps as well as denser plantations. The same species will be planted all around but with no specific structure other then have the similarities in the numbers of each species in each side of the edge, so in the future it is comparable to see how same species acts from one side to another, considering wind, light, water and so on. It is important to have both shelter giving plants as well as flowering and exotic species. It is important to plant in groups. It is tendency in the nature to have the species in groups rather then as isolated individuals (Gustavsson, R. 2007). Last but not least, low shrub will be in the outer edge of the edge and then in will get higher when its gets closer to the forest. It prevents wind to come from underneath and that wind is most often colder than the higher. (Sjoman, H, 2007) (Ideas of species selection can be found in the appendix)

• Maintaining

The maintenance will mainly be in the hands of nature. But, if one specie is intended to overtake all other it is necessary to hinder that species distribution. By give the shrubs equally or even more space then the trees, the seen on the edge will stay low and welcoming, have the flowering and fruit species in priority, and the final aim should to try to have the mixture as complex as possible.

• The pride at the entrance

A gate will be placed at the entrance with information sign inside it. Stefán Jónsson, landowner's son, has idea of how to keep ivy (*Hedera helix*) alive all year around on an open field. By making the entrance gate of water pipes and lead warm water through them all year around. By that either the ivy lives and covers the gate or it dies and by the time the gate will be covered in vegetation and that might be considered one kind of exotic experiment in the spirit of Landscape laboratory.

Figure 46: Pride of the Edge. The "Stefans-ivy-gate" is made of hot water pipes so the ivy can get warm from there so it can survive in Iceland. The structure of the edge is low shrubs farthest out and then gets higher closer to the forest. The edge is colorful and spectacular to see. Green transparent walls illustrate tree boundaries.

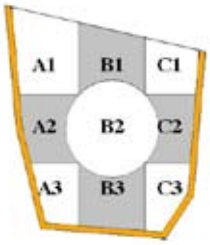


Figure 47: Stands location

3.5.2 A1- Poplar stand

English Western Balsam Popular (*Populus trichocarpa*) grows fast in southern Iceland and gives shelter faster then many other species. With creative thinking, many possible lies in dens straight stamp forest like this stand will become.

• Design
The goal in this stand is to have the trees as dense as possible. In about 150 years this stand will low culminating trees be dominated. (see cross section pictures in appendix)

• Establishing
First step: Western Balsam Poplar is a pioneer plant and have turned out well all around Iceland, especially in this part. It is relevant to have the poplar as dominate as possible. By planting them close together, 1,0 x1,0 meters, the trees will get tall in short time, cause of the competition, and more depended on each other.
Second step: After 10 years, when the microclimate has changed, an in-planting will be implemented. In every fifth meter distance a 5 x 5 meters large area will new plantation, so that about ¼ of the stand will be replanted. In every mini stand, as it will be called here, will 5 poplar be sacrificed for 5 new one. Two silver birches (*Betula pendula*), two Field maple (*Acer campestre*) and one small-leaved Lime (*Tilia cordata*).
(Plant list and more in the appendix)

• Maintaining
The poplar should be in great competition against each other and should be co-dominating, but when it looks like some trees are likely to take over the others, become dominant, it is time for improvement cutting and cut down every other tree or what is necessary at that time. The first cutting will probably be after 10 - 15 years.

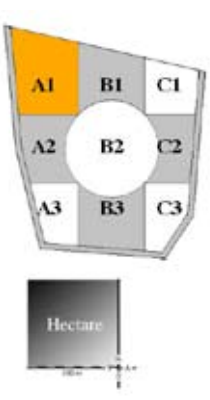


Figure 50:
Stands location

• The pride of stand A1
The “Baby pillar hall” is the dignity for this stand. When the forest is little higher then 5 meters, about 10 -15 years old, it is time to make the “baby pillar hall” maid after the recipe as in Västerskog (nr. 17, page 11), which is 10 x 10 meters pruned area up to 4 meters hight.

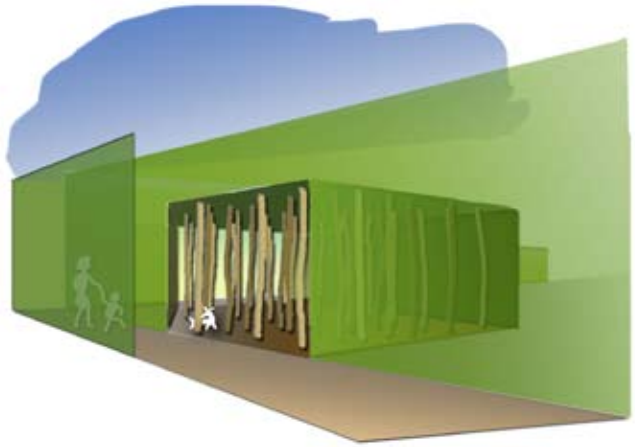
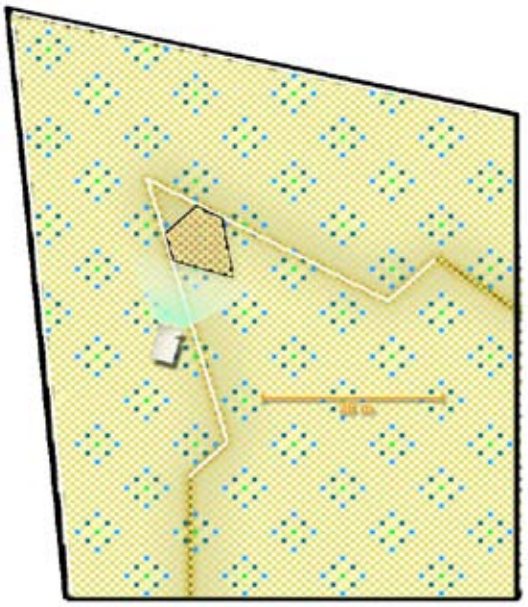


Figure 48: “Baby pillar hall”, made of poplar. Green transparent walls illustrate tree boundaries.

Figure 49: Map of stand A1. Plantation of 1 x 1 meter density to get a microclimate as soon as possible. In this figure it is possible to discern how the plantation is. Yellow is poplar, blue is silver birch, dark green is maple and light green is lime.
Viewpoint for figure 44 is on this map and also a cross section line, which may find in the appendix.



3.5.3 C1- Poplar stand 2

This and stand A1 is basically all the same in the matter of design establishing and maintaining. The only difference is the plant selection. Instead of the maple (*Acer*) it is Hornbeam (*Carpinus betulus*)

• The pride of stand C1

This is basically copy-adapt situation from Västerskog, "Dana's square", "Open corridor" and "Tunnel" (nr. 16 and 17, page 11). In this case is poplar playing the role of the beech. Both poplar and beech are pioneers species and have straight physique so it is comparable to each other what that mater.

Figure 51: "Dana's squere", and "tunnels" that leads into it, maid of poplar. Green transparent walls illustrate tree boundaries.

Figure 52: Map of stand C1. Sama plantation as in stand A1. Viewpoint for figure 47 is on this map and also a cross section line which may find in the appendix.

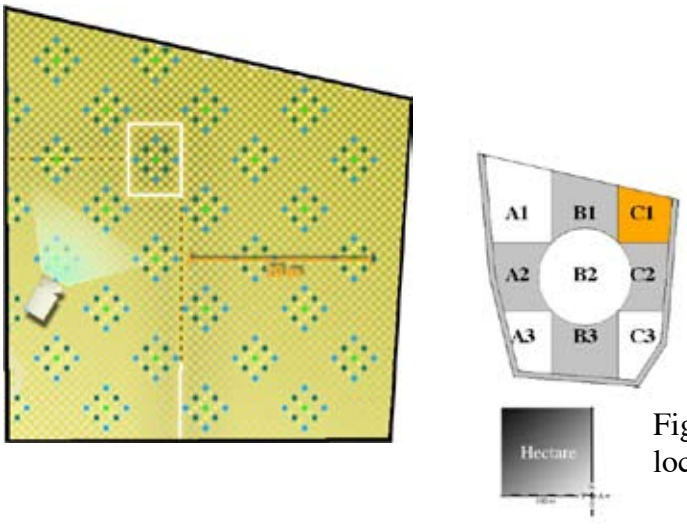


Figure 53: Stands location

3.5.4 A2 Spruce stands

This stand is suppose to be dens, dark and dramatic.

• Design

A2 and C2 are the only two spruce. 50 % of the stand is though birch (*Betula pubecens*) as the nurse tree. That is done because spruce needs changed microclimate to be strong. The first 10-20 years will the birch throne over the spruce and then it is expected that the spruce will take over (Sjoman, H. 2007). There are two types of spruces in this stand and they are almost equally combinations of compatible conifers. In every 10th meter is a small group of broadleaf. Those conifers, blue engelmann spruce (*Picea engelmannii*) and Norway spruce (*P. abies*), have two different appearances and will them give this stand sort off a stripe forest landscape.

Along the path, which lies in the middle of it, will be an opening that will not be planted in and that is this stands pride. The shape of the opening is thought for two purposes. One, is a snow trap, how will the wind go over the forest and how will the snow fall into the trap. Will it have some consequences that are not expected? Will it be covered in grass, rowan, birch or simply be open in the future? The other purpose of the shape is illusions, seen from the path on one hand and to the path from the field on the other. The illusion is that to have the feeling that the southern corridor is either shorter or longer then the other, for two main reasons. The southern has two spruce types on each side, although it is shorter and the northern is mixed in many ways. It might also be handy to sit down there and relax.

The mini stands with the spruce and birch all around will give the dark stand open and fresh atmosphere. Rowan (*Sorbus aucuparia*) will have beautiful red berries in the autumn and snowberries (*Symphoricarpos albus*) will be a fresh under layer that might even spread out underneath the conifers and give the stand a character of a fairyland in the wintertime with possible white berries. In about 150 years this stand will have the low culminating tree dominated, the sycamore (*Acer pseudoplatanus*). (See cross section pictures in appendix)

• Establishing

Main stand: The open field is marked and left out when the whole are is plowed. Every other plant is birch that is planted in between the spruce. The spruce is planted in stripes with 3 parallel rows for about 10 meters, does not have to be accurate 10. Every tree will be planted with about 1 meters open space.

Mini stand, step 1 and 2: In every tenth or so meters will be mini stand about 5 meters long and wide. It will be mixture of two trees and one shrub. One of those trees will though not be planted until after 10-15 years. Rowan and Snowberry will be planted but the Sycamore will come later. The plantation can be wider then 1 meter. Both the main and the mini stand will be planted at the same time, except the sycamore, it might be better to do that after 10-15 years.

(Plant list in the appendix)

Figure 54: Tussocks that are characteristic for Deildartunga.

• Maintaining

This stand will be recognized by two main spruce species the first 100 years at least. In Iceland; birch grows fast and well but neither of the spruce grows extremely fast but probably faster then the late culminating one. Also it is expected that Norway spruce grow a little faster then blue Engelmann spruce, at least in the beginning. After about 10 years the sycamore will be planted in but imminent threat is towards Sycamore if the snowberries cover the light and even take to much energy from the soil. That might kill the sycamore so the maintainers have to be where of that and clear the way to the light for the sycamore, permanently if possible.

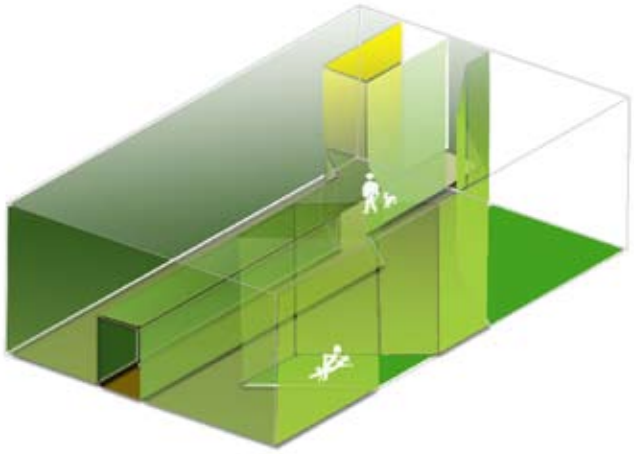


Figure 55: Openings towards path. Dark green area illustrates tussocks and Green transparent walls illustrate tree boundaries.

• The pride of stand B1

Today there are tussock all around witch is not particularly any bijou but it might be later when everything will be covered in forest. It will be interesting to see those high tussocks in the middle of the forest, a tussock that no one would be expecting after many decades in a landscape like that. It might give the forest an adventuring spirit. Possible would also to fens it in and have horses or sheep every once in a while there to maintain the tussock

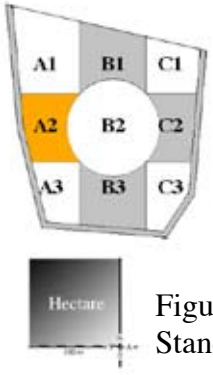


Figure 57: Stands location

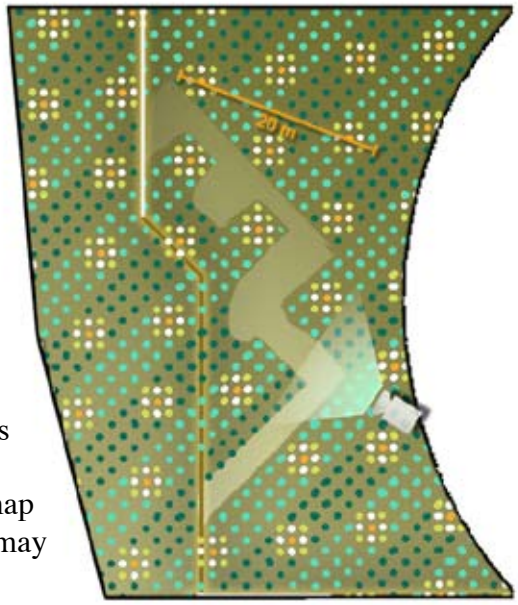


Figure 56: Map of stand A2. Dark green is Norway spruce, light blue is Engelmann spruce, yellow is rowan, white is snowberry and orange is maple. Color for birch is missing.

Viewpoint for figure 51 is on this map and also a cross section line which may find in the appendix.

3.5.5 C2- Spruce stand 2

This stand is suppose to be dens, dark and dramatic.

• Design
Similar to stand A2, they both have birch as a nurse plant, but the spruce type is just one instead of two, Sitka spruce (*Picea sitchensis*). The goal is to have this stand kind of morbid and dark, to make a contrast to the neighboring stand, C3. In short part of the path, which lie in the middle of the stand, is little open area. There is the stands pride. This little opening connects a birch stand, B2, with one little view. This view is important because in both directions on the path is very dens forest, so this little opening is heaven-sent in the "horrifying" stand. The mini stands are similar mixture as in A2, just slightly different. *Sorbus koehneana* will give the under story "white berries" character, *Sorbaria sorbifolia* will cover the lowest layer and spread out partly. Norway maple (*Acer platanoides*) will be planted later and are supposed to take over this stand when a time comes, after about 100 years.

• Establishing
Same strategy as in A2.
(Plantlist in the appendix)

• Maintaining
Same strategy as in A2.

• The pride of stand C2
A rusty old farm gadget is this stand pride. It is always nice to have something that reminds you of the good old days, when your parents and grandparents where up. It is similar as the temples in the English

Figure 58: Rusty old gadgets that used to be used in Deildartunga in the past. It will grow old prosperously in the shelter of trees.

Figure 59: "Tunnel" connected to the "Open corridor" in the back. Green transparent walls illustrate tree boundaries.

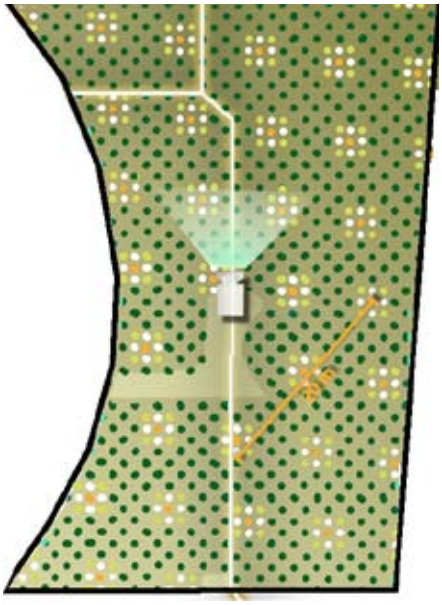


Figure 60: Map of stand A1. Dark green is Sitka spruce, yellow is Sorbaria sorbifolia, white is Sorbus koehneana and orange is Norway maple. Color for birch is missing. Viewpoint for figure 51 is on this map and also a cross section line, which may find in the appendix.

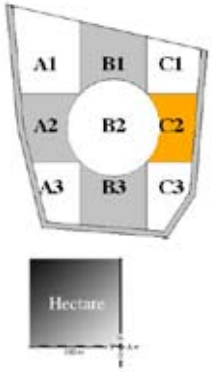


Figure 61: Stands location

3.5.6 C3 - Rowan stand

The idea here is to have flamboyant, fragrant and friendly stand in as many layers as possible. Big contrast to the neighbor stands, witches are darker and even a little morbid.

• Design
The stream from the ponds lie through this stand and gives it soothing and calm appearance. The little stream is the stands pride. Hopefully this stand will reach that goal and regenerate like that over and over. The paths shape is gently sloping from left to right, or vise versa, depends on the direction you are walking, and is suppose to give that feeling that you will always see a little longer ahead in every step.

• Establishing
Here is a random plantation method. Planting is in straight lines; on a side from stand B3, 3 nursing plants and then 3 plants of one of the 5 exotic species in random order. It is most effective to start on either the upper right corner or the lower left and plant from north vest to southeast and then U-turn and continue. The lines will shape a beam that leads from the center stand, B2.
(Plantlist in the appendix)

• Maintaining
The maintain is basically dynamic. It is not suppose to be extremely dens like most other stands (A1, A2, B3, C1 and C2).

• The pride of stand C3
The little Bridge over the stream will be narrow and kind off unexpected. A narrow bridges that only one person can cross at the time. When persons or groups come across the bridge from both sides at the same time it will come up little social conflicts. People usually like to be polite and communicate a little to strangers. (Gustavsson, R. 2007)

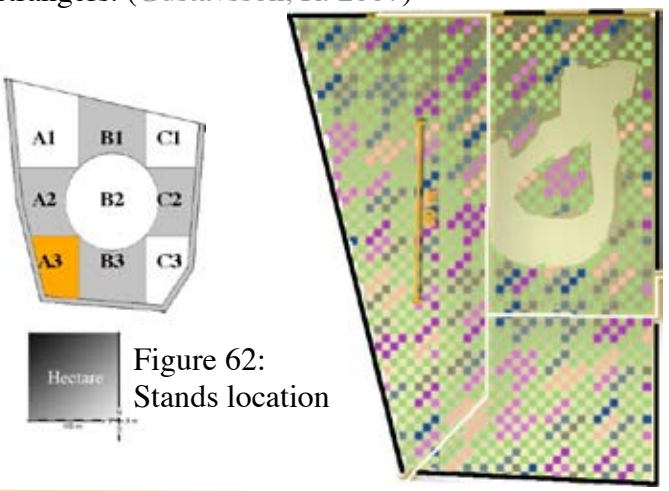


Figure 62:
Stands location

3.5.7 A3 - Rowan stand 2

The idea is very similar as the C3 stand except this is the entrance to the park.

• Design
The plantation well be the same as in C3 so the south corners of the forest will be similar. The path will be quite open and will there be view axis to the water and the high viewpoint in stand B1. That is so the guests can have a little feeling of the area and even feel excitement about what to expect while walking the Landscape laboratory. The path will be stricter and obvious.

• Establishing
Same as stand A2
(Plantlist in the appendix)

• Maintaining
Improvement tree cutting that leads to big and glamorous individuals.

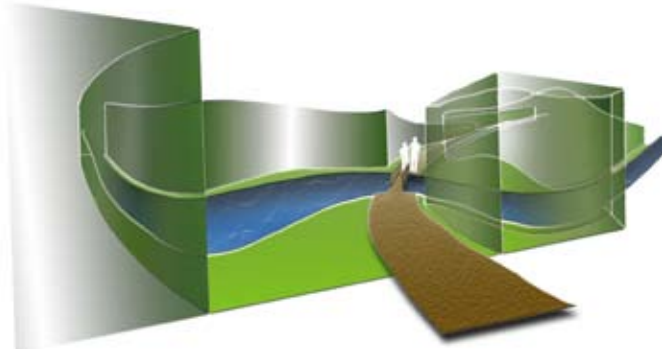
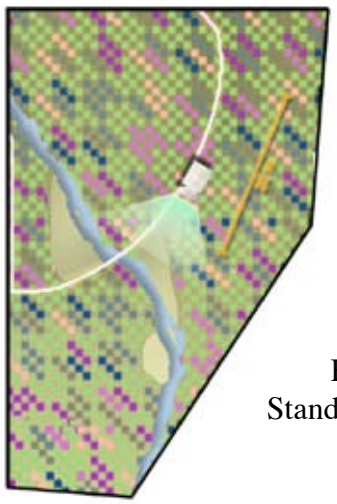


Figure 63: Narrow bridge that can make little social conflicts. Sloping path to right (or left) . Green transparent walls illustrate tree boundaries.

Figure 64 and 65: Map of stands A3 and C3. Mixture of many species. Viewpoint for figure 59 is on this map and also a cross section line, which may find in the appendix.



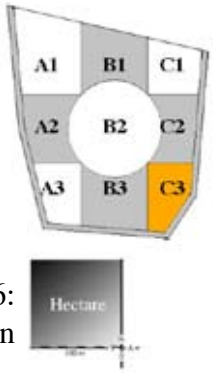


Figure 66:
Stands location

3.5.8 B2- Birch stand

The water plays the main role here but the main tree will be birch, all kinds of it.

• Design

The water stream will be structured in a slightly different way then in Alnarp. The elevation in Deildartunga is much steeper then in Alnarp and there fore it might be more difficult to force water to stay there. It should not be problem in the springtime but in summer and autumn it might.
Water is attraction for most people and it is there by relevant to have it in the middle of the Landscape laboratory and are the ponds this stands pride.

• Establishing

It will be the most open stand and only broadleaf will be there. Alder, willow, cherry and birch are the main species. Birch will dominate the southern part and will there be many experiments of many types of birches. The northern part will be mixture of alder cherry an willow. No rool is structured for the plantation.
(Plantlist in the appendix)

• Maintaining

It is important to have it open and welcoming for people. Cutting will then be taken cautions but with dynamic approach.

• The pride of stand B2

Two ponds will be established with a high difference in about half meter. Similar as in Alnarp they would have different character but unlike Väseterskog they would connect. But no one is suppose to see that directly. The corridor would be in overlayer so it would not have any affects on the pond, but it will be possible to walk over it. A path would lie there through and people could feel the water level difference and hear sound in small waterfalls “underneath” them. All around this corridor would grow reed and similar plants to hide the high differences even more. In the middle of this corridor, on a little islet would be planted ash (*Fraxinus exelcior*), and would it be a simple of connections; like Ash Yggdrasill connected universe in heathendom.
Possible problem might be to hold the water all year around in the pond and is it necessary to have that in mind when the pond is established.
The upper pond would be rougher then the lower one and have bank covered in vegetation like alder, willow and reed. The lower pond is more peacefully and enjoyable. Like the southern pond in Västerskog this would have alder along it with one, two and more stamps to fool the eye. The bank will be approachable and possible to bath possibly.

Figure 67: Two different ponds. The hart in the Landscape laboratory. Green transparent walls illustrate tree boundaries.

Figure 68: Map of stand B2. Random plantation of alder, willow, cherry and especially birches. Viewpoint for figure 63 is on this map and also a cross section line, which may find in the appendix.

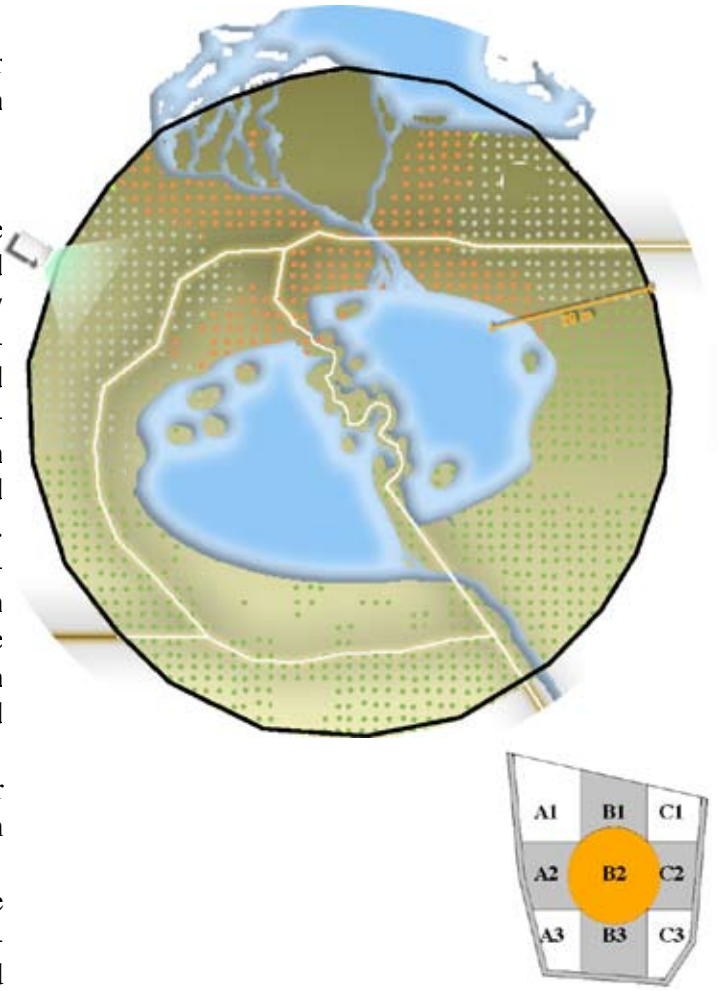


Figure 69: Stands location

3.5.9 B1- Alder stand

Viewpoint with Baroque affects and bridge over stream characterise this stand.

• Design
The idea of this stand is viewpoint, which is also the stands pride. The neighbor stands are both dense poplar stands, which give this stand a little open character. A little stream lies in the middle of the stand and split it partly into two pieces. Those two peace are divided in two other parts cause of the path. The east upper part is the smallest and has basically just willow (*Salix philicifolia*) and dwarf birch (*Betula nana*). The western upper part is the same whith common birch and silver birch extra. The lower are more similar but little bit more of alder is in the east and more of Common Osier (*Salix viminalis*) in the west.

• Establishing
Random and wild plantation but having in mind how different sizes these trees can become.
(Plantlist in the appendix)

• Maintaining
Improvement cutting.

• The pride of stand B1
The viewpoint is on a bridge wich will be in about one meter high from the average surface and so wide that two grown man can easily stand side by side. Handrail will be strong with the mountain horizon graved into it. People could then stop on the bridge and enjoy the view of the bridge. The view would be framed of the alder and willow. Little further (in stand B2) would be the birch stand and the pond, then the hemlocks with the bird sherry all around. In the further perspective could be seen the steam from the hot spring and finally the maintain horizon.

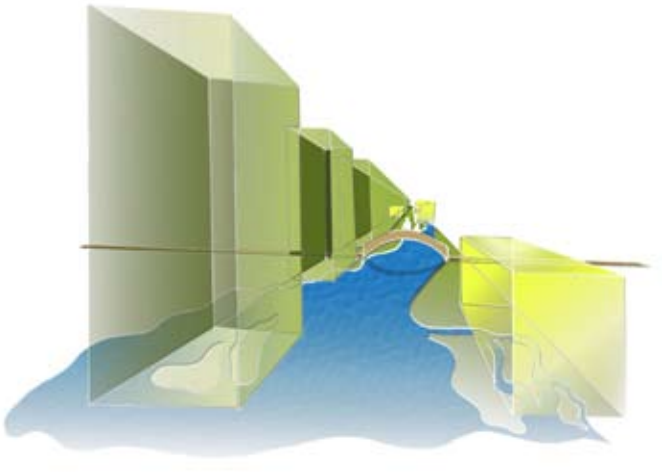
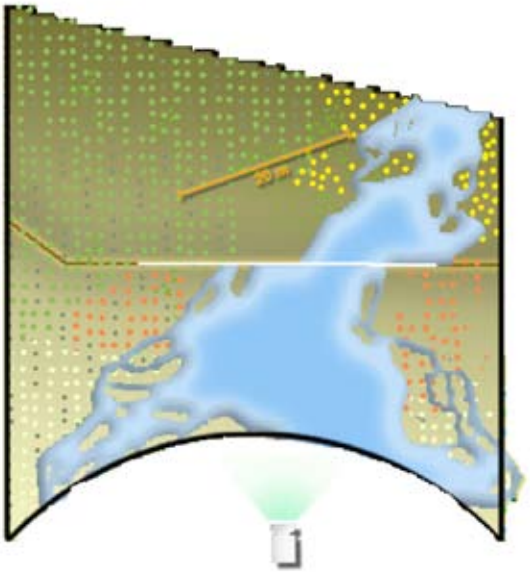


Figure 71: Viewpoint off a bridge. While standing upon the bridge it is possible to see the nature in many kind of perspective. Graved horizon of the mountains around will be graved in the handrail. The Green transparent walls illustrate tree boundaries.

Figure 72: Map of stand B1. Random plantation of alder, willow, and birch. Possible to divide this stand into four parts of different vegitation. Viewpoint for figure 67 is on this map.



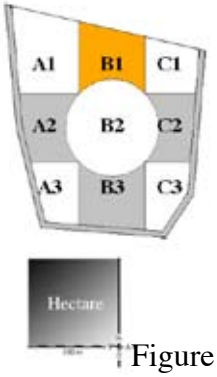


Figure 70: Stands location

3.5.10 B3- Pine stand

The only stand that have "no" similarities to the others. Quit open conifer stand.

• Design
Monoculture of pine. Three species has bean selected, one of them grows well in Iceland, but is not any sprinter, Lodgepole pine (*Pinus contorta*). The other ones are no sprinters ether, Western Hemlock (*Tsugahederophilla*) and English oak (*Quercus robur*). It is just a gamble if the oak survives but the hemlock should. It is planted from east to west so the pride can work as well as expected. In stand B1 is a viewpoint that can see all over. This stand will be in the middle of that view so this stand should be beautiful in the distance, with sculpturing pine and later on dominating oaks and hemlocks.

• Establishing
Step 1: The plantation is simple. Planted from east to west the Lodgepole pine with about 1 meter distance between.
Step 2: 10- 15 years later the stand will have improvement cut and one row will totally be waxed out and hemlock will be replaced of the pine. Then mixture of pine and oak, three pine and then two oaks, and then the final two rows will be completely pine. Then all over again.
(Plant list in the appendix)

• Maintaining
If there are any signs of living oak it is necessary to take good care of it and do not let the pine overcome it. Then the general maintain is better dens then open, at least the first 50 years. It is possible to earn some money by selling Christmas trees.

• The pride of stand B3
"Pillar tunnel". The path will lie straight east to west, like the plantation. In the middle of the path will be hemlock and around it will be dense pine. It is similar to Vesterskog (pictures nr 13 and 14 on page 10 an 11), except in this case it is only conifer.

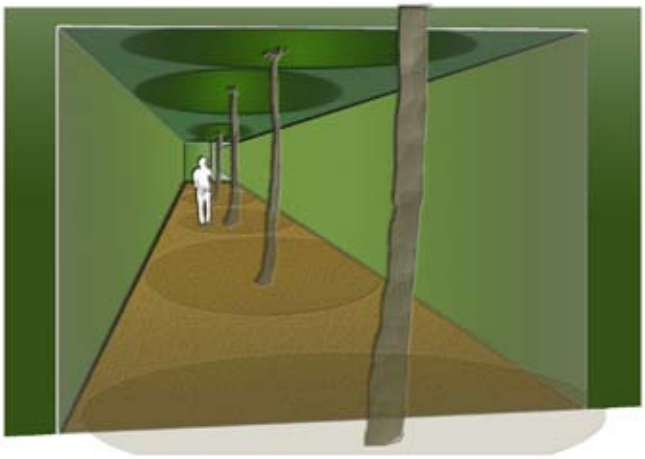


Figure 73: "Pillar tunnel" is a path witch has pruned trees in the middle of it. In this case hemlock is in the middle. Green transparent walls illustrate pine boundaries.

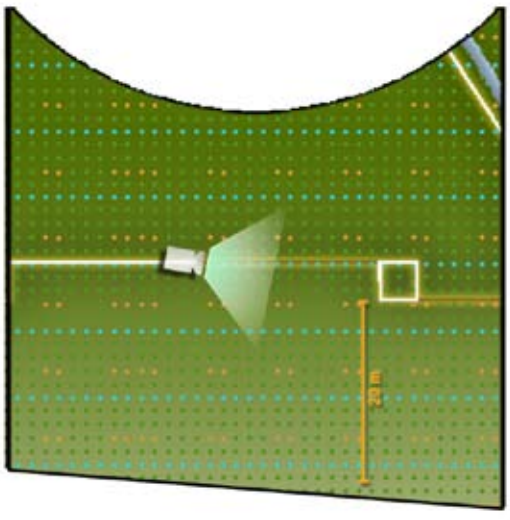


Figure 74: Map of stand B3. The first ten years this will be monoculture pine stand. Green dot is pine, blue is hemlock and orange is oak. Viewpoint for figure 69 is on this map and also a cross section line, which may find in the appendix.

Figure 75: Stands location

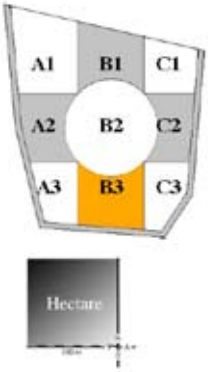


Figure 76: 360° horizon, whashed from stand B1

4 Discussion

A lot of questions have probably not been answered; maybe that is the whole idea?

Discussions about plant selection could last forever. Was it good selection, would it be better with more complexity or just to have it pure monoculture? That is certainly charming option to plant in two time steps, first a massive plantation and then after 10 - 15 years add inn some exotic ones. Maybe after 10 years or so, a new knowledge or new vision or even less or more money might come up with different direction? Roland Gustavsson warns about divide plantation into two or more periods (2007). The experience shows that the later period never comes, and the reasons for that are many; it will be forgotten, lack of time, new owners or what so ever.

The path system ides are very flexible. It might even have been better to not plan them at all and let the dynamic thinking approach take car of that.

How will the big picture look like? How will the forest policy for Deildartunga be later on? It is important to look at the big picture in all perspectives, from the project area point of view, view from the transport system, biodiversity point and more.

Now, this “Twin-Forest project” might be around the corner and it would be a strong action to established a website for that project. Even a genuine Landscape Laboratory website that’s combine Västerskog, Snogeholm, Holstebro and hopefully now Deilldartunga. It might be interesting to compare them and learn even more then just from one Landscape laboratory. Also it might be interesting do make a documentary film about it and all the others off course.

5 Conclusion

General population in Iceland is aware of increasing forestation in Iceland. The public opinion about forestry in Iceland is generally quit good, the author wants to maintain. So forest as a Landscape laboratory has a good raison d'être and the publics support, especially if it has recreational, biological, carbon dioxide holding, and recourses value. When Icelanders have occupy the slogan "Dynamic landscape", forest will earn, in a way, new validity, with similar reaction as Västerskog in Alnarp did, as a "People forest" and especially "Children's forest". Only 5 minutes away by car are two little villages, Kleppjárnsreykir and Reykholt. Many enthusiastic children live there as well as in all the Reykholt shire so the future might be quite bright for both young Creative managers as well as young Twin-forest. The possible alternatives are endless when it comes to Dynamic landscape. The ideas from Västerskog are just a foretaste of all the ides that are expected to become and they should never be taken out of the table at any time; simplest ideas can be the best as well as the silliest.

Threats and opportunities are many in Deildartunga, Iceland. It will be much more difficult to establish forest in Iceland then in almost any other part of Europe cause of the climate-, whether-, sunlight- and soil- conditions, but it has been seen that it is well possible. The project are is also well chosen considering Iceland. It is in a slope of about 1/10 meters so the groundwater moves rather fast as well as the stream water, it is unlikely to be frost very long on the ground and the slope lies towards south so it is more light from the sun then if it was on a flat land.

Using different kinds of tree stands strategies gives option for the future to have either complexity or simplicity of even little bit of both. The option is flexible and do not have to be detriment by the maintenance at each time.

This Landscape laboratory will be preaches alternative for all guests of Deildartunga's hot spring. It is not likely that this forest might possible become more famous then this biggest hot spring in Europe, although that is not the intention. On the contrary, it is to illustrate how two magnificent nature element can work with each other, and hopefully in the future, visitors, that come to see the magnificent shire of Reykholt, will decide to take a little turn to see the hot spring and have there lunch in the Twin-forest.

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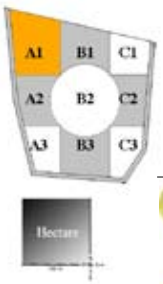
Figures

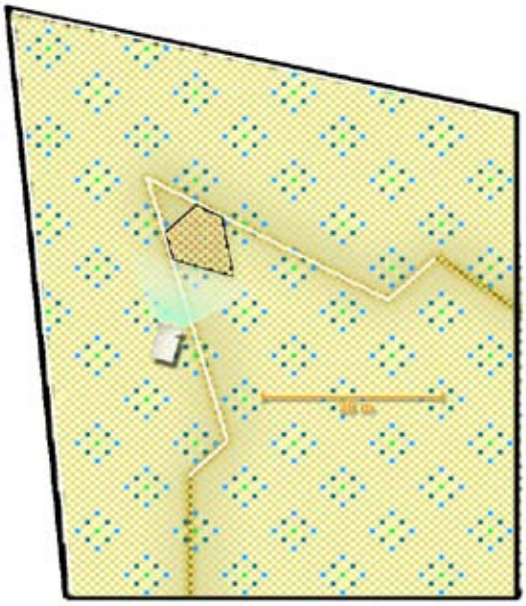
Figure that belong to Stefán Jónsson are: 38 and 41
Figure from the book Íslandsskógar (Blöndal, S., Gunnarsson, S.B. 1999 p. 7) is: 37
Figure from the book Att Forma Ett Rikare Landskap is (Folkesson, A. 1996): 6
Figures that belongs to Roland Gustavsson are following: 3, 4, 9, 13, 14, 18, 24, 25, 29, 30, 31, 36
All other figures belongs to the author, Hlynur Gauti Sigurdsson

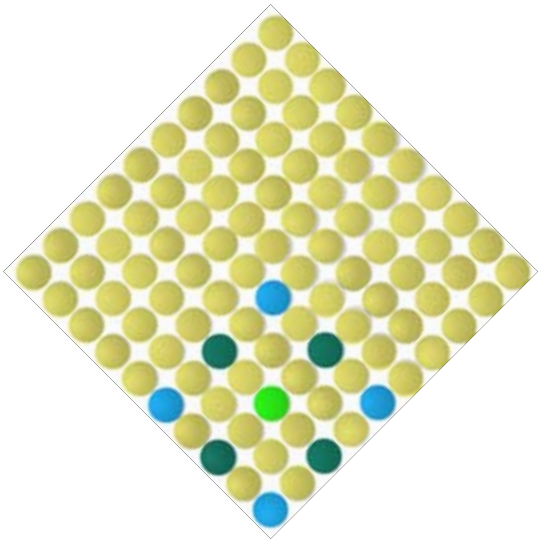
7 Appendix



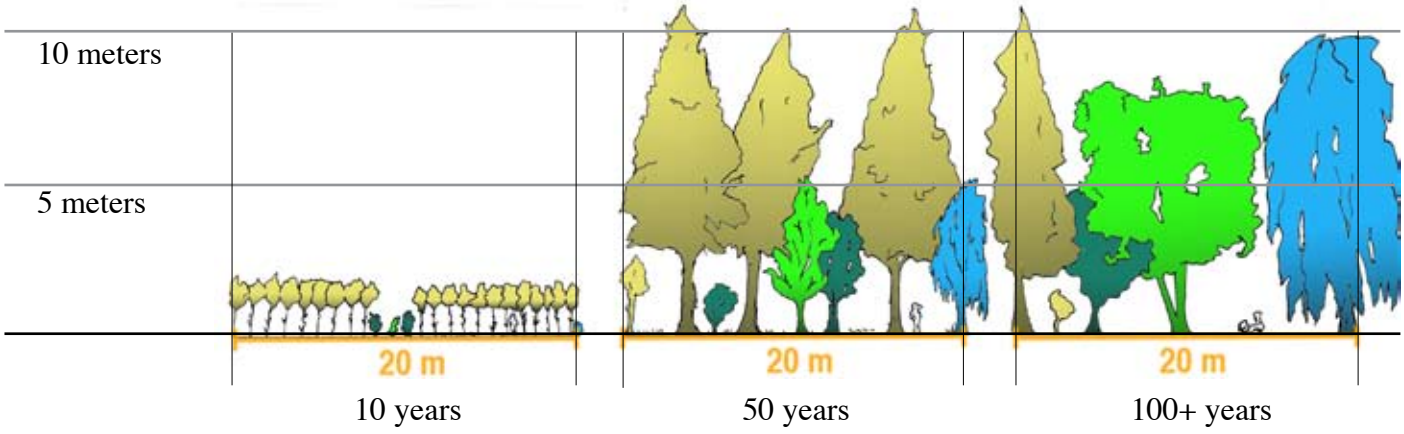
A1 -

	Language	Specie	Brief description
	Latin	*Populus trichocarpa*	Nurse tree. Tall and fast growing.
	English	Western Balsam Poplar	
	Icelandic	Alaskaösp	
	Latin	*Acer campestre*	Grows in north of Sweden.
	English	Field Maple	
	Swedish	Naverlönn	*In-planted after 10- 15 years*
	Latin	*Betula pendula*	Can grow in good shelter in Ice-
	English	Silver Birch	land, often used as nurse tree in
	Icelandic	Heingibjörk	Europe. *In-planted after 10- 15 years*
	Latin	*Tilia cordata*	Can grow in really good shelter,
	English	Small-leaved Lime	Normal in European forests.
	Icelandic	Linditré	*In-planted after 10- 15 years*

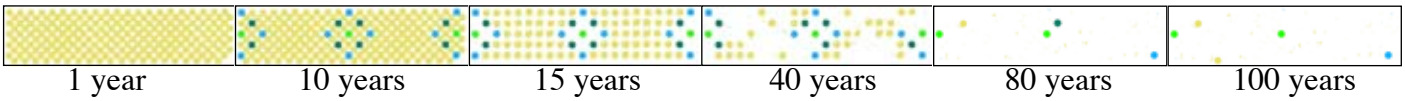


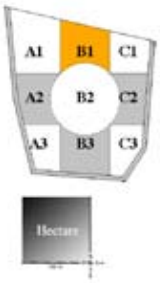


Cross section



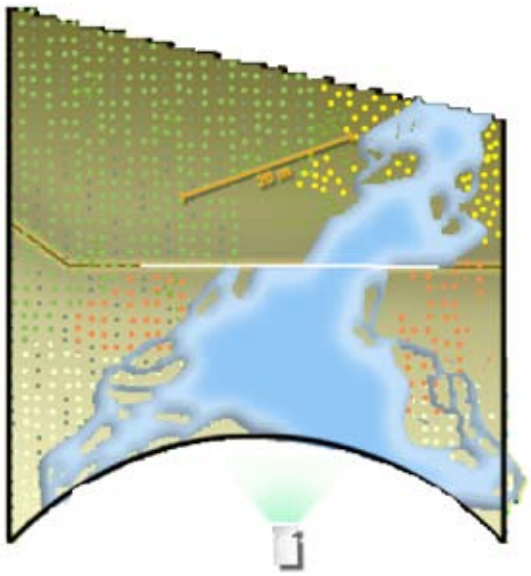
Possible cutting maintenance

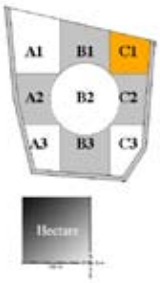




B1 -

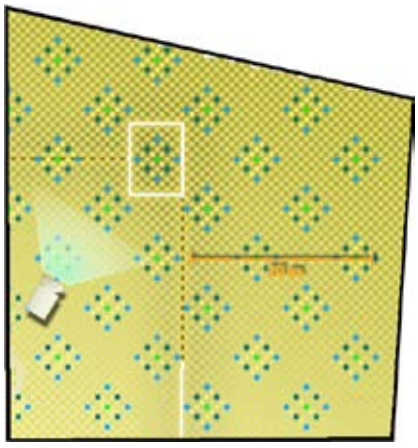
Language	Specie	Brief description
Latin	*Betula pubenscens*	Nurse tree. Most common tree in Iceland.
English	Birch	
Icelandic	Birki	
Latin	*Salix philicifolia*	
English	Willow	
Icelandic	Gulvíðir	
Latin	*Salix viminalis*	
English	Common Osier	
Icelandic	Körfuvíðir	
Latin	*Alnus incana*,	
English	Gray alder	
Icelandic	Gráölur	
Latin	*Betula pendula*	
English	Silver birch	
Icelandic	Hengibjörk	
Latin	*Betula nana*	
English	Dwarf birch	
Icelandic	Fjalldrapi	

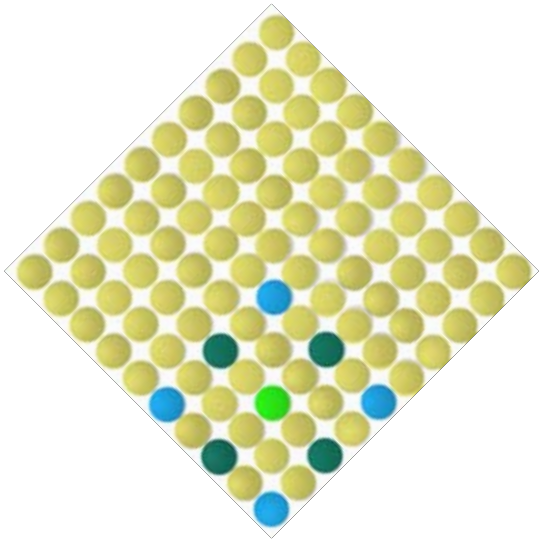




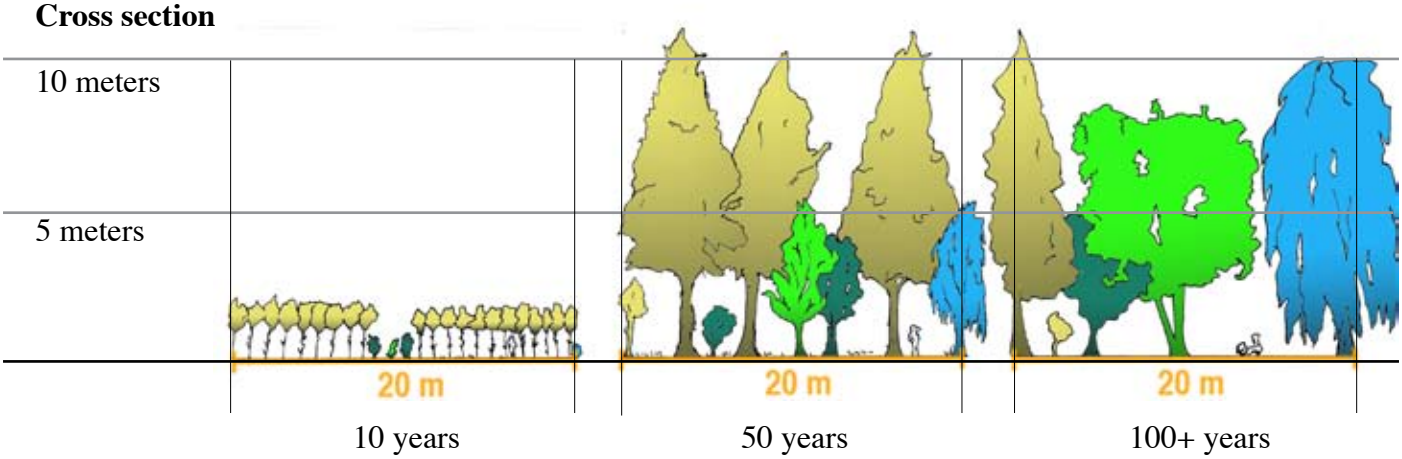
C1 -

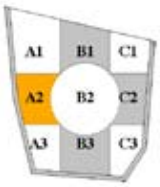
	Language	Specie	Brief description
	Latin	*Populus trichocarpa*	
	English	Western Balsam Poplar	
	Icelandic	Alaskaösp	
	Latin	*Carpinus betulus*	
	English	Common Hornbeam	
			In-planted after 10- 15 years
	Latin	*Betula pendula*	
	English	Silver Birch	
	Icelandic	Heingibjörk	*In-planted after 10- 15 years*
	Latin	*Tilia cordata*	
	English	Small-leaved Lime	
	Icelandic	Linditré	*In-planted after 10- 15 years*





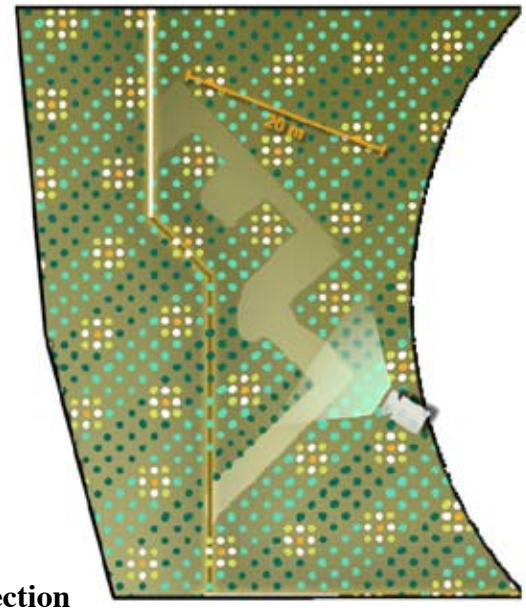
Cross section





A2 -

	Language	Specie	Brief description
	Latin	*Betula pubenscens*	Nurse tree. Most common tree in Iceland.
	English	Birch	
	Icelandic	Birki	
	Latin	*Picea engelmannii*	
	English	Blue Engelmann Spruce	
	Icelandic	Blágreni	
	Latin	*Picea abies*	
	English	Norway Spruce	
	Icelandic	Rauðgreni	
	Latin	*Sorbus aucuparia*	
	English	Common rowan	
	Icelandic	Ilmreynir	
	Latin	*Symhoricarpos albus*	
	English	Common Snowberry	
	Icelandic	Snjóber	
	Latin	*Acer pseudoplatanus*	
	English	Sycamore	
	Icelandic	Garðahlynur	*In-planted after 10- 15 years*



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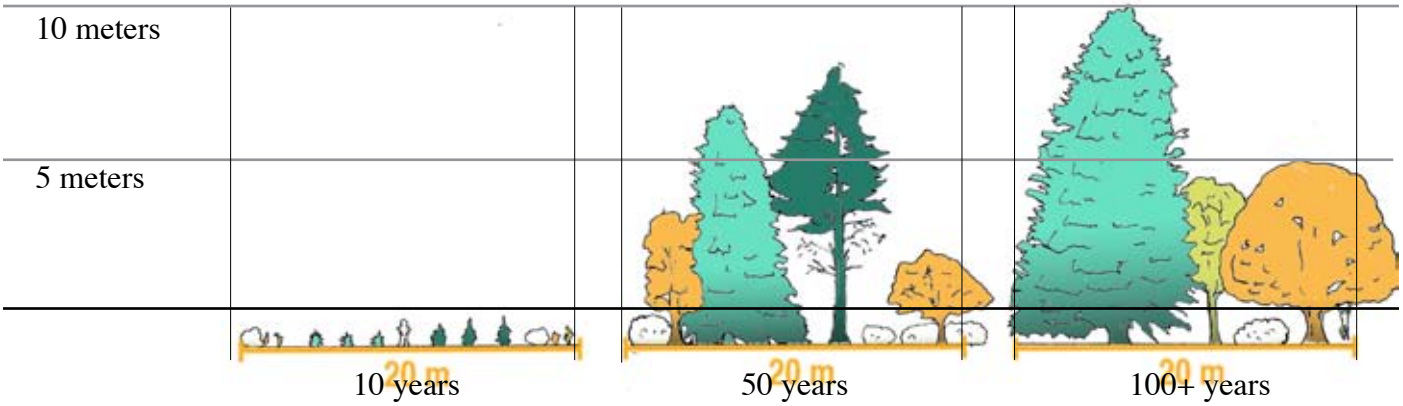
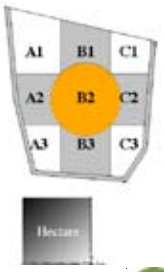
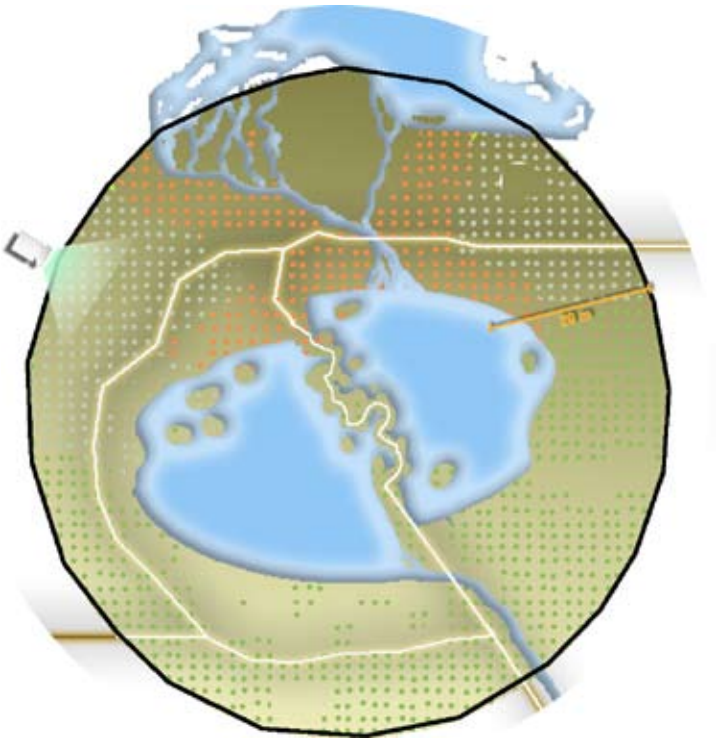




B2 -

Language	Specie	Brief description
Latin	*Betula pubenscens*	Nurse tree. Most common tree in Iceland.
English	Birch	
Icelandic	Birki	
Latin	*Alnus glutinosa,*	
English	Common alder	
Icelandic	Rauðölur	
Latin	*Prunus*	
English	Cherry	
Icelandic	Heggur	
Latin	*Betula*	
English	Birch	
Icelandic	Birki	



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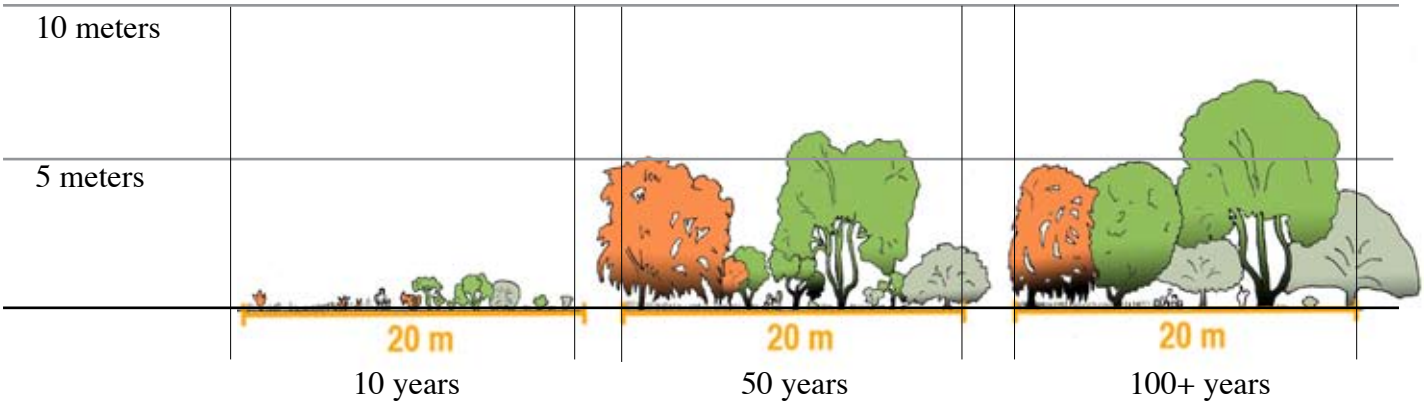
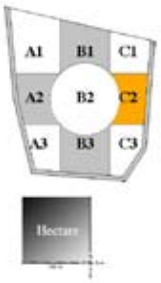
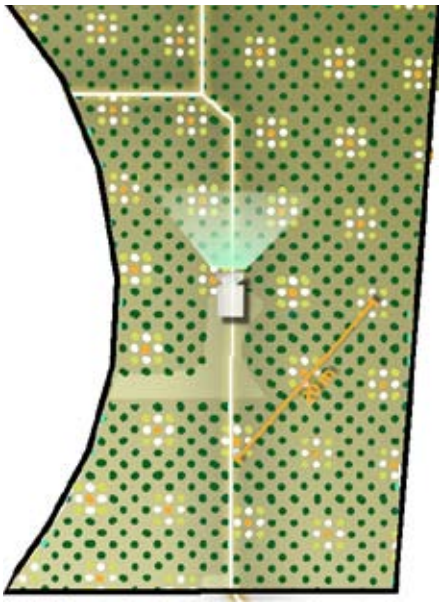
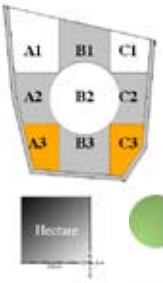




C2 -

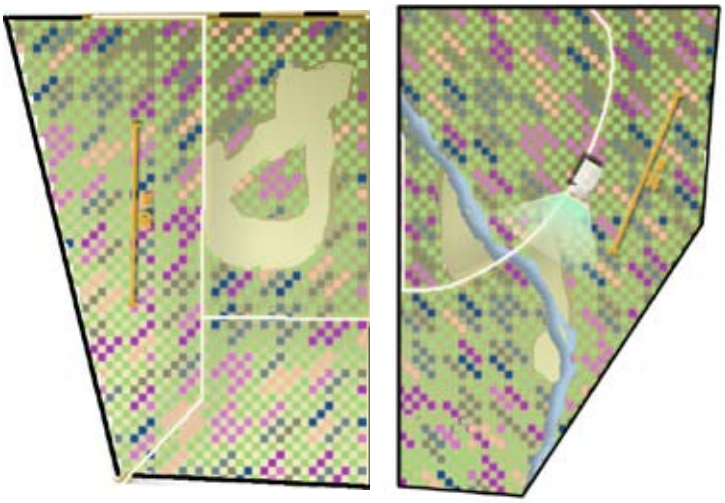
Language	Specie	Brief description
Latin	*Betula pubenscens*	Nurse tree. Most common tree in Iceland.
English	Birch	
Icelandic	Birki	
Latin	*Picea sitchensis*	
English	Sitka Spruce	
Icelandic	Sitkagreni	
Latin	*Sorbaria sorbifolia*	
Icelandic	Reyniblaðka	
Latin	*Sorbus koheneana*	
Icelandic	Snjóber	
Latin	*Acer platanoides*	
English	English Norway Maple	
Icelandic	Broddhlynur	*In-planted after 10- 15 years*

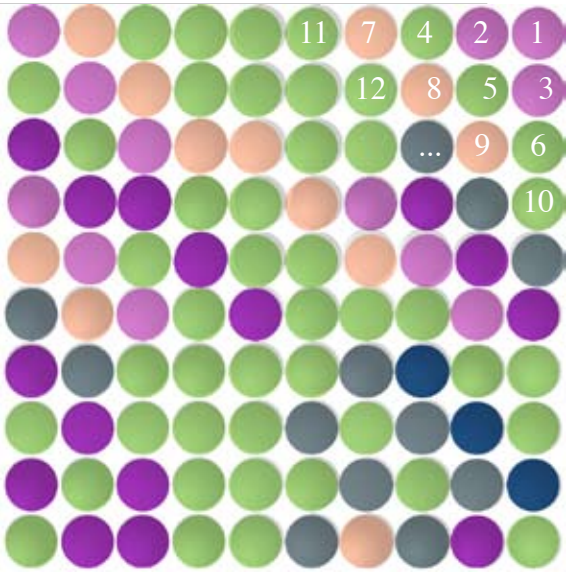




A3 - C3 -

Language	Specie	Brief description
Latin	*Salix borealis*	Nurse tree.
English		
Icelandic	Viðja	
Latin	*Prunus padus*	
English	Bird Cherry	
Icelandic	Heggur	
Latin	*Sorbus decora*	
English		
Icelandic	Skrautreynir	
Latin	*Sorbus mougeottii*	
English		
Icelandic	Alpareynir	
Latin	*Sorbus commixta*	
English	Japanese Rowan	
Icelandic	Fjallareynir	
Latin	*Sorbus intermedia*	
English	Swedish Whitebeam	
Icelandic	Silfurreynir	
Latin	*Sorbus hybrida*	
English	Finnish Whitebeam	
Icelandic	Gráreynir	





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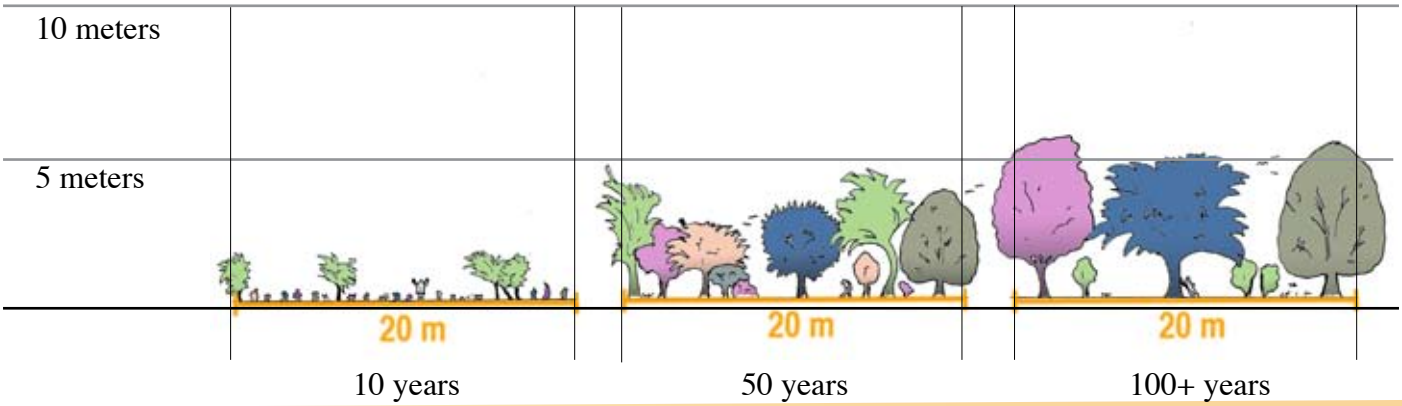
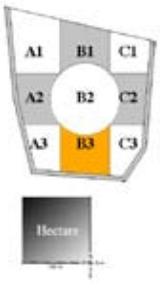
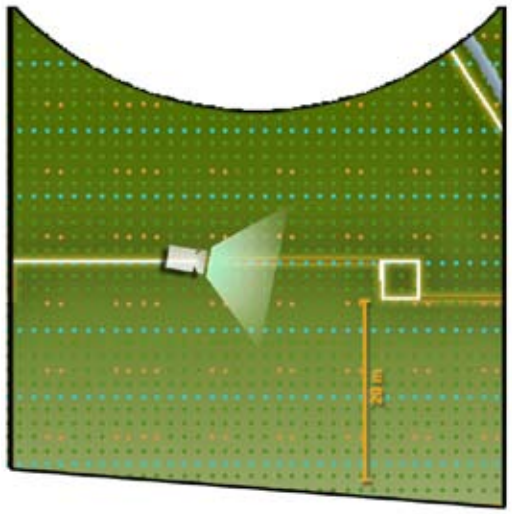
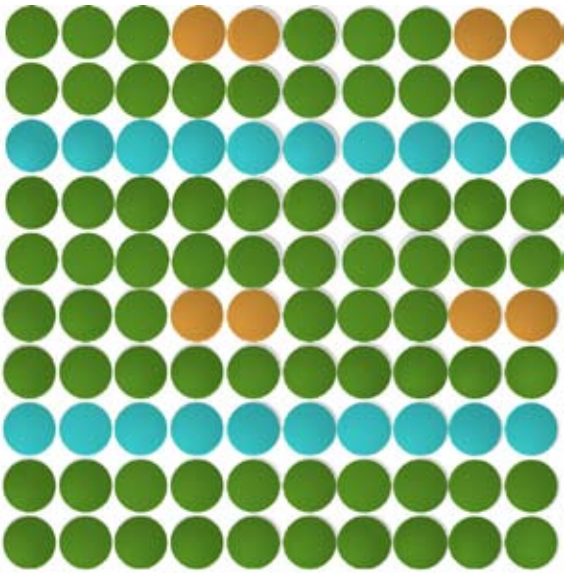




B3 -

Language	Specie	Brief description
Latin	*Pinus contorta*	
English	Lodgepole pine	
Icelandic	Stafafura	
Latin	*Tsuga hederophilla*	
English	Western Hemlock	
Icelandic	Marþöll	*In-planted after 10- 15 years*
Latin	*Quercus robur*	
English	English oak	
Icelandic	Sumareik	*In-planted after 10- 15 years*





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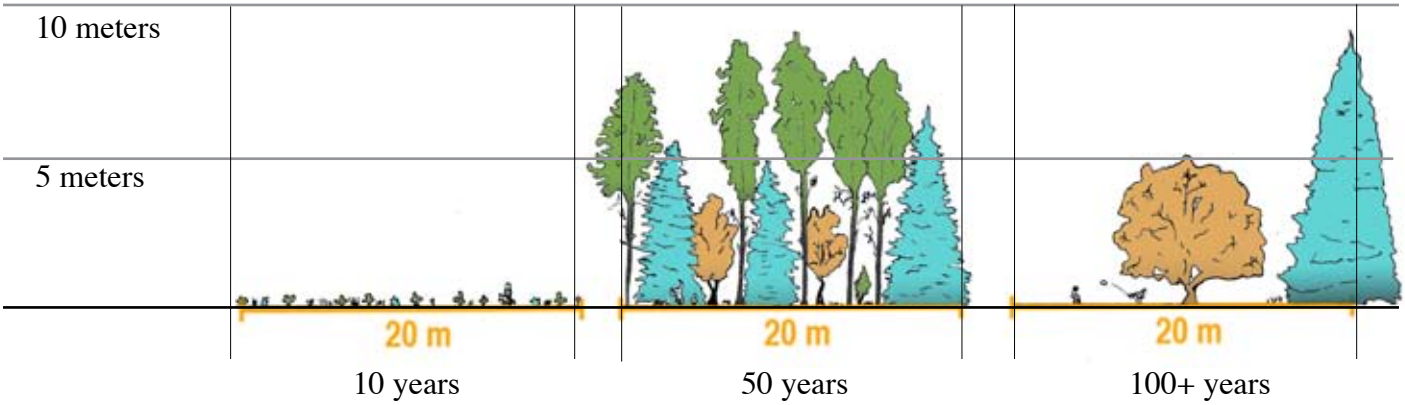

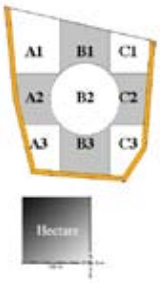

EDGE - Ideas of species selection

• Suggested species for the edge are fallowing.

Betula nana,
Crataeugus sanguinea,
Juniperus communis,
Laburnum alpinum,
Rhododendson catawbiense,
Ribes nigrum,
R.uva-crispa,
R. rubrum,
Salix arctica,
S. caprea,
S. lanata,
S. phylicifolia,
Sorbus koehneana,
Spirea japonica,
S. nipponica

Species that might be interesting to plant

Sometimes it is mention in what stand it "should" be in, the others are just general suggestion.

stand B2
Latin Fraxinus excelsior
English Common Ash
Icelandic Evrópuaskur

stand B2
Latin Betula ermanii
English Erman´s Birch
Icelandic

stand B2
Latin Betula mandshurica
English Japanese White Birch
Icelandic

stand B2
Latin Betula grossa
English Japanese Cherry Birch
Icelandic

stand B2
Latin Betula szechuanica:
English Sichan Birch
Icelandic

stand B2
Latin Betula utilis
English Himalaya Birch
Icelandic

Latin Ulmus glabra
English Wych Elm
Icelandic Álmur

Latin Fagus sylvatica
English Common Beech
Icelandic Skógarbeiki

Latin Syringa reflexa
English
Icelandic

Latin Syringa x prespniae
English
Icelandic

Latin Syringa wolfii
English
Icelandic

Latin Syringa yunnanesis
English
Icelandic

Latin Alnus trenuifolia
English
Icelandic Blæölur

Latin Prunus padus
English Bird Cherry
Icelandic Heggur

Latin Prunus avium
English Wild Cherry
Icelandic Fuglakirsuber

Latin Prunus maackii
English Manchurian Cherry
Icelandic Næfurheggur

Latin Prunus virginiana
English Choke Cherry
Icelandic Virginíuheggur

Latin Lonicera xylosteum:
English
Icelandic sve Skogstry
(p 178 Det Nye Landscapet)

Latin Viburnum opulus
English
Icelandic sve Skogsolvon
(p 178 Det Nye Landscapet)

Latin Nothofagus antarctica
English
Icelandic

Latin Cercidiphyllum japonicum
English
Icelandic

Latin Cornus sanguinea
English
Swenske Skogskornell
(p 178 Det Nye Landscapet)

Latin Corylus avellana
English Common Hazel
Icelandic Agnbeiki
http://www.simnet.is/borghveragerdi/treogrunnar.htm#c

These plants are just ideas for further Landscape Laboratories